WHAT DO THINGS DO IN POLICY?

DESCRIBING THE HEATING SECTOR REFORM IN POST-SOVIET RUSSIA

DISSERTATION

Presented in Partial Fulfillment of the Requirements for

The Degree Doctor of Philosophy in the Graduate

School of The Ohio State University

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2007

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ABSTRACT

Today, the notion of "right" institutions – ones that are democratic, pro-market and civil society-oriented - predominate conventional studies of democracy in post-communist countries. The focus is on the articulation or non-articulation of citizens' interests and their ability to influence the state and its decisions. For instance, while studying the city infrastructure and its post-Soviet transformations in current Russia, most analysts believed that changes in ownership or management style of housing maintenance and utility companies would result in the empowerment of citizens and the creation of civil society. Many studies, then, were developed to explore constraints that inhibit such progress. While this view captures many of the central problems of market and democracy building in Russia today, this study claims that such an approach should be corrected through an examination of the role of things in policy-making processes.

Employing the "actor-network" approach, it will argue that things do matter in analysis of democratic policy-making and explore the case of reforms in the administration of the Russian municipal sector. As in other sectors of the Russian

economy, the biggest changes included market-oriented reforms that proposed to make people liable for their apartments and common areas in multi-unit buildings. Residents, who have become owners of their flats after privatization programs, are now responsible for the maintenance of their buildings, yards, streets, cities, i.e., they are required to be more engaged in community affairs. While the program of reforms included many stages, one of the major steps was the introduction of market-oriented technologies such as water and heat meters that were expected to re-orient residents' incentives from collective to individual consumption of utility and housing services. It was claimed that, together with institutional changes, these new technologies would result in drastic changes in consumers' behavior.

However, this conventional account misses something important about local politics in the housing and utility sector – the technology itself. For most analysts, the implementation process evolves in a 'materially free' environment where the "right" technologies can successfully "teach" consumers to live in a democratic pro-market society. Focusing on financial requirements, they neglect several things including: (1) the everyday usage of technology in post-Soviet conditions, (2) the interactions of new technology with old elements of the network, and (3) the overall effect of new technology on the implementation of democratic and market policies across Russian cities. Most studies do not account for fact that technological innovations were introduced in the field with the already existing scripts of consumers' behavior and experts' power. How do old technologies that promote collective use interact with the new equipment that encourages individual consumption? What are implications of such a conflict for urban development in Russia? In this study, I will address these questions by studying changes in urban infrastructure in one Russian locality - the city of Cherepovets, Vologda region.

Dedicated to my parents

ACKNOWLEDGMENTS

I wish to thank my advisors – Trevor Brown, Anand Desai and Ted Hopf – for intellectual support, encouragement and enthusiasm which made this thesis possible and for their tolerance of my stylistic errors. I also thank my former advisors – Bert Rockman and Timothy Frye – for inspiring my research at early stages.

I am grateful to participants of the Academy of Finland's project "Self-Governing Associations in Northwestern Russia: Common Things as the Foundation for Res Publica" – Risto Alapuro, Oleg Kharkhordin, Evgenia Popova and Olga Kalacheva – for discussing with me various aspects of this thesis. I am indebted especially to Evgenia for sharing all the difficulties of field trips in Cherepovets and for providing constant intellectual stimulation. Without her support, this research would not have been possible.

I also thank Sarah Wilson Sokhey and Eva A. Baker for their help in proofreading of my dissertation.

This research was supported by the Academy of Finland (grant #208170) and by the Edmund S. Muskie Ph.D. Fellowship Program, a program of the Bureau of Educational and Cultural Affairs (ECA), U.S. Department of State under the authority of the Fulbright Hays Act of 1961 as amended, and administered, by the American Councils for International Education: ACTR/ACCELS (American Councils). The arguments presented herein are the author's own and do not necessarily express the views of the Academy of Finland, ECA, or the American Councils.

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CHAPTER 1

INTRODUCTION

On the morning of January 1, 2003, a very cold day, residents of Tihvin, the small town in the Northwestern part of Russia, woke up in deadly frozen apartments. A series of heat system disconnections were caused by severe low outside temperature that dropped below – 40° Celsius (- 40° F) before New Year Day. Around 75,000 people were left without hot water and heat. Even though the government took prompt actions to restore the city's heating networks and in-house pipes, the work was not completed until February 13, 2003. During December 2002 and January 2003, 20,000 residents in St. Petersburg and the residents of 40 localities (that is about 10,000 people) in the Republic of Karelia were left without heating supply: "The savage weather cooled seasonal celebrations, if not quite putting them on ice. With just 10 minutes to go before the New Year and with the temperature outside at 45 below zero, the town of Muezersky in Karelia found itself without electricity, heat, and water. Nineteen apartment blocks housing 600 people, a hospital, and two hotels were affected" (Borisov 2003). Similar reports came in from other parts of the country, where because of very cold climate, heat is "a matter of life and death" (Collier 2004, 52).

In Russia there are 2940 cities with an urban population of 106 million and 155,288 settlements in rural areas with 39 million people. Centralized heating systems serve 80-92% of urban residents and 20-41% of rural residents, that is, about 63% of the total population (Goskomstat 2002). What had gone so wrong with the heating systems in the country during the last years?

Highly visible and dramatic activity of the Russian heating networks in this year stood in stark contrast to its prior 'behavior.' According to some data, the number of breakdowns of heating networks in the country had increased from 175 incidents in 2000 to 192 cases in 2002 and 241 cases in 2003. During the winter of 2002-2003, there were 75 cases of serious emergency damages in 38 Russian regions, where the heating supply was disconnected in 4,000 houses with around 350,000 residents (Starcheva 2003). As the Federal Government data indicates, during November 2002–March 2003 there were 1049 big and small incidents with heating networks around the country. The largest number of incidents occurred in the Volga (36.2% of all cases with 650,000 people left without heat and hot water), the Northwestern (30.8% of all cases with 886,000 involved people), and the Far East Federal Districts (11.1% of all cases with 140,000 people) (Minenergo 2003). These numbers continued to increase quickly during 2004-2007 (Nezavisimaya Gazeta 2007; Vokryg sveta 2007).

During the very cold winter of 2003, the "normal" operation of heating technologies had broken down somehow, and what many Russian politicians and journalists called a "heating disaster" or "community catastrophe" ensued. What are the reasons for this technological disaster in the country? What factors can be blamed for broken pipes and frozen citizens?

Satisfactory answers to such questions have both practical and theoretical implications. Most previous studies have already discussed changes in the heating sector by focusing on politics at the federal level and have neglected local level factors. This dissertation will explore factors overlooked by the existent research, and explain ongoing technological reforms in the Russian heating supply networks in a single locality. The analysis of these changes in a selected Russian municipality will shed light on the chances for carrying out meaningful utility reforms in other places -

by analyzing the local context for such changes and by suggesting useful lessons for practitioners. The exploration of the role of engineering infrastructure in policy-making will also contribute to our understanding of the determinants influencing the successful reform of utilities at the grass roots in Russia and to an explanation of a more general puzzle – how the everyday operation of technology affects the outcomes of decision-making.

State-of-the-art of research on the heating sector reforms in Russia

As a starting point, it will be useful to review the findings of the existing studies, which explore the main reasons for the heating disaster in Russia. It should be noted that overall, changes in the administration of the municipal sector, including the housing and utility sector,[1] are not very popular topics among scholars of Russian politics and public policy. As some scholars of regional Russian politics argue, "local government is often viewed as the 'backyard' of 'Big Moscow Politics'" (Gelman 2002, 496) and is not considered to be an attractive research subject. While this trend is slowly changing, there is still a tendency to focus on transformation at the federal level. Even studies that investigate local changes concentrate mainly on aggregate data and ignore the details of changes in specific localities. For example, the reports of the World Bank (2003) and the United Nations (2004) mention the experience of several Russian municipalities but leave out the details of reforms in the utility sector.

Main arguments: The major explanation for the puzzle of the heating disaster suggested by most studies is the lack of funding to reconstruct old Soviet heating supply networks. In general, financial resources are a prerequisite for changing existent systems, which often requires intensive financial and human investments: "Money is a threshold resource for any public policy program" (Rose 1993, 130) (Rose 1993). This is especially true for technological reform in the housing and utility

[1] One of the main features of Russian municipal sector management is the interweaving of the housing and the utility sectors. In Russian, this sector is called *zhilizhno-kommunal'nyi sektor* (housing and communal sector) or *zhilizhno-kommynalnoe zhozyaistvo* (housing and communal economy).

sector: "Public financing for housing has decreased dramatically and is currently clearly insufficient. The total amount spent on capital investment and maintenance and repair in the housing sector during the past decade has been far too low to prevent the housing stock from decaying… The Government needs to actively seek out funding options to prevent the stock from decaying further" (United Nations 2004, 13). **Two factors** are cited as the main reasons for the current lack of funding in the sector:

1) The first factor is **the legacy of Soviet central planning system**. As some scholars argue, the Soviet planned system promoted the universalism of heating services and did not build cost recovery mechanisms into the technology (Lampietti and Meyer 2003; Nachional'nyi Doklad 2002). In the Soviet Union, infrastructure services were universal for most residents in many urban and some rural areas. When in 1950-1970s centralized heating systems were developed throughout the country, heat and a hot water supply quickly became an obligatory part of everyday Soviet life. Today, approximately 80% of the urban population lives in apartments that are equipped with hot water radiator heating systems where the heat and hot water are supplied from an external source – either heat and power combination plant or heat-only district boiler-house.[2] Users of this heating system have no influence over when and how much heat is produced for they do not have shut-off valves on individual radiators and meters to calculate their heat consumption. However, residents do not object to the lack of control over individual heating bills for they pay relatively small charges[3] for this service, They are partially confident that hot water will be provided for a whole year and heat would be provided as soon as outside temperature are below 8° Celsius for at least five days. They can also assume that every room in the apartment will be heated to at least 20° Celsius most of the time during heating season – from October to May in most Russian localities (Lampietti and Meyer 2003, 5-6).

[2] Heat and power combination plants and boiler-houses are two of the main heating sources that produce 71.5% of heat in the country. Within this group, combined heat and electricity stations generate 29.3% and heat-only boilers produce 53.9% (Fedyaev and Fedyaeva 2000; Minenergo 2002).

[3] In Russia as in the USSR, these charges are called *tariffs*, the target price for a service set by the relevant public authority.

As some studies conclude, with low cost-recovery charges for the end-consumers, the Soviet-type heating system is left without sufficient financial support and is doomed to endless damages and destruction (Kara-Murza and Telegin 2004).

2) The second factor is the **re-organization of federal-regional fiscal relationships**. During Soviet rule, like in almost all sectors of the economy, the operation of the utility sector was based on cross-sectoral subsidies where industrial enterprises covered the largest part of expenses for heat production and residents paid only a small share of these expenses. In the early 1990s, the Russian federal government transferred traditional state social programs (like health care and utility production) to local governments (Heatley et al. 1999). Where previously heating services were produced by local enterprises, today the district heating systems are owned by the municipalities and operated as municipal services by departments of the local governments. In addition to transferring services, the federal government also pursued fiscal centralization. In particular, all taxes collected at the local level are first sent to the regional and federal centers, and then later on redistributed to localities. Municipal budgets continue to be highly regulated by federal laws that limit local autonomy in determining the volume and structure of the provided public services in the area. In general, municipalities only have control over about 4-5% of their revenues (Chernyavsky 2003). In the early 2000s, municipal budgets were responsible for 32% of the overall expenditures in Russian consolidated budget and received only about 17% of the total revenues (Gelman 2002; Kirkow 1997).

Due to the lack of the full cost-recovery mechanisms and current pattern of federal funding, the major problem at the local level is an interruption in the supply of public utility services to the residents. As many studies demonstrate, the costs associated with urban engineering networks are one of the biggest items in municipal budgets.[4] It is about 20-60% of local budget expenses[5] and 4-5% of the GDP on a

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[4] The survey conducted around Russian towns in 2003-2004 by the Institute for Urban Economics (2004) (a survey of heads of municipal administrations in 217 cities of different sizes, localities and status – including the region's capital, townships in the region, etc.) indicated that 70% of city heads cited the housing and utility sector as the most pressing problem. Expenditures on the housing and

national level.[6] Due to the lack of money in local budgets, these expenses are left uncovered almost everywhere. As previous research demonstrates, at the end of 2002 Russian utility companies were 2.3 billion rubles short every month. Of this deficit, unpaid households account for 22% and the remaining 78% was due to non-payments from the local budgets (United Nations 2004, 93-94).

Under-financing of the sector results in a lack of maintenance of district heating systems. In many places, water pipes have been in operation for 40 to 50 years – well beyond their working standards of 16 years. Pipe breakdowns became more frequent and resulted in shutdowns for repairs. Living without a hot water supply initially for two weeks and later on for the entire summer, has quickly become the norm for residents of many Russian localities. As some scholars estimate, about 70% of heating pipelines (in total about 202,000 km of pipeline) need to be replaced in the near future (Glazunov 2003; Semenov 2003; United Nations 2004).

Given such poor condition of the existent infrastructure, construction of buildings with new types of pipes, meters, and other energy-saving methods appears to be the best option for many localities to solve current utility problems. However, the United Nations report estimates that even if new construction rates returned to their 1990 level (the current rate is only about 40% of the volume of 1990), this would still only result in a 2% annual increase in the new housing stock. Therefore, the main problem for Russia now is rehabilitation of the old, Soviet-type housing and utility systems (i.e., to maintain in good condition the existent housing stock that will

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utility sector are followed by financial and economic problems, such as budget deficit (59%), lack of investments (46%), and depreciation of fixed assets (48%) (Institute for Urban Economics 2004).

[5] Exact data is not available. The World Bank report states that it is 20-30% of annual local budgets. The United Nations report claims that it is 40-60% of all municipal expenses. In Moscow, for instance, in 2002 expenditures on housing services were about 1/3 of the city's budget (United Nations 2004; World Bank 2003).

[6] Like with other data about the housing and utility sector in Russia, exact data are difficult to obtain on aggregate subsidies to housing rents, subsidized utility costs, and subsidies to new construction (United Nation 2004). Only microeconomic evidence from a few surveys is available, which suggest that direct budget subsidies are 4-5% of GDP, including expenses on utility services and housing maintenance (3% of GDP), cross subsidies (1% of GDP) and direct subsidies to residents (about 1% of GDP) (Freinkman 1998; United Nations 2004).

constitute the bulk of Russian housing and will still be vital for the survival of most Russians for many years to come) (United Nations 2004, 6, 14, 33).

Conventional policy recommendations: Rehabilitation of the aging system requires major investments. Thus, for many analysts, finances appear to be a necessary condition to repair broken technologies and maintain their future operation. Many reports conclude with the recommendation that Russian localities need financial resources to support the local heating system and implement corresponding building-based efficiency measures (Freinkman 1998; Lampietti and Meyer 2003; Minenergo RF 2002).[7] The cost of improving buildings' internal facilities was estimated to be $200-400 per apartment (overall, in the country there are approximately 55 million apartments, 11% of which needs urgent renovation) – e.g. for control and metering equipment installation, new piping and radiators, window and door repairs, roofs and wall insulation), depending on the size and the age of the building (Nachional'nyi Doklad 2002). It is expected that such methods will reduce heat loss and therefore the total volume of heat supplied for houses (e.g. meters are estimated to cut heating expenses by 16% and hot water supply expenses by 67%) and correspondingly, ease local budget and households' expenses on heat and hot water. The exact costs of improving the centralized heat supply in a single locality are very hard to calculate for there is no consistent data about the heating sector at the local level. As the Russian

[7] There are also a number of radical recommendations to solve the heating problem in Russia, including shrinking frozen cities. For example, Fiona Hill and Clifford Gaddy (2003) argue that by simply rejecting heat as a state supported service (especially for residents in cold and expensive to heat regions such as Siberia), Russia can achieve sustainable economic growth. In their book, they review the history of failed market reforms in the country and argue that Russia's geography and history have locked it into a dead-end path to economic ruin. Russian's greatest assets – its gigantic size and Siberia's natural resources - are now the source of one of its greatest weaknesses. For seventy years, driven by ideological zeal, communist planners forced people to live in Siberia. After the Soviet Union disintegrated, tens of millions of people and thousands of large-scale industrial enterprises now languish in the cold and distant places communist planners put them. Many current Russian officials still believe that an industrialized Siberia is the key to Russia' prosperity. As a result, the country is burdened by the ever-increasing costs of subsidizing economic activity in some of the most forbidding places on the planet. As Hill and Gaddy argue, Russia pays a price for continuing to support Siberia – it wastes the very resources it needs to recover from the communist past. Their recommendation is very unusual – Russia should throw off this legacy, shrink Siberian cities and facilitate the relocation of population to western Russia, closer to Europe: "Downsizing Siberia will be a costly and wrenching process. But there is no alternative. Russia cannot afford to keep the cities left by communist planners out in the cold" (Hill and Gaddy 2003, 345).

government estimate indicates, the approximate price for the replacement of one kilometer of heating pipeline is 5.3 million rubles (in 2002).[8] Overall, in the country, there are 200,000-250,000 km of pipes, 70% of which requires major modernization (Minenergo RF 2002).

The required money for technical upgrading is supposed to be received after implementation of market policy in the sector, that include two main components (Renaud 1992; United Nations 2004; World Bank 2003):

1) Financial and institutional changes (a) *legal and institutional reforms* (clarification of the public sector role, introduction of competition among heat producers and housing companies that are responsible for the maintenance of housing stock in the country, privatization in the sector, competitive bidding for maintenance, and reallocation of the housing stock) and b) *tariff and regulatory reforms* (restoration of meaningful, full cost-recovery, pricing; improvements in utility regulation and restructuring of monopolies);

2) Technological changes - installation of new, market-oriented and energy efficient technologies (like heating meters and automatic heat exchangers) are expected to result in changes in consumers' behavior and increase profits in the sector: "Metering of heat and water consumption would facilitate the introduction of appropriate pricing and strengthen incentives for energy efficiency" (Freinkman 1998, iii). For instance, the "right" technologies, like heat meters, are expected to impose market discipline on end-users who will be forced to rationally calculate their expenses on heating and hot water services and be frugal with their consumption - shut off heating when leaving the house, implement energy-saving measures in their apartments and so on.

Limitations of the conventional argument: Obviously, money is a precondition for reforms, given the financial requirements of technological changes. However, are financial resources both a necessary and sufficient condition to assure

[8] It costs about $171,000 per one km of networks (1 USD = 31 ruble). According to other sources, this is an underestimated cost of replacement. The real price is stated to be about $300,000 per one km of heating supply networks (Kara-Murza and Telegin 2004, 163).

technological reform? Do financial resources alone predestine the fate of Russian urban engineering networks?

As one review of heating reforms in the country claims, “money does not mean instantly restored pipes and boilers” (Kara-Murza and Telegin 2004, 172). A lack of funding can be the necessary but not sufficient explanation for technological reform at local level. Various Russian townships have raised funds to change the local heating infrastructure. However, the outcomes of the implemented changes vary across and inside cases. While one locality can spend money to install new technological facilities, another city may waste new resources for superficial short-term repairs of the old heating system until it breaks down again in the future. As one resident of a Northwestern locality indicates, “Whether the city has money or not, it does not really matter. I have traveled a lot around the country and have witnessed the poor quality of utility services in very rich Russian cities. Say, Nefteyagansk… yes, it is a center for the oil-company Yukos… yes, it is very rich town, and still… they do not drink water from the tap. Everybody buys bottled water and drinks only that. When you are taking a shower there…. well, it is a strange feeling of dirty water. You want to take a bath again after such a shower!” (Representative of the local administration. Personal interview. Cherepovets. Spring 2005).

Given previous studies demonstrating the importance of financial resources, money is clearly an important factor in explaining technological reforms across Russian localities, for one case can be a rich city that is able to invest in heating supply networks, while another falls into a group of poor localities with no ability to reconstruct technologies. However, as some studies demonstrate, budget capacity has little relation to the percent of city’s budget expenditures in the utility sector. Using budget statistics from 79 Russian cities from 1999 through 2001, Chernyavsky (2003) evaluates the validity of the argument that in the case of underfinanced spending on the housing and utility sector, an increase in municipal budget revenues will lead to an increase in housing and utility spending. Instead, correlation analysis demonstrates a negative relationship between these parameters (Chernyavsky 2003, 32). As this study concludes, other factors, such as the physical condition of the housing stock, the volume of private housing versus public housing, and the percent of population below poverty level can affect investment decisions in the housing and utility sector. Another survey of city officials conducted by the Institute for Urban Economics demonstrates that the lack of money is not the sole reason for the current poor state of the housing and utility sector.[9] Poor management and the lack of professional specialists were cited as additional factors (Institute for Urban Economics 2003).

Even inside a locality with sufficient financial resources, the results of technological changes can vary from one project to another. While one technological project can be successfully implemented and result in the improvement of utility services, another fails (Kara-Murza and Telegin 2004). A new technology can be installed, but will be ineffective in the overall urban engineering network. As some studies demonstrate, the heating meter is one example of this. The installation of the heating meters is claimed to be an indicator of implementation of market reforms in the housing sector. This new technology helps the end-user to acquire self-discipline for they become empowered to calculate their heat consumption. However, this new technology proves to be useless because residents cannot control heating consumption on the level of individual apartment units equipped with radiators without control valves (Kara-Murza and Telegin 2004, 235-253).

In addition to financial resources, what other factors influence the outcomes of technological reforms across Russian localities?

Research questions

Despite the significance of heating services in cold Russia, very little research exists in the current literature on heating policy in different Russian localities. While there are thousands of publications in newspapers and a number of academic studies that analyze heating reforms at federal level (Bates 1996; Ebel 1994; Kennedy 2003;

[9] The question was whether the low local tariffs for utilities were the main factor of deteriorating networks. Most respondents answered negatively to this question (Institute for Urban Economics 2003).

Opitz 2000), there is a lack of scholarly analysis of trends in the utility reforms at the local level. Even the central questions have eluded satisfactory answers:

Given that money is not a sufficient explanation, what else explains heating accidents around the country? Why do some Russian localities succeed in market policy implementation in the sector while others fail? What explanations of implementation outcomes do different conceptual models suggest?

What explains variation in heating reform within municipalities? What technical factors enable or disable the effect of policy actions in the heating sector? Why do certain technological changes succeed in transforming the operation of the heating network, while others strategies fail?

What lessons can be derived from local experiences to reconstruct heating networks and install new, market-oriented, technologies? What does the experience of successful cases teach us about urban technological policy in current Russia? What insights do they suggest about the role of technological artifacts in urban policy-making? How can we conceptualize this role and how can we study it empirically?

In the analysis below, two models will be employed to answer these questions – a conventional implementation approach and an actor-network theory. Each framework suggests a unique way to tackle the problem of current heating damages across Russian localities by advocating a specific vision of the reform process and by asking distinctive research questions about successful and failed cases. The conventional model proposes an excellent way to explore the implementation of institutional and financial sub-programs of market reforms in the sector. It focuses on the behavior of implementing actors and the peculiarities of the implementation context as the most important variables, which explain variation in policy outcomes across localities. As it argues, because the city's administration was afraid to implement a painful 100%-tariff policy on residents or because the communication was broken between different levels of government, the destructive damages on heating networks was ensued in some Russian cities.

While the implementation model is concerned about financial constraints, the alternative approach, the actor-network theory, is mainly interested in the implementation of the second sub-program of market reforms in the heating sector – the technological innovations. It employs in-depth analysis and tries to understand different effects of the new heating equipment installed currently across different places in Russia. This model also focuses on issues of everyday usage of new technology in the locality and relationships between technological factors and policy decisions.

As this study will demonstrate, because each model suggests a unique overview of the reform process in the country, only their concurrent application can suggest a more complete account about current modernization in the Russian heating sector and lead us to a fuller understanding of the role of technological artifacts in urban policy-making.

Organization of the dissertation

The following five chapters will try to answer the above research questions. Chapter 2 will present a research framework. It formulates research questions and reviews possible analytical models for explanation of technological reforms in current Russia. Chapter 3 will discuss the methodological framework of the study. Chapter 4 will describe in detail the first framework – the implementation approach - for analysis of reforms in the Russian heating sector. It will also apply this conceptual lens to explain the operation of heating utility in a single case - the city of Cherepovets, Vologda region. Then, chapter 5 will discuss an alternative frame of the analysis – the actor-network approach and demonstrates its application to the same case study. Chapter 6 will summarize the main differences between the two frameworks presented in the study, and discuss their policy recommendations and analytical limitations.

Such a structure will allow me to achieve the ultimate research goal by addressing the research problem from different frames of reference to probe more deeply into the case and demonstrate "how alternative conceptual lenses lead one to see, emphasize, and worry about quite different aspects" (Allison 1971, v) of the case in question.

CHAPTER 2

THEORETICAL FRAMEWORK

When we are puzzled by urban governance, the main issue is typically specific factors that explain the variation in outcomes of the implemented policy or the provided public service. That raises obvious research questions: Why did one policy succeed and another fail? In pursuing the answers to these questions, the analyst usually seeks to discover why a specific policy outcome came about rather than another. For example, for the case of heating policy in different Russian locations, the analyst would study the reform process, the causes of why the heating disaster happened in one case but not in others, and what factors were responsible for the failure in policy implementation in the sector. Were heating accidents purely technical or human problems? Was the heating pipe failure caused by a technical defect, design mistake or fuel problems? Alternatively, might not the accident have been caused by the lack of management and the operational capacities of representatives of the heating company? Did the city administration - the owner of the most boiler-houses in many Russian localities - not pay enough attention to operation of its heating utility?

For my research, I choose two analytical models that can help us to answer these questions:

- The conventional **Implementation studies approach** that suggests human factors (including the behavior of human beings, social institutions, and organizations) explain most of the variation in policy outcomes. I refer to this approach as Instrumentalism[10] because of its evaluation of the role of technology in the policy process. It considers technology as a neutral means - an instrument - to realize policy goals.
- The second model is the **Actor-Network Approach** that suggests both human and technical factors are the explanations for policy outcome variation. It considers technologies, or non-human factors, as equal participants in the policy implementation process.

The following discussion will outline the theoretical framework of the research. It will present the theoretical underpinnings of two models, their assumptions and policy recommendations as applied to the Russian context. I will also evaluate the strengths and flaws of these frameworks and suggest ways to address their limitations in the presented research. In the conclusion, research goals and research contributions will be discussed.

2.1.Instrumentalist approach.

2.1.1. Previous studies.

The conventional model of policy studies argues that human factors (including the behavior of human beings, social institutions, and organizations) are the most

[10] I call this approach instrumentalist after Albert Borgmann. Borgmann, an American philosopher of technology, suggests distinguishing two extreme positions in the analysis of technology in a modern society, - *instrumentalism* and *substantivism* (Borgmann 1984, 7-12). Instrumentalists consider technology as a mere tool and as the means to realize human goals. Technology appears as something neutral and independent of normative evaluations. It does what humans want it to do. Substantivism, on the other hand, claims that technology is not neutral. It must be considered as an independent variable that alters our culture and society drastically. While the second position is prevailed among a few philosophers who are concerned about the destruction of human nature through technological progress (Dewey, Ellul, Habermas, Heidegger, Husserl, etc.), the first position is widespread in social debates around technology. Most studies of post-Soviet Russian technological policy are also based on this instrumentalist vision.

important in explaining what happened with the operation of heating networks across Russian localities.[11] This argument is widespread among experts of different international organizations that lend money to Russian municipalities and produce numerous reports about centralized heating systems: “Above all, the problem of affordable comfort in Eastern Europe must be considered as a human problem… Although CEU governments have recognized the political threat of cold families, they have only recently moved to learn how people are handling difficult situations. In that sense, it is very important to couple politically difficult-but-necessary decisions to increase residential energy prices with bold strategies to reduce energy needs” (Kazakevicius et al. 1998, 857).

The logic of this approach is straightforward. Regardless of almost fifteen years of market reforms, the Russian housing and utility sector is still governed by the Soviet administrative model. The state (i.e. local government) is responsible for the maintenance and modernization of engineering infrastructure and multi-family buildings around the country. Residents pay only a small amount of actual costs of utilities’ production (around 30-80% in different places); the rest is subsidized by local administrations. There is not enough money in local budgets to cover such responsibilities. The Federal Government does little to help solve this problem. It does not provide localities the opportunity to create their own tax base and it extracts almost all local profits for future redistribution to central priorities. Most local administrations resist making changes in the local tariff policy and increasing prices on utilities to the full cost-recovery level. They keep utility bills at a lower level for fear of public protests and of losing re-election. As a result, local utility enterprises (including the heating utility) that are under control and ownership of localities are typically under-financed. They do not have money to cover their expenses – to buy required equipment, fuels or to invest in repairs and the modernization of pipes and

[11] Of course, the presented argument that most analysts tend to rely on a single conceptual model sounds crudely reductionist. Analyses rarely proceed exclusively and single-mindedly within a pure conceptual limits. Analysts can discuss the local governance in terms of one model, occasionally shifting from one variant of it to another. While acknowledging the existence of several variants of the model, however, for analytical purposes, I will insist on their logical similarity.

boilers. With the outdated equipment and low quality of fuel, the failure of the heating system is assured (Bertrand 1992; Freinkman 1998; Nachional'nyi Doklad 2002; Struyk 1997; World Bank 2003).

From this starting point, most instrumentalist studies analyze how political, social, or economic factors influence the reform process and its outcomes across Russian localities. They focus on how the behavior of key actors, who either promote or oppose the required changes (e.g. representatives of heating companies, local officials, regional and federal authorities and consumers), influences reform implementation.

Most studies of the Russian housing and utility sector are descriptive and, with few exceptions, have not suggested propositions of any generality or references to a particular analytical model. Therefore, I will try below to reformulate their findings and place them in a broader theoretical context.

2.1.2. Theoretical background.

In searching for an explanation of the heating problem in Russia, the first typical step for the analyst is to put herself in the place of the government (either at the federal, regional or local level) confronting an issue and trying to figure out what a government has done right or wrong with the policy in question. She usually assumes that the policy outcome can be most satisfactorily explored through an analysis of political, economic, or social implementation contexts and the behavior of human policy participants within these contexts (i.e. through evaluation of the existence of policy barriers, the motives of behavior, and the possession of required resources).

In policy studies, the area most commonly associated with this type of approach is referred to as Implementation Research (see review in O'Toole 2000; Parsons 1995; Pulzl and Treib 2006). This field examines the environmental conditions, policy-related variables, and supports/constraints that enhance or hinder policy implementation. While there are a number of versions of the general implementation model, each of which suggests a different picture of the policy process, they all consider the process based on the following simple scheme that includes human actors and social institutions as the only participants of policymaking. "Action for implementation involves two or more interdependent actors - individual and/ or organizational" (O'Toole 2004, 322).[12] All other factors – like the environment and technologies – are the background for human interactions in the implementation process (Figure 1).

There are three generations of implementation research that present distinct theoretical approaches to fill in these explanatory variables (Goggin et al. 1990; Pulzl and Treib 2006). While the first two generations – top-down and bottom-up approaches – focus mainly on implementation actors and propose only a few insights about the implementation Context, the last generation – hybrid theories – are concerned especially with the context variable. Hybrid theories provide numerous suggestions for what we can consider the "Implementation Context" as well as how we can study implementation "more scientifically" and what the "theory of implementation" means (Goggin et al 1990).

The first generation of implementation research, **top-down theories,** were developed in the 1980s and identified decision makers as the main policy actors. The top-down approach focuses on the ability of key decision–makers to produce unequivocal policy goals and to control the implementation process (Pressman and Wildavsky 1973; Bardach 1977; Sabatier and Mazmanian 1979, 1980). It assumes a direct causal link between central policies and the observed local policy outcomes and neglects the impact of actors who delivered policy at the local level.

[12] Organizations are allowed to enter the analytical scene only because they share some human-like characteristics: "Organizations do not have brains, but they have cognitive systems and memories" (Hedberg 1981, cit. on: Rose 1993, 52).

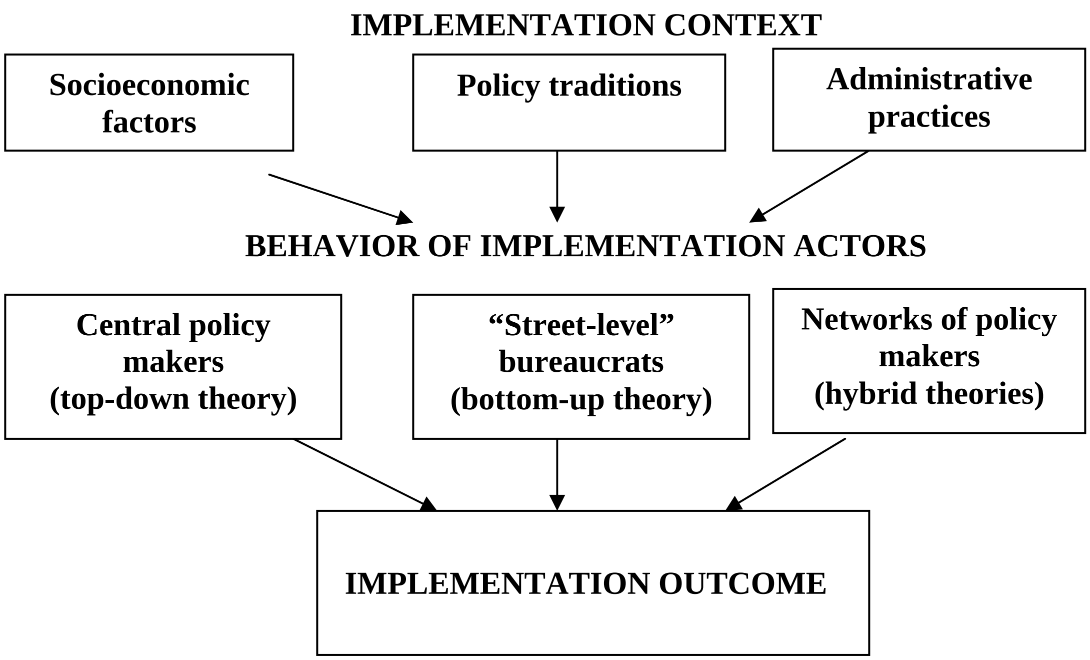

Figure 1. Implementation process.[13]

[13] Most implementation studies demonstrate associations rather than direct causality between variables in the implementation process. Therefore, the conventional concepts of “independent” and “dependent” variables are replaced by the more accurate notion of “explanatory” and “response” variables in Figure 1.

The classical example of the model is presented in Pressman and Wildavsky's classic *Implementation* (1973). They study the implementation of a federal program of economic development in Oakland, California, and demonstrate that the establishment of adequate bureaucratic procedures (i.e. a system of clear responsibilities and hierarchical control) in the central governmental agency is the main reason for effective policy implementation. They also argue that the number of agencies involved in policy delivery has a direct effect on the implementation outcome: more actors imply increasing difficulties with effective implementation, and vice versa. Bardach (1977) also argues that successful implementation is possible only when central policy makers succeed in structuring and controlling the implementation games thoughtfully.

The second generation, **bottom-up theories,** emerged in the late 1970s and early 1980s as a critical response to the top-down school and pointed towards local bureaucrats as the main actors in policy implementation. It considers policy delivery as a negotiation process across networks of implementation actors (Lipsky 1971, 1980; Elmore 1980). Bottom-up studies reject the top-down approach to implementation as the hierarchical execution of centrally defined policy goals. Instead, they suggest studying events and factors at the local level of policy delivery and focus on the everyday problem-solving strategies of "street-level bureaucrats."

Lipsky (1971) suggests classical examples of this model by analyzing the behavior of public service workers (e.g. teachers, social workers, police officers, doctors) and by arguing that their direct interactions with citizens can affect implementation outcomes. As his works demonstrate, hierarchical control and well-defined policy design are not enough for successful implementation. Other advocates of this model (Hjern 1982; Hjern and Porter 1981; Hjern and Hull 1982) also argue that policy delivery has a multi-actor and inter-organizational character. Therefore, implementation analysis should start with the identification of networks of actors from all local agencies and then analyze their strategies to solve policy problems.

The third generation, **"hybrid" theories** (Goggin et al. 1990), developed in the late 1980s and early 1990s, proposed to synthesize top-down and bottom-up insights and incorporate elements of other theoretical approaches into implementation analysis

(Elmore 1985; Sabatier 1986; Goggin et al. 1990; Winter 1990). Unlike the previous generations that were concerned mainly with empirical observations, this school lays much emphasis on theory building by trying to specify clear hypotheses about the implementation process and by testing them through adequate empirical observations.[14] Hybrid theories usually start with the top-down perspective of effective central government control over policy implementation and then add several elements of the bottom-up model as well as other theories, mainly from political science. They believe that a wider range of actors may participate in the implementation process and that simplistic top or bottom-oriented models should be abandoned.

Elmore (1985), for example, combined the concept of "backward mapping" with the idea of "forward mapping". As he argues, considerations about both central agency policy instruments and the incentive structure of local implementers should be included in the analysis of policy delivery. Majone and Wildavsky (1978) demonstrate that implementation is the process of incremental learning in which programs are constantly re-shaped and re-defined. They start the analysis with policy goals defined by central policy makers and then explore changes in the course of their delivery at the "street level". Goggin et al. (1990) also combine top-down and bottom-up theories. They begin the analysis with an identification of the policy decision defined at the central level and then consider the role of the negotiation processes between implementers and central authorities in policy implementation. Exploring empirical cases of federal programs' delivery at the state level in the U.S, Goggin et al. developed a communicative model of intergovernmental implementation that considers the effect of the governmental communications system on policy outcomes.

In addition to the debate about the roles of actors, hybrid theories also suggest valuable insights about the effect of the implementation context on variation in

[14] However, as some scholars note (deLeon 1999, O'Toole 2000), only a few studies from the third generation have followed this theory-building path. Most of them are still empirically oriented with the dominant goal to provide policy recommendations rather than to develop a consistent theory of implementation.

delivery outcomes. An "advocacy coalition framework" developed by Sabatier and Jenkins-Smith (1993), for example, emphasizes the role of extraneous social and economic conditions that may influence policy implementation.[15] However, as another hybrid implementation theory notes, the advocacy coalition approach neglects the social and historical context in which policy delivery occurs (Fischer 2003).

To solve this problem, historical institutionalists working on implementation theory argue that policy traditions and administrative routines are "sticky" and have profound impacts on policy delivery (Bates 1981; Duina 1997, 1999). These insights were employed mainly by scholars who conducted comparative implementation research in different countries (like integration studies in the European Union, see Pulzl and Treib 2006). As these studies demonstrate, the degree of "misfit" between the existing institutional context and the new policy can profoundly change implementation outcomes. If both the old context (like deeply rooted institutional and regulatory structures) and the new program fit together, implementation should be unproblematic process. If the new policy does not match existing traditions, then implementation will be highly contested, leading to considerable delays and with a high probability of failure.

2.1.3. Implementation studies on Russia.

As noted earlier, previous studies on market reforms in the Russian housing and utility sector were mostly empirically oriented and were not concerned with placing their findings in any theoretical context. Here I reformulate the arguments of these studies in terms of three conventional theoretical approaches to the analysis of implementation – top-down, bottom-up and hybrid theories.

The first explanation of what is going wrong in the Russian housing and utility sector that mirrors the insights of the **top-down school** in implementation theory

[15] It should be noted that Sabatier, together with Mazmanian (1979, 1980, 1983), began to develop ideas about the effect of context while working under a top-down perspective. They demonstrated, for example, that certain sets of favorable or unfavorable socioeconomic conditions could cause implementation success or failure.

which emerged around the middle of 1990s. Some important elements of market policy programs in the sector – like enterprises' housing stock divesture and privatization of individual apartments - have been already implemented at this point and suggested as the starting point for analysis. Exploring the policy delivery of these elements across the country, the top-down account focuses on the actions of the central implementing agency – the President and his Administration. It portrays market policy implementation in the sector as a rather apolitical process, the success of which depends on clearly defined goals and effective administrative organization. Problems in policy delivery were not put down to political resistance by local implementers, but to "technical" parameters, like insufficient administrative resources or inter-organizational co-ordination problems (Freinkman 1998).

Top-down studies usually start from the assumption that market policy implementation begins with a decision by the Russian President and confirmed by the Duma. These actors set out the program of market changes in the sector that includes two elements – (1) financial and institutional changes (like restoration of meaningful, full cost-recovery, pricing or privatization in the sector), and (2) technological innovations (installation of new, energy-efficient technologies). Their next task is to ensure the hierarchical control over the "accurate" implementation of this program across the Russian regions. This top-down argument aligns well with policy-making in the Soviet model of a planned economy where all decisions were delivered by the central level directly to localities.[16]

However, as it was discovered in the implementation process, the program was not adequately designed, implementation was not cleverly structured and too many actors at the federal level with contradictory interests were involved in market policy delivery in the sector. The failures of policy makers at the central level to ensure appropriate policy design and create hierarchical control resulted in the failure of market policy implementation in the housing and utility sector and, in the end, led to massive heating damages in 2000s (Freinkman 1998). Based on this picture, top-down

[16] I would like to thank Trevor Brown for contributing this idea to my research.

studies conclude with the list of policy recommendations to the Russian president that specify what should be done next and how policy in the sector can be designed more thoughtfully.

The **bottom-up explanation**, another popular way to explain current events in the Russian housing and utility sector, emerged in the late 1990s and insisted on focusing on local explanations of market policy implementation in the sector (Andrianov et al. 2003). This approach rejects the idea that only central decision makers define policies and their implementation outcomes. Local bureaucrats like regional governors or city mayors are much closer to the field of market policy implementation than central policy makers are. Given the considerable amount of discretion at the disposal of these "regional" and "town-level" bureaucrats, their motives and behavior can directly affect market policy implementation in the sector (Institute for Urban Economics 2003).

In most bottom-up studies, the behavior of the specific mayor in the selected locality is often considered one of the important factors in market reform implementation in the heating sector: "Strong local leadership and expertise are essential for city-based development programs to succeed" (World Bank 2004, 23). According to the World Bank and the Institute for Urban Economics reports, the political will of the head of local authority – i.e. his/her desire or resistance to implement market reforms in the housing and utility sector - is one of the possible explanations for progress. As these studies claim, for instance, many local officials fear to increase tariffs (one of the important element of market reforms) and therefore declare that residents in their regions cannot pay high bills (World Bank 2004). The results, as indicated in another report, are insufficient municipal funds, lack of money for capital investment, maintenance and repair spending and continuous deterioration of the technological networks (United Nations 2004).

The **hybrid explanation** is the most current account among analysts of the Russian utility case (Institute for Urban Economics 2003; World Bank 2003). This approach tries to reconcile the top-down idea of political steering by central authorities with the bottom-up idea that the policy delivery in the housing and utility sector depends upon the preferences of "town-level" bureaucrats and the interaction of a multitude of actors with separate interests and strategies. While not directly employing the concept of networks, such studies pay attention to a multiplicity of policy actor networks in the sector and emphasize the importance of coordination and communication processes among mutually dependent actors. As some reports claim, the nature of communication with regional and federal centers affects the outcomes of market policy implementation across localities. "Of prime importance for the implementation of the housing reform is… that the coordination between the different levels of government, the federal, regional and municipal levels works well, that the roles and responsibilities of each level are clearly defined and that a regular system of communication is established" (United Nations 2004, 30).

The focus of these studies is the quality of interactions between actors at different levels – both in the central government and at the street-level. If communication and coordination between the different levels of government are broken, the locality does not receive sufficient funds to support the local housing and utility sector: "At present the housing and the municipal sector has become a victim of institutional tension due to instability and unpredictability in inter-budgetary relations between regional and municipal authorities. This relates to the amount of funding available for the housing and utility service providers and tax sharing between regional and municipal authorities. There is a lack of transparency in the finances of the municipal economy so that there is more than usual room for argument over the municipalities' real capacity to fund federal initiatives" (United Nations 2004, 52).

In addition to considerations about the negotiation process between central decision-makers and local implementers in the Russian housing and utility sector, the hybrid school also considers the effect of the institutional context (or the existing set of regulatory institutions) in which these interactions occurred. While again not directly employing the historical institutionalist assumptions (i.e. old context matter for the implementation of current policy decisions), some studies emphasize the role of certain, already existent arrangements that can be great obstacles to market reforms. The degree of misfit, that is the extent to which a particular element of a reform program requires the locality to depart from its traditional "ways of doing things" (Pulzl and Treib 2006), can explain the implementation outcome. If the new policy and old "context" fit together, implementation will be successful. If the new policy prescriptions do not match existing rules and traditions, then, implementation will probably fail. Suggesting operationalization for the "old context", hybrid analysts typically list the following variables as contextual factors that can influence housing and utility sector reforms across Russian localities:[17]

- Financial capacity of the locality;
- Human resource capacity;
- Socioeconomic characteristics;
- Physical characteristics.

The first factor is **financial capacity,** or the volume of financial resources that the selected locality possesses. For example, the United Nation's report claims: "Divergences in economic development are the main explanatory factor in differences in the housing situation across regions. The ability of the regional or municipal authorities to provide their own resource or attract private resources for the financing of major repairs and new construction depends heavily on their overall economic situation" (United Nations 2004, 30). Reformulated in terms of institutional theory, this argument implies that the proposed market policy – like the full cost-recovery prices on utility services – can succeed only in places with sufficient financial resources. If residents, for example, reject paying higher (or any) charges to the local utility, the municipality will not be left without any money to run heating services in the locality and will be able to temporally cover these losses from its own budget. In current Russia, only very few localities (like oil and gas-extracted towns or Moscow)

[17] This list is consistent with the theoretical and empirical propositions derived from implementation studies in other countries, that is, "more resources increase prospects of implementation success (almost no matter what one means by that latter notion); that resources are often not liquid, so that funding sometimes cannot be converted easily into (for instance) skilled staff, or vice versa; that therefore multiple kinds of resources may be critical and that what matters for implementation is resources for the implementation tasks themselves, not simply size of budget or extent of subsidy to clients" (O'Toole 2004, 317).

have such a lucky “fit” between the new policy and budget capacities. The poor financial capacities of most Russian municipalities imply the overall failure of market policy implementation in the housing and utility sector, including both financial and technological sub-programs: “When any centralized system is damaged, there will be always some successful and some failed local subsystems. The condition of the heating supply in the area vividly demonstrates the level of financial capacity… In towns with excellent local administration and highly educated engineers in heating utility but with a small local budget, there is not any technical reform at all” (Nachional’nyi Doklad 2001, 8-9).

The next possible factor is **human resource capacity,** or the number of professionals capable of running activities in the housing and utility sector (Chernyavsky 2003; Institute for Urban Economics 2003; Nachional’nyi Doklad 2002; United Nations 2004). As the United Nations report indicates, the poor management skills of municipal officials and directors of heating companies and the low professional skills of ordinary company’s workers can be one of the main constraints in market policy implementation in the sector (United Nations 2004, 10, 15). Again, in terms of institutional theory, it means that in order for housing and utility sector reforms to be successful, there must be a fit between financial and human capacity and the reform requirements. That is, in addition to enough money, the locality should have enough trained professionals, who know how to run the utility company under market conditions (e.g. are able to calculate the full cost-recovery prices, raise additional funds for the company and evaluate the quality of their own service).For most Russian localities, the lack of such specialists is the greatest problem nowadays. In the USSR, the housing and utility sector with its low salaries was not considered an attractive activity. As a result, this sector was characterized by a lack of professionals; most workers did not have enough education, or they were trained in a different field. The same trend exists nowadays. Some directors in the local heating companies do not have specialized training in heating networks engineering and most of them lack any education in strategic planning, project management, fund-raising, budgeting and quality/price evaluation. In housing maintenance companies, ordinary workers lack skills in renovation, repairs, interior work, reconstruction and extension of existing buildings and networks: "The rank 1 for the sector employees is 405 rubles, while specialists of the same qualification in other organizations are paid 1,200 rubles. Accordingly, many specialists left. The remaining ones are over 50, and young people stay away from the sector that has lost its prestige" (Institute for Urban Economics 2003, 60).

Another related cluster of factors is **socioeconomic characteristics** of the locality, or the share of people whose income is lower than the subsistence minimum in the city (Freinkman 1998; United Nations 2004). In terms of institutional theory, it means that in addition to financial and human resource capacities, the composition of the locality's population should be taken into account when evaluating local chances to succeed in market policy delivery in the housing and utility sector. For example, a high percentage of poor people (both unemployed and those with low income) lead to a higher chance for social protests against one of the main component of reforms – the full cost-recovery prices for utility services. It also implies higher municipal expenses on housing and utility assistance programs for residents who cannot afford to pay cost recovery rents. In the case of less expense on poor people, these municipal revenues, instead, could be invested in maintenance and capital investments that in turn allow the locality to maintain its engineering infrastructure in a fair condition and escape "heating disaster."

The last set of factors is **physical characteristics** of the locality that also should fit the proposed market changes in the sector. As previous studies note, there are three main factors inside this group:

- Geographical position of the city;
- Physical condition of the housing stock in the city;
- Volume of private and public housing stock.

Inside this group, the first factor is the **geographical position** of the city. Russia is a very big country with areas of very different geographic and climatic conditions and different needs for heating: "The climate zones in Europe are located in a paradoxical manner. The climate does not get colder from south to north, but from west to east. Sometimes, even from north to south, or more accurately, from the coasts to the inland regions. Note that Leningrad is warmer than Moscow, even though it is 400 km further north. Helsinki is warmer in winter than Oryol, even though Helsinki lies 1,000 km farther north" (Parshev 2000, 3). As a result, the location of the city in the eastern or western part of the country directly affects the costs of the heat provided. Even given a large budget, the presence of professionals in the utility company and the low share of poor people, extra costs associated with cold temperature can eliminate any chances to succeed in the implementation of the proposed market programs in the sector (Freinkman 1998; Hill and Gaddy 2003).

The second factor is the **physical condition of the housing stock** in the city. The age of most residential buildings in the locality should be in fit with the proposed market changes in the sector. The large share of old buildings and of run-down housing stock implies large municipal spending on the required maintenance and modernization of inside-house engineering infrastructure (Chernyavsky 2003; United Nations 2004). Regardless of the fact that the locality can have enough funding, professionals, a small share of people requiring social assistance and a location that is not in an extremely cold climate, the burden of old buildings can restrain any progress in market reforms by requiring huge financial and human investments in their restoration.

The last factor is the **volume of private housing (in the form of privatized apartments) versus public housing (in the form of municipally ownership)** in the city. This factor is the nature of ownership of residential units in the locality that should also be in fit with the proposed changes in the sector. A large share of public housing requires large spending from the local budget that again makes it hard to succeed in market policy delivery in the locality (Chernyavsky 2003).

2.1.4. Comparison of different implementation models for the Russian case.

As the previous review demonstrates, several characteristics of the top-down, bottom-up and hybrid theories separate the three schools of thought in their evaluations of the current "technological disaster" in the country (see Table 1).

Top-down explanations of market policy implementation failure in the Russian housing and utility sector start from a policy decision "to introduce the market in the sector" made by the Russian President and Duma in the beginning of 1990s and work their way downwards to policy implementation at the local level. They consider implementation as a "governing-elite phenomenon" (deLeon and deLeon 2002, 468), i.e. apolitical and pure administrative action to follow orders from above. Power is seen as the attribute of central policy makers, who define policy goals and are able to control their implementation in practice. Consequently, this account considers democracy as elite representation.[18] In this view, elected representatives - the President and the Duma - are the only actors within society who are legitimized to made decisions on behalf of all citizens. Proper democratic governance is seen here as the establishment of accurate control mechanisms to carry out the policy designed by central actors. Any deviation from the centrally defined goals is considered a violation of democracy. In the end, the final goal of top-down explanations is to derive recommendations for the most powerful actors at the federal level with a view of how they can improve the situation.

[18] "This "simple model" asserted that democratic control should be run through a single line from the representatives of the people to all those who exercised power in the name of the government. The line ran from the people to their representatives in the Presidency and the Congress, and from there to the President as chief executive, then to departments, then to bureaus, then to lesser units, and so on to the fingertips of administration" (Redford 1969, 70).

	Top-down model	**Bottom-up model**	**Hybrid model**
Research strategy	Top-down: From decision of President and Duma to administrative execution of market policy program in the sector	Bottom-up: From “town-level” policy implementers (e.g. city’s mayor) and their incentives to implement the market policy program in the sector	Network analysis: From decision of central policy makers to “town-level” implementers and their interactions
Character of implementation process	Hierarchical control	Decentralized problem-solving	Blend of hierarchical control and local autonomy
Vision of power	Power is concentrated in hands of central decision-makers	Power rests with the actors directly involved in policy delivery	Power is distributed among the network of actors
Attention to implementation context	Limited considerations: the effect of extraneous factors (like external economic development or influences from other policy fields)		Considerable focus: The degree of fitness of new policy with old constitutional context is one of the main variable in the study
Goals of analysis	Policy recommendation	Description/Explanation/Policy recommendation	
Model of democracy	Elite representation	Participatory	Not developed
Limitations	Neglects the large amount of discretion available to street-level implementers	Overestimate the autonomy of the bottom bureaucrats against the top authorities	Neglects the impossibility to combine elitists and participatory visions of democracy

Table 1. Comparison of top-down, bottom-up and hybrid models explanations for Russian case.

The bottom-up account, in contrast, starts out with the actors involved in policy delivery at the “town” level, - like city mayors or directors of local utilities and housing companies. Then, it considers their incentives to foster or discourage the market policy delivery in the locality and problem-solving strategies. The bottom-up approach rejects the idea of hierarchical control and suggests that local implementers always have a large amount of autonomy to decide the direction of policy delivery. Regardless of orders from the central government to create their own-source tax basis for all localities, a region’s governor can issue its autonomous political decision to concentrate all local taxes in the regional budget and re-distribute them later on. The local mayor can neglect the statutes emanating from the central government and parliaments to implement the full cost-recovery pricing policy in the housing and utility sector and make his own decision about local tariffs. Unlike the elitist model in the top-down approach, democracy is seen here as a participatory process where the concerns of those who are affected by a particular policy (like local officials or target groups of residents) should be also taken into account. In the end, the final aim of the bottom-up model is to give an accurate empirical description and explanation of the interactions of actors involved in policy delivery. While it is not widespread practice, some analysts still derive several policy recommendations for how the locality can improve the implementation of market policy in its housing and utility sector and how it can extend residents’ participation in the sector’s operation.

As the third school demonstrates, both top-down and bottom-up approaches exaggerate their positions and thus oversimplify the complexity of the policy delivery process (Parsons 1995). Hybrid explanations try to overcome the conceptual weaknesses of the two other approaches and blend the extreme arguments of both sides into one model that embraces both the role of central policy-makers and local autonomy. Hybrid explanations also point out the importance of extraneous factors in the policy delivery process. As previous studies of Russian politics demonstrate, there are several conditions “external” to the market policy implementation process in the housing and utility sector that can influence the outcome of policy delivery, like financial and human resources and socioeconomic and physical characteristics of the city.

What is missing in the hybrid account, however, is a synthesis of the top-down and bottom-up approaches to policy process and democratic governance. As deLeon (1998), O'Toole (2000), Parsons (1995), Pulzl and Treib (2006) argue, these approaches are based on "fundamentally different views on the proper conceptualization of the policy process and the legitimate allocation of power over the determination of policy outcomes" (Pulzl and Treib 2006, 12) that cannot be easily blended together. Who are the most important actors in market policy implementation in the Russian housing and utility sector – officials at the federal level who designed the program of reforms, deputies of the State Duma who enacted the program or the municipal bureaucrats who implemented this program in the localities? What is the deviation from truly democratic governance – violation from the centrally defined policy goals or a disregard of the concerns of those actors who are affected directly by the proposed policy? These are still open questions in studies that combine top-down and bottom-up approaches.

2.1.5. Application of the Model for the Russian case of market reforms in the utility sector.

As the previous section demonstrates, while having some gaps, the hybrid model's combination of top-down and bottom-up explanations provides a more comprehensive account of events in the Russian housing and utility sector. This theory will be used as the first guiding model to explore the history of heating sector development and its current market reforms in the selected Russian locality. Market policy implementation will be considered here as a study of the relationships between the local implementers and central decision-makers and the outcomes of such interactions. The focus will be both bottom-up and top-down oriented. Particularly, I will explore: a) the incentives of "town-level" bureaucrats (e.g. the city's mayor) to implement market policy in the local housing and utility sector, b) local problem-solving strategies to speed up or slow down market policy delivery, and c) negotiations with higher authorities – the central government and the regional administration - about local decisions.

In addition to individual actors, this study will also include a consideration of the nature of the institutional and physical context in which local problem-solving strategies and interactions between different actors are developed. In this respect, the focus will be on the degree of misfit that, according to Pulzl and Treib (2006, 14) is "the extent to which a particular element of new policy requires the actors to depart from the traditional "ways of doing things." There are several elements of the old context (like financial and human resource capacities and socioeconomic and physical characteristics of the city) that can be crucial for market policy implementation in the locality. As the hybrid theory of implementation and the previous studies of the Russian housing and utility sector predict, if the new market policy and these elements fit together in the city, implementation will be successful. The city will deliver the market policy program designed by central decision-makers and will escape "heating damages." If the new policy prescriptions do not match the existing conditions, then implementation will probably fail and the city will be left with broken pipes, endless breakdowns and frozen residents.

Figure 2 presents the basic logic of this theory. Explanation of how these theoretical variables will be tailored for the specific case of heating reforms in Russian localities will be provided in the next chapter. Now, we will turn on our attention to the strengths and weakness of the implementation approach.

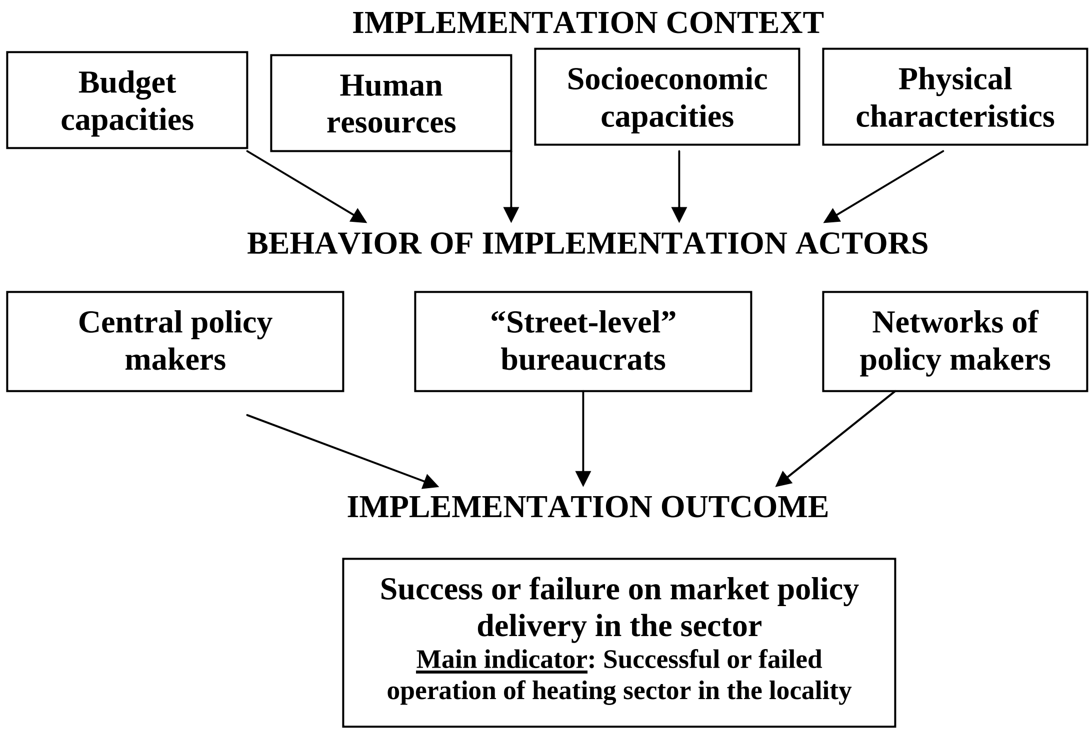

Figure 2. Implementation process in the Russian housing and utility sector: Hybrid theory of implementation.

<u>2.1.6. What does the Instrumentalist approach overlook in Russian case?</u>

In many cases, the Instrumentalist Model presented above has fruitful assumptions. Treating policy outcomes as a logical consequence of the behavior of policy actors in certain conditions and with a certain set of resources provides useful shorthand for the analysis of policy problems. However, it does not always explain all aspects of local politics in the Russian housing and utility sector. Implicitly assuming that “nonhumans should not enter an account” (Callon and Latour 1992, 352) of how humans interact with each other, the Instrumentalist approach ignores one of the key actors in policy process - the technology itself.

For most scholars, the implementation process evolves in a ‘materially free’ environment where new, “right” technologies can be installed and successfully impose their program of action to change consumers’ behavior. The analysts focus mainly on financial requirements in the sector and economic benefits of newly installed technologies and leave the analysis of the interactions of new technology with old Soviet elements of the network uncovered. The everyday usage of such technology in post-Soviet conditions appears not to be explored. It is believed that, once installed, the technology will operate in predictable ways and no questions need to be asked about what happens with the new device after its installation. In short, most current studies about the Russian case focus mainly on the role of humans and their institutions (i.e. the rules of their behavior) and overlook the role of material entities in the policy process.

The same argument can be applied to many conventional implementation studies. As the next quote from Lynn (1996) demonstrates, most implementation research accounts suggest focusing on almost everything but the material background as a possible explanatory factor in the implementation process: “An analytic approach begins with the assumption that public managers confront ‘a messy reality; of data, observations, opinions, facts and, not to be missed, human beings. A manager’s intellectual task is to understand or explain messy reality toward the goal of gaining sufficient control over events to influence the future intentionally” (Lynn 1996, 100).

It can be argued that in the specific case of reforms in the Russian housing and utility sector, the instrumentalist model does not pay sufficient attention to these three points:

1) Its main shortcoming is the lack of interest in exploring the implementation of the second component of the market program in the sector – technological changes. It is believed that "technical solutions and equipment efficiency improvements will have little impact if they are under the shadow of prices that made the heating system and its customers insensitive to prices and costs" (World Bank 2003). Therefore, financial and institutional reforms became the main research focus in the evaluation of market policy implementation across the country, and technological changes per se did not receive enough attention. There are no studies about what happened with the new, market-oriented technology after its installation.
2) There are no considerations of why some new technologies do work as predicted while others do not. This approach does not offer us a chance to develop explanations of why different technologies have different effects in the same region which enjoys favorable conditions for reforms, like enough financial and human resources, a "right-oriented" mayor and pragmatic relations between the regional and city administrations. Why does one technology operate successfully, while another technology fails to achieve its goals? As I mentioned above, heating meters are an example of a failed market-oriented device in the Russian urban context (Kara-Murza and Telegin 2004, 235-253). These meters are usually presented as an indicator of progressive market reforms in the housing sector for they impose self-discipline on consumers who will be immediately frugal with heat consumption, calculating their expenses based on the meters' readings. However, installing meters in Soviet-style apartments without radiator stop-valves (i.e. when residents cannot control heating consumption) will obviously result in the failure of such technology.

3) Most technologies installed in Russia, such as the heating meter mentioned above, were designed for Western, free-market societies. There is little information on the socio-cultural perceptions of this technology in the new cultural context. The implementation approach excludes analysis of consumers' behavior around this technology, i.e. how both residents and representatives of the housing maintenance companies that are responsible for the operation of new technology at the building level[19] coped with the installed equipment.

2.2. Possible alternative to the instrumentalism Model: Actor-network approach.

The main explanation of such shortcomings in conventional implementation studies is the absence of tools to explain theoretically and explore empirically the impact of material entities on the policy process. The application of this approach fails to explain variation in the outcomes of technological innovations in the Russian housing and utility sector. In order to find explanations, we need to turn on our attention to alternative conceptual frameworks that analyze the everyday interactions between humans and technology.

Current information system research (Gordella and Shaikh 2006; Martin 2000; Walsham 1997), environmental (Gabriel and Jacobs 2004) and urban studies (Smith 2004; Juntti and Wilson 2005; Phillips 2002) have employed recent developments in science and technology studies (STS, also called sociology of technology) to overcome the neglected role of technology in social interactions. As these studies indicate, STS emphasizes the role of the material entities in the creation of social order in a modern society and, thus, can be especially useful when studying the

[19] In Russia and many former Soviet republics, heating companies own all central heating installations up to the walls of residential buildings. All installations inside buildings either belong to homeowner associations, or are shared property of all the owners of apartments in a multi-unit building. Housing maintenance companies owned by the local administration are responsible for the operation of all engineering networks, including the heating system, inside the building.

implementation of new technologies and other situations involving technological innovation (Verbeek 2005).

This model proposes one possible path to examine the interactions of humans and technology in the context of policy implementation. It argues that in order to understand variation in technological innovations, we need to consider: 1) interactions of the new technology with the old elements of the technical networks, and 2) everyday interactions of humans with new installed technology. Three schools within STS – techno-determinism, social constructivism and actor-network theory (ANT) – suggest different ways to analyze such interactions between a) old and new technologies and b) humans and technologies. In this dissertation, I choose ANT as the main path for the analysis of current changes in the Russian housing and utility sector for, as it will be argued below, it suggests a more comprehensive account of the role of technology in a modern society. The following discussion will briefly outline the theoretical underpinnings of these schools, their main findings and limitations.

2.2.1. Three schools inside science and technology studies.

While STS is a very loose approach that includes various and often conflicting conceptions and research strategies, it still can be defined as the school of thought that argues toward equal research attention to both human and nonhuman actors while exploring social interactions. As this field argues, like humans, any material entity is able to act too (or, to be more precise, able physically to enable or disable the actions of humans). Nonhumans – in this case, technology - can prescribe behaviors, constrain political arrangements, encourage cultural beliefs and shape the social context of human interactions.

The main enemy of all schools within STS is a traditional social theory that sees humans as the primary, if not the only, subjects capable to act and consequently, to "make" society. All other elements – nonhumans, texts, beliefs, material objects, or nature – are considered as part of the "structure," and "a feature of the sociological landscape rather than an actor on the historical stage" (Disco 2005, 145). Most traditional studies consider things (e.g. artifacts, technological systems) as a black box, i.e. as an independent variable that explains social relationships but in itself does not require further analysis. As many advocates of STS argue, established social theory (except Marx) has little or nothing to say about the role of things in a modern society. All it can suggest is the very simple notion of a tool as an artifact that an intentional (i.e. human) subject uses to get a specific job done more quickly and efficiently (Disco 2005; Shields 1997). However, as STS tries to demonstrate, because human activity is always surrounded by nonhumans, we cannot leave material configurations by the wayside of research and need to give at least some consideration to how commonplace perceptions of objective, neutral and efficient technologies were constructed and to what things are doing with humans in practice.

Out of these shared beliefs, however, STS suggests conflicting descriptions of how exactly material entities can influence social interactions.[20] The first school – techno-determinism or realism – focuses on inherent properties of things and their effects on social relationships. The other two schools – social constructivism (social construction of technology, SCOT) and actor-network theory (ANT) – are inspired by postmodern, post-structuralist studies. They emphasize the role of human perception as an organizing force, while not accepting the belief that interpretation rests on a pre-determined, rigid structure of meanings. The abandonment of structural explanations reveals the political nature of reality, which is represented, maintained and acted upon in a "discursive praxis", where discourse both maintains and conditions a certain understanding of the world (Juntti and Wilson 2005). As a result, SCOT denies the techno-determinism argument that things have a priori fixed properties and focuses on human interpretations and modifications of things. ANT goes beyond both realism and post-modernism and suggests considering both socially constructed and physical features of things. Their main differences are summarized in Table 2.

[20] The discussion of three schools inside STS is based on Brey 2005.

	Techno-determinism	**SCOT**	**ANT**
Main research questions	What are humans doing with material entities? What are these entities doing in turn with humans?		
Main belief about ability to act	Things have inherent properties and have ability to act	Technologies do not have inherent properties that make them agent on their own. Agency of nonhumans depends on human interpretations.	"Ability to act" is seen as a relational category, as the product of interactions within networks of humans and nonhumans.
View of things as social agent	Things are real actors in social interactions	While things are "objective facts", their meanings and usages are socially constructed.	1) Things have some inherent properties that can affect human interactions. 2) At the same time, their usage and meanings are socially constructed.
Main concepts	Technological code	Technological frame Interpretative flexibility	Actants Network Scripts Delegation Programs and anti-programs
Limitations	Underestimates the interpretive flexibility of technology	Neglects the role of the physical properties of things	Restricts itself to mere description; Neglects diversity in agency, power and control between as well as within different user groups

Table 2. Different views inside STS on social role of technology.

Technological determinism believes that artifacts have inherent properties and agency. They may be a priori authoritarian, democratic, unjust, repressive, etc. (Corea et al. 1985, Mumford 1964). Such agency of things is not correlated with the agency of human agents involved in their production, regulation or use; it is a feature of things themselves. As a result, any technological artifact can affect the society and prescribe specific patterns of social relations. The main concept used by this school to describe the actions of things is "**technological code**," that is, inherent attributes of the technology that makes it ultimately good or ill (Feenberg 1991).

Numerous determinism studies demonstrate how the code of a technology constrains or enables social practices and cultural beliefs. Langdon Winner (1986), for instance, suggests the example of the effect of a particular technological artifact - Long Island bridges – on social stratification. These bridges were built at a height of no more than 9 feet. This prevented buses passing under them and blocked access to the area by public transportation. Because many poor people in the city depended on public transportation to travel, such bridges worked to restrict access to this place for many of the poor. As Philip Brey argues, "here, the thing is considered as the major independent variable, that thus, while it is located in a specific context and there are many other contextual factors, it itself is most directly linked to the change that occurred" (Brey 2005, 64).

Richard Sclove (1995) suggests the example of "technological code" in modern Western furniture. As he argues, modern sofas with two or three separate seat cushions define distinct personal spaces and thus work to both respect and re-impose modern Western culture's focus on individuality and privacy. Such design in furniture is different from Japanese futon sofa beds without separate sitting spaces, for example. Techno-deterministic organizational studies also demonstrate the impact of technology on organizational dimensions, like the structure, size and performance (Aldrich 1972; Blau et al. 1976; Perrow 1967). Winner (1980), for instance, analyzes the effect of the technology of nuclear power on organizational structure and argues that nuclear energy stood for centralized, hierarchical managerial control, the increasing power of experts, the threat to individual freedom and, in the end, the strengthening of totalitarian power.

According to opponents of the deterministic school, its main limitation is the underestimation of the interpretive flexibility of technology. As Brey (2005) argues, in many cases, certain technologies may often display properties that are thought to be incompatible with their claimed inherent nature when used in a different social and cultural context (Brey 2005). This school also lacks an analysis of how the codes structured into a technology are differentially perceived, changed or ignored by the humans who use them (Orlikowski 1992). Social factors are played down under deterministic analysis. They are assigned a mere background role while in practice social representations of things can determine how this particular artifact or its specific feature will be used. Brey suggests he example of pink baby clothes for girls that impose a gender stereotype. Clothes themselves do not physically induce stereotypical treatment of a baby. It is merely a social construct in some societies. As Brey concludes, “even when it may seem that social change is due to the physical properties of a technology, social representation processes often play an important role” (Brey 2005, 65).

The next STS school – s**ocial constructivism of technology**, SCOT**,** – tries to overcome this limitation of the techno-deterministic model. It argues that while being objective facts, technologies do have interpretive flexibility and that people can attribute very different functions, abilities and properties to them (Pinch and Bijker 1987). Agency is seen here as an a priori property of independent human entities. The school denies that technology has inherent properties that make it an agent on its own. As it claims, the agency of nonhumans depends on human interpretations. The main metaphor of the school is “artifacts as texts” that “allow for different readings of them” and cannot physically force the particular reading (Woolgar 1991).

Because of such readings, artifacts can have attributed agency that is based on the interpretations and behavior of individuals and social groups. As SCOT studies demonstrate, different social groups can represent the same thing very differently. However, in the end, the process of social representation lead to “closure” – the situation when one social construction tends to dominate, determining the way the material entity is interpreted and the human practices that evolve around it (Pinch and Bijker 1987). When closure is reached, one dominant perception of the thing prevails and other "readings" of the thing may become impossible. As SCOT insists, such a result is not determined by inherent characteristics of the thing itself, as techno-determinism would argue, but rather by the dominant social representation. In short, constructivism studies consider the technology not as an independently existing fact but as a particular social representation. The main concepts that are employed by SCOT are the "**technological frame**," that is, the repository of knowledge, cultural values, goals, practices and exemplary artifacts shared by a social group, which structures the meaning of the material objects (Bijker 1995) and **"interpretative flexibility**" - the degree to which users of a technology are engaged in its constitution (physically and socially) during development or use (Pinch and Bijker 1987).

Weber Bijker (1995), for instance, demonstrates the application of these concepts while analyzing the development of fluorescent lighting. As he argues, different interpretations of the same artifact – fluorescent lamps - existed, but the particular social construction that won in the end was a "high-intensity daylight fluorescent lamp." This social construction required changes in the technological frames of other relevant social groups. Such changes, as Bijker argues further, are a vivid indicator of the social effect of the new technology. The same logic of interpretative flexibility of technology can found in organization studies employing the "strategic choice" model (Child 1972; Davis and Taylor 1986; Zuboff 1988). As they demonstrate, in most cases technologies are physically constructed through the social interactions and political choices of human actors. Here, material entities are considered as contingent on other forces in the organization, most notably powerful human actors.

While SCOT suggests interesting insights of how we can overcome determinism of the first school, it still has some limitations. As numerous critics state, "it places too much weight on social processes and in many cases neglects the role of the physical properties of things" (Brey 2005, 67). In many examples, the physical nature of the thing makes it impossible to insist on the dominance of social interpretations. Brey suggests reconsidering, for instance, the case of the Long Island bridges suggested by Langdon Winner. For the main issue here is the physical design of the bridge; regardless of how it is interpreted by bus drivers or poor people, the height of the bridge still makes it physically impossible for buses from NY to go to Long Island. Another example that is not open to personal interpretation is car driving. Regardless of how the driver thinks about the car, "while driving it is physically impossible to stand up or turn around to face backward" (Brey 2005, 78). While SCOT responds to such a critique by arguing that what looks like cases of physical constraints are still mere social constructions (i.e. users learn to read the technology in such a way that constrains them later on), there are still many examples when physical constraints are obvious regardless of what particular users think about them.

Trying to overcome limitations of both techno-determinism and SCOT, the last STS school – **actor-network theory**, ANT[21] – mixes their insights about human-nonhuman interactions. ANT criticizes determinism for its firm belief in rigid and stable properties of things. At the same time, it also disagrees with SCOT for assigning the dominant role to social elements and excluding natural elements from explanation. In ANT, capacity to act as an a priori property of any entity – whether it is human (like in SCOT) or nonhuman (like in determinism) – is rejected. Instead, the "ability to change other actors' behavior" is considered a relational category and the product of on-going interactions between people and material entities (Latour 1986). Things are seen here both as objective facts and as social constructions. They are constructed because their "ability to act" emerges from their participation in a network of human and nonhuman entities. It is in this context that they gain an identity and that any properties can be attributed to them. However, since they are objective facts, these things are not only social constructs. They are powerful participants in social

[21] This theory was developed by French science and technology studies scholars, Michel Callon and Bruno Latour and British sociologist, John Law at the Centre de Sociologie de L'Innovation (CSI) of the Ecole nationale superieure des munes de Paris in the early 1980s.

interactions as well and having the "ability to act," even though this agency derives from their place in the whole network.

Disco (2005) suggests the example of modern time organizers, such as Blackberries or Palm Pilots which are both real objects and social constructions. Organizers impose self-discipline on the consumer, like a strict daily regime of data gathering and digesting. As he argues, it is often difficult to decide who or what is programming whom or what. The human agent programs the organizer to provide certain information on call, but the organizer subsequently turns around and disciplines the human to enter data and to obey the organizer's orders.

In ANT, the starting point of analysis is very simple. Humans and nonhumans are two sides of social cooperation and social order. In order to understand this cooperation, we cannot consider only one side of this cooperation and should focus research attention on the nature of both elements and their role in the outcomes of such interactions. It is the so-called *principle of generalized symmetry* (Callon and Latour 1992). It claims that humans and nonhumans have an equal capacity to influence the interaction process. Thus, they should be studied using the same vocabulary, and no a priori distinctions should be made between their capacity to affect others: "*By themselves,* things don't act. Indeed, that there are no things "by themselves." Instead, there are relations, relations which (sometimes) make things" (Callon and Law 1995, 490). While agency of humans is different from "agency" of nonhumans, the outcome of social relations depends on interactions between these "agencies." Nonhumans do not just mediate relationships, as traditional social theory would believe, but themselves impose social norms inscribed by their designers and can create certain social practices,[22] while humans act consciously and can suggest different meanings for such practices. In the end, the contours of material and human ability to affect another agent reciprocally constitute one another.

[22] Practices are defined here as "embodied, materially mediated arrays of human activity centrally organized around shared practical understanding" (Schatzki 2001,2).

ANT suggests several specific concepts to analyze symmetrical interactions between humans and things (Verbeek 2005). The traditional notion of *actor* (that is, a human or human-like (e.g. institutions, classes) agent capable of acting) is replaced by the concept of "**actant**" – any acting agent that leaves traces in a society – irrespective of its being a human, an animal, a text, an artifact, or an object (Latour 1987). Actants are assigned "**competencies**," or powers to act. As ANT argues, the competencies of actants in a setting cannot be determined beforehand, but can only be attributed to them as a result of analysis of the whole setting in which they operate.

Actants may form associations or links when they start interacting with each other on a structural basis. When multiple actants form links with each other, "**networks**" of actants emerge. The traffic light is an example of such a network. As Latour demonstrates, the capacity to direct traffic is not the inherent property of light (as determinism would argue) or a social construction of drivers (as SCOT insists), but is rather the result of the network's operation. This network includes the light, the drivers, who are taught to respond to changes in the light, and the infrastructure that support the working of the light (e.g. electricity, cables, road itself). As the result of the operation of such a network, the traffic light has the capacity to control human behavior – i.e. to direct people's movements in space.

Another important ANT concept is "**delegation**," a process by which certain actions performed by one or more actants are transferred to other actants that perform them more effectively or efficiently. For example, in an organization in which people constantly leave the front door open, the process of "closing the door" can be delegated from the guests to a groom or a door closer (Latour 1992). As several ANT studies demonstrate, because technologies are often more predictable than humans, delegation often flows from humans to a stable machine.

The delegation is manifested in "**scripts**" (Akrich 1992) that are a series of instructions on how to act, roles played by technology in social interactions, pre-described schemes of operations, tasks and responsibilities for the users. For instance, scripts in software tell the actions, sequence and skills required by users to put their data into the computer. When a user does not follow the script, the computer program refuses to perform its task in the way that the user desires. Other examples are speed bumps and seat belts that have the clear visible scripts to force the driver into safe driving practices – to "slow down when you approach me or you will damage your breaks" and "buckle it or you cannot drive" (Latour 1992).

As some studies argue, such artifacts can be called also "legalfacts," material things that posses "the rule of law" and impose it physically in everyday life. The lock on the door, for instance, has a strong "moral appeal" and reinforces "the idea of legitimacy of private property" developed in capitalist societies (Feenberg 1991). Signs on the street that determine who owns a space, who can use it, for what purpose it can be used and for how long, inform us about certain patterns of behavior ("Stop" or "Slow down") and regulate our actions in public settings (Silbey and Cavicchi 2005).

Actants may also be assigned "**programs of actions**," that is an intended outcome of the technology or goals that the designers try to reach through the artifact. Such programs can serve as the point of departure of an analysis. For example, as mentioned earlier, the case of a speed bump may be analyzed as "the slow-down-or-you-damage-your-breaks" program of actions. However, scripts and programs of actions are not always obeyed. The user may not be properly trained to follow them (or instead be so highly trained as to be able to overcome them) and may refuse to comply with rules. Correspondingly, the context, in which a particular artifact functions, defines this device in a way that can be quite different than the purpose for which it was designed.

In order to describe such cases, ANT suggests the concept of "**anti-programs**" that are the unintended outcomes of technological innovations or programs of action that are in conflict with the program of actions chosen as the point of departure of the analysis. For example, drivers may be too rushed to follow instructions (the "program") of the traffic light. The speed bump can anticipate such an anti-program, - not everybody will risk their breaks to drive too fast near this piece of concrete (Verbeek 2005). Another example of "anti-programs" is suggested by Andrew Feenberg (1992). In the 1980s, the French government created a special system to provide access to central data and facilities – Minitel – the main goal of which was information exchange. Nevertheless, consumers used it primarily for gossiping and accessing pornography, and eventually this device turned into a means of personal communications. As Feenberg demonstrates, contrary to the clear and explicit intentions of Minitel's designers, its users in effect were able to redesign the technology and its original program.

Applying these concepts to empirical cases, ANT suggests the specific definition of power. Power is considered here as a product of interactions inside networks rather than a static quality among designated top-down or bottom-up actors, structures or institutions, as implementation models would believe. Societal order is seen here as an outcome of interactions in and through the web of relations (Latour 1993). Using such a definition of power, ANT suggests changing the very notion of politics and policy-making conventionally used by many social scientists. In many cases, material entities can be understood as untraditional politics for they embody action and impose certain values on humans: "Technology is a hidden political power in society and an unwritten set of laws that establishes social roles and relations" (Smits 2001, 149). As many ANT studies argue, politics and policymaking take place not only in the conventional stage of human interactions described by most social scientists but also in another domain, in which things are one of the key players. Material objects bind people "in ways that map out a public space profoundly different from what is usually recognized under the label of 'the political'" (Latour 2005, 15). Thus, technology can be understood as politics by other means for it embodies action and imposes certain values on us: "Morality is from the beginning inscribed *in the things* which, thanks to it, *oblige us to oblige them*" (*emphasis in original*, Latour 2002, 258).

While suggesting a more complex picture of social interactions, like any concept, ANT has its own limitations. As some analysts argue, there are at least two main shortcomings of this approach:

1) It restricts itself to mere description. ANT is generally suspicious of theories that claim to deliver general explanations of why social life

is as it is. As a result, it does not suggest cause-effect relations and is limited to contingent and local explanations of mere episodes (Juntti and Wilson 2005).

2) The approach neglects diversity in agency, power and control between, as well as within, different user groups. The notion of generalized symmetry loses touch with asymmetries within interaction process – factual asymmetries between humans and nonhumans in terms of power and responsibilities (Collyer 1997; Outdshoorn et al. 2005). As a result, ANT fails to understand why and how certain actors manage to impose their construction of a particular technology on others (Juntti and Wilson 2005).

2.2.2. Improving the ANT Model for application to the Russian case of market reforms in the housing and utility sector.

As the previous section demonstrates, although flawed, the ANT model suggests a more comprehensive account of the role of technology in social interactions through a combination of determinism and social constructivism ideas. This theory will be used as the second guiding model for this study of current market reforms in the Russian housing and utility sector.

In particular, I will apply ANT ideas to explore one of the puzzles of this study – to clarify the variation in the implementation of the technological sub-program of market reforms in Russian case. Many advocates of this approach argue that the major purpose of ANT is not to explain interactions (i.e. suggest a list of variables that predicts the outcome of interactions between humans and nonhumans), but only to describe the process. However, in this study, I am interested in explaining why some market-oriented technological innovations operate successfully while others fail to achieve their goals across Russian localities.

As some scholars argue, institutionalism, one of the approaches in organization theory that also pays attention to the interaction process, can allow us to accommodate ANT's lack of cause-effect explanations (Juntti and Wilson 2005). Stephen Collier

(2001), for instance, demonstrates the relevance of combining this organizational approach and ANT. In his dissertation, Collier describes the current development patterns in small cities around Russia and demonstrates that basic characteristics of the social and material reality have persisted here regardless of implementation of market-oriented programs. He suggests understanding the persistence of such forms in terms of the 'stuckness' of social and economic relationships that were materially and institutionally inscribed in the design of small cities around USSR. Collier demonstrates that the technical details of these systems themselves are the main constraints of market reforms for they must be completely dismantled in order to implement such a policy. These technologies prescribe certain interdependencies at the local level among a range of human actors (like enterprises, local, regional and federal public administrations, and residents) who have no choice of alternative interactions and stick with the existing infrastructure of their cities. The option to destroy such structures is unrealistic for many of them are essential to maintain human life in Russia. The heating system is the best example of such a vital structure for no one can survive in a very cold country without heat.

Based on insights suggested by this study, a possible model that combines ANT and new institutionalism may include the following components: (1) human actors – technology designers, users and decision-makers, (2) nonhuman actors – technology itself and its mediating role in human interactions, and (3) the institutional context of interactions, including organizational dimensions such as structural arrangements, ideology, culture, control mechanisms, the division of power and environmental conditions (e.g. socio-economic factors). The interplay between these components is either reinforcement or transformation of the existing structure of domination in a society (Orlikowski 1992). These elements are explained below.

(1) Contributions from ANT – nonhumans and humans: The first elements of our model are technology and the humans who use them. As ANT demonstrates, technology is a human artifact and, thus, exists only because of creative human action and support from human maintenance. It is also constituted through constant human usage and application. On its own, technology is not important; it comes into existence only through interactions with people. Human actors create technologies and impose certain values ("scripts" in ANT language) in their design.

However, in its turn, technology can directly constrain or enable human actions – again because of "scripts" or values that its designers inscribe in the particular artifact. It can force humans to act in a certain way (e.g. in the case of speed bumps, encourage them to slow down) and restrict the performance of other kinds of actions (e.g. in the case of a lock on a door, restrict entrance to someone's private property). Moreover, the ability of technology "to affect others" has an important temporal effect.[23] An artifact can impose past social values for a long time – even when its creators are not alive anymore and everyone has forgotten about the original purpose of the technology. In this sense, technologies have their own "agency" – the capacity to impose the "value of memory" - that can directly affect current interactions in society.

(2) Contribution from ANT – network of interactions between humans and nonhumans: As ANT predicts, whether a particular technology will restrict or enable action depends on various factors, including the material components comprising the artifact, the motives of designers, and the skills of end-users to overcome rules inscribed in the technology. The last variable plays an important role in the variation of outcomes of technological innovations. Users can adapt to the technology's scripts and, thus, sustain the institutional structures/context in which the technology was built. They can also rebel against the rules – i.e. use the technology in a different way and undermine and sometimes transform the embedded values and the existing institutional context. Several organizational studies (Perrow 1983; Wynne 1988) and ANT studies (Akrich 1992) demonstrate how users operating complex technologies often have to deal with high levels of ambiguity and unstructured local situations that are totally different from the expected "normal" operating conditions. In such cases, users of technology employed it in ways very different from the prescribed purpose.

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[23] I would like to thank Andy Hultquist for contributing this idea to my research.

ANT allows us to predict whether the end-users will use technology in the prescribed ways. Such predications are based on considerations about the physical nature of the material entities (Latour 1992). As Latour argues, there are two possible degrees of prescription in things – weak and strong. If a script is weak, it is possible to overcome it. For instance, while people are required to stop at a red traffic light, they can still physically drive. However, if a script is strong, there is little possibility of overcoming it unless you have some specific skills to do so. The car that is wired to start only when the driver wears a seat belt is an example. Only a driver who has the competence to disable the wiring is able to evade this prescription. In keeping with this logic, technology with a strong script is more capable of supporting the context in which it was built, and vice versa (see Table 3).

Physical nature of the artifact	**Predictions about application**
Weak script E.g. traffic light	Can be used in un-prescribed ways and, thus, fails to achieve the expected "positive" effect
Strong script E.g. wired car that requires a driver to wear seat belt	Will mostly be used in prescribed ways with only a few exceptions. In most cases, technology will achieve the expected "positive" outcome.

Table 3. Variable #1 – physical nature of the artifact: ANT predictions about usage of new technology by consumers.

Applying this argument to the Russian case, we can argue that variation in the outcomes of technological innovations in the housing and utility sector can be explained by the physical nature of the new technology – whether it has strong or weak prescriptions for users to follow its rules. For example, we can predict that new heating pipes will be a mostly successful technology for they have a strong script "to reduce heat transportation losses" that not everyone can easily change. Heat exchangers, on the other hand, are more likely to result in a failure to impose their prescriptions "to reduce heat consumption in the building," for they have weak scripts and cannot force residents of this building to follow their rules.

(3) Contribution from new institutionalism – context: What ANT neglects, however, is the explanation of whether users will certainly break the weak script and follow the strong script in all cases and what can explain the variation in their behavior. Will new market-oriented technologies with weak scripts fail in all cases?

New institutionalism allows us to fill in this gap by making predictions about the possible effect of the institutional and technological context in which technology is implemented and used and by specifying the conditions in which a particular trajectory was followed or not. As the institutional approach argues, properties of the institutional and technological context can directly influence humans in their relations with technology and determine the outcome of such interactions. Any technological policy not suitable to the existing context (or the set of expectations and norms embedded in the existing external environment, see Meyer and Rowan 1977) could lose its way in an institution, for members of an organization could apply the technology in ways that were contrary to the defined means and ends for which the device was actually established. Numerous technology studies, for example, demonstrate that the implementation of the same equipment (in ANT terms, with the same degree of prescription) in institutional settings with different funding, labor relations, socio-economic conditions and cultural traditions results in the technology having different effects (Anderson 1988).

Explaining such variation in the implementation of the same innovation under different institutional settings, new institutionalism focuses attention on the existing context and argues that successful organizations usually adapt basic rules of their particular context and by doing that, gain power and resources that are necessary for their survival (Selznick 1957; DiMaggio and Powell 1983; Meyer and Rowan 1977). The degree of adaptation (also called conformity, homogeneity and isomorphism) to the previous “rules of game” (e.g. rationality, formality and complexity) can determine the chances for survival and the future development of innovation. The general prediction is “path-dependency,” i.e. that congruence of the new institution with the current context most likely results in an increased chance to succeed and vice versa.

Employing the same argument, we can assume that in the case of technological innovation in the Russian housing and utility sector, new technology will work if it is congruent/compatible with the old institutional and technological context. That is, it has the same administrative and technical prescriptions as the existing context and does not dramatically change the way humans interact around things. It will also probably fail if there is no such fit (i.e. a new technology tries to change the patterns of interactions between humans and things) (Table 4).

Fit into old technological network	**Totally new for the old network**
Will achieve a “positive” effect, i.e. will be used by consumers in the predicted way	Will probably fail to achieve a “positive” effect, i.e. consumers will use it in a non-prescribed way
Success in future development	**High probability of failure**

Table 4. Variable #2 – context: New institutionalist predications about the usage of new technology.

(4) Combining institutionalism and ANT ideas: What is missing, in turn, in these institutional predictions is the explanation of whether new technology will definitely fail when it does not fit with the old context, or with old values and expectations about human-nonhuman interactions. What can explain deviation from the rule of homogeneity with the existent rules? Combining the ideas of ANT and institutionalism, we can get answers to such question and receive a more complete picture of technological innovation in the Russian case (Table 5).

	Fitting with old context	**Incongruence with old context**
Weak script	**Successful case** There is little chance that technology will be used differently from the prescribed way. While there is a physical possibility of overcoming the script, there are no incentives to do so.	**Failed case** Technology will certainly be used in non- prescribed ways and break the rule of the context in which it was designed.
Strong script	**Successful case** Technology will work in the prescribed way and impose the rules of the context in which it was built.	**Probably successful case** In most cases, technology will work in the prescribed way with some exceptions. Exceptions include high skilled users who will be able to overcome the script.

Table 5. ANT and the new institutionalist model: Predicting the effect of new heating technology in the Russian case.

As such a combination predicts, technology with weak scripts and good fit with the old context will probably succeed in imposing its prescriptions, while technology with strong scripts will be successful in any case - even when it is incongruent with the old context.

This marriage of new institutionalism and ANT can be useful in several respects. The institutional approach suggests a cause-effect model and institutions as explanations but restricts its analysis to only humans (and social organizations) and thus does not consider physical attributes of the involved material entities that can also support or destroy the existent institutional context. In its turn, ANT offers a more dynamic approach to analyze social interactions and suggests a way to account for the impact of nonhumans in the power distribution and the creation of social order.

2.2.3. What does this combined model overlook in Russian case?

Like any other analytical tool, the combined ANT and institutionalism model has its weaknesses. It does not consider the effect of all possible variables that can explain the chances of a new heating technology achieving a positive effect. For example, another possible theoretical variable is time. Historical institutionalism studies predict that time can also influence the effect of technology as the interpretation and use of technologies tend to be routinized over time, becoming less open to modifications by the end-users. Such time closure typically becomes institutionalized and technology becomes more stable thereby disproving its potential interpretative flexibility (Orlikowski 1992). However, the affect of this variable will not be analyzed in this study because market-oriented technological innovations are relatively new in Russia.

2.3. Research goals.

Applying the two models described above - Instrumentalism and the Actor-Network-Institutional approach - and answering the question of how we can describe current changes in the heating sector and the cases of heating disaster in Russia, this study will pursue three goals.

- **It will provide alternative explanations and descriptions of heating accidents in Russia.**

This study will employ empirical data to explore the puzzle of current technological changes in Russian localities. Several studies have already discussed such breakdowns through an exploration of federal policy. Yet, the causes vary across localities, and tens of millions of Russians are affected directly by the operation and changes in heating utility systems at the local rather than the federal level. Only a few of the previous studies suggest empirical descriptions of what happened with heating technologies at the local level (European Commission 1995).

- **It will assess the explanatory power of two conceptual models for the Russian case.**

Russian urban engineering networks also serve here as basis for a more general investigation. The study will compare descriptions of the Russian heating disaster suggested by two conceptual lenses, examine the influence of (sometimes unrecognized) ontological assumptions that are built into these models and demonstrate what they reveal and neglect when applying them to the analysis of the operation of Russian utility systems. To say that different frameworks produce different pictures of the world has become commonplace; however, that fact is often ignored in the research process. When analyzing questions like "How can we describe what is going on with technological policy at the local level?" what we see and consider to be essential elements depends not only on the available evidence but also on the frameworks, categories, and assumptions that we employ for our investigation. Thus, another purpose of this study is to demonstrate how different perspectives channel our thinking about problems such as the success or failure of the operation of urban technologies and what the policy consequences are of including or excluding certain elements of the overall picture.

- **It will apply ANT to analyze policy problems and assess its potential in the field of implementation research in post-communist countries.**

Unlike the conventional instrumentalism framework, ANT suggests also focusing on the role of non-human actants, and analyzing the ways in which such actants have transformed our everyday experiences and, in the end, our society. This model claims that the politics of technology and utility network development (rather than separate fields of technology and policy) should be carefully analyzed in order to understand the peculiarities of urban political economy. How have values inscribed by past decision-makers in these networks affected society and politics?

Several policy studies have already discussed this question, analyzing interactions between different technological artifacts (e.g. information systems, health equipment, etc.) and humans. Yet, while ANT was widely used in various fields of analysis, it has only rarely been applied to technology innovations and transfers in developing and post-communist countries (i.e. the process of transferring a technology developed in one socio-cultural context to another). This study will try to fill this gap. It will also discuss whether this alternative framework can be useful for the analysis of cases like changes in the heating sector in Russia where we can clearly observe competition between the past values of Soviet central planners inscribed in the old equipment and the values of market-oriented decision-makers in the new technologies.

2.4. Research contributions.

The proposed research will have both practical and theoretical implications. First, it will employ empirical data to analyze the case of the provision of public services – heat and hot water – that are fixed geographically. The study will explore the peculiarities of decision-making about such essential services across Russian localities and evaluate the path of current technological reforms there. It will present two alternative viewpoints of the same events and discuss the strengths and weaknesses of their policy recommendations as applied to the case of Russia. This study will also contribute to our understanding of the role of the heating system in social interactions. There is little in the social science literature on centralized heating technology beyond the analysis of economic and technical configuration aspects (a few exceptions include Collier 2001; Summerton 1992). This study tries to fill out gap and demonstrate that technologies often have the persistent value of memory and legacy of their creators who imposed certain social norms in the artifact's design. Such a temporal effect of past memories and legacies can directly influence the implementation outcomes of new policy decisions by enabling success of certain programs and by disabling the effect of others.

Secondly, this research will demonstrate the applicability of the ANT model to the analysis of market building in post-communist countries. Currently, there is no definitive answer to the question of whether we can derive any lessons at all from applying ANT's perspective to such types of analysis. As many ANT reviews indicate, the approach is not assumed to be prescriptive: "It is worth noting that the use of ANT for predictive or diagnostic purposes is quite unfaithful to ANT founding precepts" (Martin 2000, 735). While it is not concerned with building a better society and is often limited to contingent and local explanations, this theory – especially when enriched by insights of approaches that provide cause-effect explanations, like the new institutional approach, - may still be useful in understanding a particular policy.

ANT has the potential to open up policy analysis in transitional countries to new areas that traditionally have not been viewed as part of the field of study. It attracts research attention to the issue of the opposition of different values inscribed in the material surroundings of human interactions. Technologies often have a much longer period of operation in comparison to the life spans of any their designers. They persistently impose the values of past policymakers (e.g. the collectivist values of the designers of the Soviet heating system) and compete against the values of new decision makers (e.g. the market values of the reformers of the Russian heating networks). ANT's critique of modern social scientific practice might also encourage policy researchers to reorient their research practices from *a priori* distinctions between important (i.e. human) and insignificant (i.e. technologies) actors in the market reforming policy process. Such a claim does not imply that policy analysts should abandon their projects and accept ANT immediately, but rather calls scholars to look more closely at conventional models and to ask what is missing or silenced in the present accounts of democracy and market-building in post-communist countries.

CHAPTER 3

METHODOLOGICAL FRAMEWORK

In order to explain the reasons for the current technological disaster in Russia, this study will apply the theoretical insights from two conceptual frameworks – the instrumental implementation approach and a synthesis of the actor-network and new institutional theories. These theories suggest factors that should be analyzed in the study of technological reforms in the country. The next task is to adapt these theoretical frameworks to the specific case of heating reforms in Russia. The main question in this chapter is as follows: How can we operationalize conceptual variables suggested by these models and explore their validity empirically? First, I will outline the main arguments of the implementation approach and the ANT-institutional synthesis and derive a set of expectations for the case. Then, I will discuss the methodological framework of this study and explain the research strategy, selection of the case, collection of data and methods.

3.1. The Implementation Approach and the ANT-institutional Model: Operationalization of main variables.

3.1.1. Comparison of the Implementation and ANT-institutional models.

The implementation approach and the ANT-institutional synthesis advocate different ways to explore the main research puzzle of this study – the causes of current damages on heating networks across Russian localities. Although the first model starts with the conventional analysis of the behavior of both central and street-level policymakers responsible for the operation of the heating sector in the country, the second approach proposes to focus on everyday usage of heating equipment in the locality and on interactions between technology and humans.

Consequently, these models ask different research questions when addressing the problem of the Russian heating disaster. While the first model identifies the constraints of financial and institutional reform implementation in the localities, the second approach questions variation in the implementation of market-oriented technological innovations in different places. Table 6 summarizes the main differences between these models and highlights the research points that each model suggests we should explore in detail or exclude from the analysis.

The implementation approach begins with the persistence of the Soviet administrative system and the failure to implement market reforms policy in the housing and utility sector across Russian localities. It analyzes the main political, social, or economic constraints that facilitate or hinder the reform process in the country. Two theoretical constructs - implementation actors and implementation context – are the main variables for any implementation study (Goggin et al. 1990; Pressman and Wildavsky 1973). Top and bottom-level policymakers are usually considered implementation actors, whose motives for behavior can be analyzed through the exploration of central and local policy decisions and interviews with the relevant officials.

	Implementation approach	ANT-institutional synthesis
Research question	What are the main constraints to carrying out fiscal and institutional reforms in the country?	What are the main technological constraints to the implementation of market reforms?
Conceptual variables	Implementation actors Implementation context	Scripts Programs and anti-programs
Operationalization of main variables	**Actors**: motives for behavior of both central and street-level policymakers **Context (or set of the existing institutions and certain features of these institutions):** financial capacities, human resource capacities, socioeconomic characteristics; physical characteristics	**Scripts:** Physical design of the technology **Programs:** Physical and institutional context (or values and expectations about human-nonhuman interactions embedded in the equipment) in which technology's use takes place **Anti-programs:** Ways invented by end-users to overcome scripts
Data sources	**Actors**: analysis of central and local policy decisions in the sector and interviews with the responsible officials; budget data analysis. **Context**: descriptive statistics comparing the selected case with other Russian cities.	Ethnographic study; Participatory observation of interactions between humans and technology; Interviews with residents and representatives of local housing and utility companies; Analysis of local archival documents about development of heating network in the city
Limitations	Overlooks the details of implementation of the technological component of market reforms; Does not consider usage of new technology in everyday life.	Does not include considerations of the financial aspects of market reforms.

Table 6. Comparison of theoretical arguments of the Implementation model and the ANT-institutional synthesis for Russian case.

A certain set of environmental characteristics (in our specific case, they include financial and human resource capacities, socioeconomic and physical characteristics of the locality) constitutes the implementation context. These variables can be measured through descriptive statistical analysis. While focusing on the behavior of decision-makers in the sector and providing excellent explanations of why financial and institutional reforms were successful or not in the particular locality, the implementation approach overlooks the details of the implementation of the technological component of market reforms and does not consider the fate of new technology after its installation.

The ANT-institutional synthesis model addresses the issues left unanswered by the implementation approach and explores the question of what happens with market-oriented heating technologies after they were introduced. Like the implementation model, this approach also employs the concept of "context"; however, it focuses on different elements of the environment, in which interactions between humans and technology are developed. It pays attention to values and expectations embedded in the technologies. While the implementation model is concerned about funding, human resources, socioeconomic and physical characteristics, the ANT-institutional synthesis model is more interested in descriptions of the competition between the old and new administrative model in the sector and technical prescriptions built into these models. Insights from both ANT and new institutionalism allow an analysis of the effect of such contextual elements inscribed in technology and an exploration of the variation in the implementation of various technological innovations across Russian localities. The effect of the main theoretical variables – the "script," or values built into a technology by its creators, and "anti-programs", or meanings that consumers can impose on the technology - are measured through an exploration of interactions between the physical nature of the artifact and the institutional context in which it is employed. Ideally, such evaluations should be based on a combination of both sociological (e.g. an analysis of historical documents that depict the evolution of the heating network in the country and interviews with consumers of new technology – residents and representatives of the housing and utility companies) and anthropological (e.g. an ethnographic study and direct participatory observation of interactions between humans and technology) methods. However, due to access problems during field research that will be explained below in the section "Research Limitations," this study will employ only sociological methods to explore the implementation of technological reforms in the housing and utility sector.

Like the implementation approach, the ANT-institutional synthesis model forces us to look at and neglect certain aspects of market building in Russia. While suggesting explanations of why we can observe variations in outcomes of technological installations, this model does not consider financial aspects of reforms covered by the implementation model. As this study will try to demonstrate, because each model neglects something important in the picture of the reform process in the country, only their simultaneous application to the same case can offer us a more comprehensive account of the current changes in the Russian heating sector. The discussion below will outline the main dependent variable of this study, which is the same for both approaches, as well as the independent variables, which are different in the implementation and ANT-institutional synthesis models.

3.1.2. Dependent variable: Implementation outcome.

The implementation outcome is the dependent variable for both the implementation and ANT-institutional synthesis approaches. In this study, the main indicators of whether a locality succeeds in implementing market policies in the sector are:

1) The complete or near complete implementation of all required elements of market reform program including: a) financial and institutional changes and b) technological improvements.
2) Performance in the heating sector, or the quality of heating sector operations, - *heating comfort.*

The last indicator is missing from previous studies that are concerned mainly with an evaluation of the city's progress according the first indicator and neglect the overall performance in the sector (World Bank 2003; United Nations 2004). The heating comfort variable may be measured in several ways including aggregated volume of heating supply or the number of heating days per year (Fedyaev and Fedyaeva 2000; Minenergo 2002). In the present study, the heating comfort will be evaluated using two indicators:

- <u>Aggregated volume of heating supply</u> in the city, that is, the volume of heat produced in thousands of Gcal per year compared to the same indicator in other Russian localities. Due to a lack of data across the country, this parameter will be considered only for the localities inside the same region.

Relevant research data: Statistical data about heat production across localities.

- <u>Quality of heating services</u>. Because the first indicator is very vague measure of the heating quality in the city (e.g. the location may have a high volume of heat production, but due to old pipes, it may have huge losses on heat transportation rather than comfortable heating in apartments), quantitative indicators – the satisfaction of residents with heating services in the city – will be also considered. This variable will be measured based on the analysis of the number and nature of consumers' complaints about the heating sector submitted to the central dispatching office and the city council. While this approach does not measure heating damages directly, it still allows an analysis of whether residents are comfortable in their apartments during the heating season or not in the selected case. In short, it is a reasonable proxy for heating comfort in the city.[24]

Relevant research data: Statistics regarding consumers' complains about the sector submitted to the central dispatching office and to the city council.

[24] Other possible measures of heating damages include: (1) Statistics of damages collected directly by the utility company. This is the most preferable indicator of damages in the city. However, due to access limitations during field research, I could not collect this data. Moreover, as some representatives of the utility company reported in personal interviews, statistics on damages was not collected in the city until the beginning of 2005, which again makes it hard to employ this measure. (2) Reports about damages in local newspapers. This data is relatively easy to collect, but often inconsistent. Coverage of such damages presented in local mass media is usually very short and limited.

3.1.3. The implementation model: Main explanations for the dependent variable.

According to the prescriptions of the first model – the implementation framework, two independent variables can help us to explore market reform implementation across the Russian localities. They are the implementation actors and the implementation context. Based on previous findings, we can formulate the following theoretical **expectations** about effect of these variables on the dependent variable – that is, the implementation of financial and institutional reforms in the housing and utility sector in case of a Russian locality.

Implementation actors:

Implementation of market reforms in the city depends on both the incentive structure of local implementers and central decision-makers' policy instruments.

1) *Political will of city's mayor (i.e. courage to increase local tariffs regardless of hurting re-election chances) explains the policy implementation outcome in the locality.*

As the bottom-up theory of implementation demonstrates, the incentive structure of local implementers and their direct interactions with residents determine the implementation outcome of any policy. In our case, it implies that the motives for the behavior of local officials and their policy decisions – the mayor's desire to implement market policy in the local housing and utility sector, especially to increase tariffs on utility services to the full cost-recovery level regardless of the increased probability of social protests in the city – are one of the major factors that explain variation in reform success across the country. If the mayor is willing to introduce and sustain financial reforms in the locality, then, the city will have enough money for capital repairs and rehabilitation of the outdated urban networks and, in the end, will escape heating damages.

2) *The nature of cooperation and communication between different levels of authority determines the degree of discretion available at the local level and influences market policy implementation outcomes in the city.*

However, top-down theory adds to the previous argument that higher-level policy-makers can also influence the implementation outcome. Their decisions and policy instruments can increase or decrease the degree of discretion available to local implementers. If communication between central decision-makers and "town-level" officials is stable and the locality is allowed to extract its own funds, it will have a higher degree of autonomy to make its own decisions in the city's housing and utility sector and eventually succeed in market policy delivery and technical restoration of the sector.

Implementation context:

3) *The outcomes of interactions between the above actors and, in the end, market policy implementation outcome in the city, heavily depend on the degree of fit with crucial components of the old institutional and physical context.*

In addition to local incentives and central policy instruments, the hybrid theory of implementation suggests also considering the nature of the context in which interactions between different actors are developed. If the city has a small degree of misfit between the required components and the new market policy (misfit means here the extent to which the new policy is different from the conventional "way of doing things" in a locality), it will be able to succeed in market policy implementation in the sector. According to previous studies, for the specific case of the housing and utility sector in Russia, elements that increase local chances to successfully progress in market reforms include: high budget capacity; the high number of professionals with special education in the city's heating utility; low share of poor people and high average wages of employees; relatively low costs of heat due to the geographical position of the locality in a temperate climate; the small share of old building and run-down housing stock; the small share of public housing in the city.

3.1.4. The implementation model: Operationalization of independent variables.

The next question is how we can empirically measure these theoretical concepts or factors and where we can find the relevant research data. In order to evaluate the validity of these assumptions in the selected case of market policy implementation in the housing and utility sector, I will examine the following indicators.

Independent variable #1 - implementation actors:

1) Behavior of the city's mayor and his administration (political will of the mayor is evaluated based on: a) his capacity to introduce elements of market reform in the city, and b) the sustainability of these decisions, i.e. whether the new policy has or has not been immediately canceled after social protests in the city).

Relevant research data: Annual city report about operation of the housing and utility sector; local regulations and programs in the sector; publications in local mass media that describe implementation of local decisions.

2) The nature of region-city relations (the degree of financial and political independence of the city from the regional and federal centers; the variable is evaluated based on the budget analysis and an analysis of conflict cases when the higher authorities intervened in the local housing programs and the city insisted on delivering its own decisions).

Relevant research data: Local budget analysis; annual city reports and local regulations and programs in the sector; publications in local newspapers that describe implementation of these regulations.

Independent variable #2 - implementation context:

In order to generalize our case to other Russian towns, all local data will be compared to data from other Russian cities. The lack of state municipal statistics considerably hinders comparative analysis inside the country. In most cases, information is only available at the national level or for cities of federal significance – Moscow and St. Petersburg. Therefore, I will primarily compare the selected case to the national average as well as to data from these two cities. When possible, I will also employ data from other Russian cities as well.

1) Financial resources (specifically, whether the city has enough money to cover activities in the housing and utility sector; this variable is measured through an analysis of local budget).

Relevant research data: Local budget analysis.

2) Human resources in the local heating utility (specifically, whether the city has enough professionals to run the activities of the heating company; this variable is measured through employment analysis – number of labor turnover in the sector and the level of salaries in the sector in comparison with wages in other industries).

Relevant research data: Statistics about the employment structure in the locality and the local housing and utility sector.

3) Socioeconomic characteristics of the city (the share of people with minimum salaries and the unemployed rate, the level of average wages in the city, the percentage of budget expenses on social assistance programs).

Relevant research data: Data about the salary and employment structure in the locality; local budget analysis.

4) Physical characteristics of the locality that include:

- Geographical location of the city.
- The age of the buildings and the share of run-down and dilapidated housing stock.
- The number of privately owned vs. municipally owned residential units.

Relevant research data: Statistics on the housing structure in the locality.

3.1.5. The ANT-institutional synthesis model: Main explanations for the dependent variable.

The second approach employed in the study – a model that combines ANT and institutionalist insights - suggests scripts and programs as the main independent variables for the study of implementation of technological reforms in the country.

Based on previous findings, we can formulate the following theoretical **expectations** about the implementation of the technological sub-program of market reforms in case of a Russian locality:

1) *Human actors are not the only policy actors; technologies do have the capacity to influence human decisions and change the outcomes of policy implementation.* They can enable or disable the prescriptions of the institutional context in which they were built.

2) Behavior of technology (i.e. whether it will have "positive" or "negative" effects) can be understood through an analysis of the local context of interactions between artifact and humans. Such an analysis should include: a) an investigation of the material components comprising the artifact, b) the institutional context in which a technology was developed and the context in which it is currently used, and c) the power and interests of human actors (designers, users and managers).

3) *An explanation of why heating technologies produce different outcomes is predicated on the degree of their fit with old institutional and technological contexts (or sets of values embedded in old equipment) and the degree of prescriptions in the new technology.*

- If the new technology – both with weak and strong scripts - is congruent with the old context (i.e. it fits with expectations inscribed in the old heating network), in most cases, it will achieve prescribed goals.
- If the new technology is derived from the new context (i.e. it tries to impose new values that are different from the existing expectations), it will fail if there are weak scripts and is more likely to work if there are strong scripts.

3.1.6. The ANT-institutional synthesis approach: Operationalization of the independent variables.

The main variable of the ANT-institutional synthesis model will be the content of s*cripts*, that is a set of instructions for actants' actions inscribed in technological artifacts. The degree of prescriptions in technology – whether it has a strong or weak script - was measured through a determination of the physical possibility for humans to access the equipment. For instance, heat meters are installed inside the individual apartments where any resident can interfere in its operation. Heating pipes, in contrast, are installed under the ground and do not provide chances for ordinary residents to access them directly.

There are two main stages in scripts' evolution in human-technology interactions. At the initial stage, scripts - "initial scripts" (e.g. in the heat meters case, scripts that impose calculative behavior on consumers) - are inscribed in the technology. When interacting with technology, human actants can promote "anti-programs" of action (e.g. consumers invent a way to use a heat meter in an unexpected manner) and then, the initial program or script can alter and emerge as a different "script-in-use" (Underwood 2001).[25] The divergence or similarity between such scripts can provide some insights to why the policy inscribed in the device was or was not headed in the claimed direction.

The main data that can help describe these scripts and the context of their changes in the Russian housing and utility sector include: a) initial scripts in the Soviet heating system and b) new scripts in the market-oriented heating technologies.

- Design principles inscribed in the Soviet-time heating network.

Like any technology, Soviet urban networks were designed in such a way that they imposed certain norms of behavior and patterns of everyday interactions on people that were appropriate for the society. Soviet centralized heating is one of the largest and most unique systems in the world. While other countries such as the U.S., Great Britain, Switzerland, Italy, Belgium and Scandinavian countries have several district heating systems within the country, only in the Soviet Union was the network extended to almost every location and apartment in the country. In the U.S., for

[25] As Underwood (2001) argues, there are some similarities between "scripts-in-use" and one of the concepts in organization theory - "theories in use"(Argyris and Schon 1978). The main difference between ANT and conventional organizational theory is their perception of social interactions: While organizational theory believes that only humans can possess theories in use, ANT grants such an ability both for humans and for non-humans.

instance, district-based heating systems are employed only in few places, like New York, St. Paul (Minnesota), Trenton (New Jersey), Pittsburgh (Pennsylvania) and Los Angeles (California) (Summerton 1992).

In addition, another major difference should be kept in mind. In most places, especially around Europe, district-based heating systems emerged after most commercial and residential buildings were already built, i.e. district heat came to towns that had the pre-existing physical infrastructure. In the former Soviet Union, the heat network and most buildings (and in many places, the city itself) were constructed simultaneously, and therefore, many ideas that governed Soviet society could be easily built into the newly installed technology. Even in Moscow and St. Petersburg (the old cities with already existing material infrastructure), most residential buildings were constructed after 1946 (in Moscow, 95% and in St. Petersburg, 78%) – the period when centralized heating systems had been widely extended around the country.

As a result, Soviet collectivistic norms could be easily inscribed in the design of the heating technology. Single-way inside house pipelines in residential buildings prescribed limitations to disconnect individual apartments and control temperature levels in every household's unit. While the consumer was the end-user of the Soviet utility networks, she enjoyed less agency and ability to act than the other groups, e.g. representatives of the utility and housing maintenance companies.

In order to explore the initial "scripts" in Soviet technologies, we will look for the following points:

1) Administration model in the sector (main actors and their administrative resources, set of instructions of who is responsible for what in the sector). In terms of our model, **the institutional context** in which the technology was developed.

Relevant research data: Historical documents that describe the development of the heating network in the locality during the Soviet period, e.g. local archival data and the heating company's historical materials.

2) Technological model in the sector (The same actors with the same resources as in the administrative model, or are there some differences? What were the

ideology/scripts behind the Soviet heating equipment?). In terms of our model, these are **scripts for nonhumans/technology,** or material components comprising the artifact**.**

Relevant research data: Historical documents that picture the development of the heating network in the city during the Soviet period, e.g. local archival data and the heating company's historical materials.

3) Power of different actors to change anything in the sector allowed by both the administrative and technological model. In terms of our model, that is the **distribution of power** among actors prescribed by technology (in ANT language, programs).

Relevant research data: Historical documents that describe the development of the heating network in the city during the Soviet period, e.g. local archival data and the heating company's historical materials; interviews with high- and low-level officials who were responsible for the implementation of heating policy in the locality in Soviet times, e.g. representatives of the municipal administration, heating utility and housing maintenance companies.

4) The ways to overcome both administrative and technical restrictions invented by ordinary residents and representatives of the housing maintenance companies. In terms of our model, strategies to overcome the existent power distribution imposed by technology (in ANT language, **anti-programs**).

Relevant research data: Historical documents that picture the development of the heating network in the city during the Soviet period, e.g. local archival data and the heating company's historical materials; interviews with low-level officials who were responsible for the implementation of heating policy in the city during Soviet times, e.g. representatives of the housing maintenance companies; publications in local newspapers that describe the operations of the sector during Soviet times.

- <u>Prescribed role of the new, market-oriented technology.</u>

Like the Soviet heating equipment, new, market-oriented technologies installed in Russia are also designed in such a way that they try to impose certain norms of behavior and models of everyday interactions. Water and heat meters, for example, are expected to provide the right set of incentives for consumers and utility producers and allow the calculation of utility consumption. Automatic heat exchangers are expected to promote energy-savings).

Like in the case of the old design, there are four main points I am going to look for and compare with elements from the old Soviet system:

1) **The new institutional context:** The new administration model in the sector suggested by market reform programs (the main actors and their administrative resources, set of instructions of who is responsible for what in the sector, comparison of the Soviet-time and the new administrative instructions).

Relevant research data: Annual city reports about the operation of the housing and utility sector; local regulations and programs in the sector; historical documents that picture the development of the heating network in the city in post-Soviet times, e.g. local archival data and the heating company's historical materials.

2) **New scripts for nonhumans/technology:** Technological innovations in the sector (What is the ideology behind the newly installed heating equipment? Is it the new type of equipment? If so, is it congruent with elements of the old infrastructure?).

Relevant research data: Annual municipal reports about the operation of the housing and utility sector; local regulations and programs in the sector; interviews with high-level officials who are responsible for the implementation of heating policy in the locality, e.g. representatives of the municipal administration and of the Department of Housing and Utility Services.

3) **New distribution of power**: Abilities of different actors to change anything in the sector allowed by the new administration and the technological model.

Relevant research data: Interviews with high- and low-level officials who are responsible for the implementation of heating policy in the locality, e.g.

representatives of the municipal administration, heating utility and housing maintenance companies.

4) **Anti-programs**: The ways to overcome prescriptions suggested by the administrative model and to change the meaning of the new technology invented by ordinary residents and representatives of the housing maintenance sector. What type of technology can be easily changed?

Relevant research data: Interviews with low-level officials who are responsible for the implementation of heating policy in the city during Soviet times, e.g. representatives of housing maintenance companies; interviews with residents; publications in local newspapers that describes the current operation of the sector.

3.2. Methodology.

3.2.1. Case-study research.

This is a single interpretive case study (King et al. 1994; Yin 1994).[26] The reason to pursue such a research strategy is as follows: Russia is a very big country with 2,940 cities and 155,288 rural settlements with areas of very different geographic conditions and different needs for heating (United Nations 2004, 25). Thus, the feasibility of conducting a multi-case study of the implementation of heating reforms intended to produce unified policy recommendations for the entire country is very questionable. As some studies demonstrate, for some Russian regions there are unique challenges and peculiarities of implementation that are not issues for other localities and therefore, different policy conclusions will apply in different parts of the country (United Nations 2004). Another problem is the lack of consolidated data about the heating sector across Russian localities. For a long time, the housing and utility sector was not considered an economic activity; thus, there is only very general information

[26] I employ Yin's definition of a case study: "an empirical inquiry that investigates a contemporary phenomenon within its real life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used" (Yin 1994, 23).

about the sector's operation in Soviet and Russian statistical databases (Andrusz 1984). Under such conditions, it is hard to conduct any feasible research for the Russian housing and utility sector as a whole.

A single case study is the best way to realize the research goals of this study - to furnish the details of policy implementation in the heating sector and analyze the role of technology in this process. While the limitations of studying one case are self-evident (i.e. it is based on a limited set of evidence; it limits generalizations and provides an insufficient representation of diversity), the examination of a single city still has a big advantage. Because of the manageable proportions of the analysis, it allows me to demonstrate how different conceptual lenses suggest diverse explanations for events in the Russian heating sector.[27] Moreover, even one case can be enough to sustain causal inference if it engages in comparative analysis. In this research, a single locality can serve as an example of variation across different aspects of the role of technology in policy-making within a similar political and economic context (thus, unlike multi-case comparisons, it can control for many factors that may be important but are otherwise unexplored).[28]

Finally, regardless of regional variation, one case study can be helpful in understanding current developments in the housing and utility sector in Russia for the nature of the problem (e.g. the lack of heat, frequent breakdowns, and the resistance of Soviet network to accept new technologies) is basically the same across different locations. This case analysis can serve as the baseline for future studies that seek to identify major implementation challenges in other locations.

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[27] A single-case approach was employed in number of social science studies and proved to be a useful research strategy in the evaluation of the strengths and flaws of different theoretical models. For instance, Graham Allison's *Essence of Decision* (1971) used the Cuban Missile Crisis as a case study to compare three different ways or "lenses" of examining governmental decision-making: the "Rational Actor" model, the "Organizational Behavior" model, and the "Governmental Politics" model. As Allison argues, none of his models could explain the event in full; however, policymakers would definitely benefit from stepping away from one model and exploring alternative viewpoints of the same case.

[28] Numerous studies have made use of the intra-case variation technique, e.g. George and Smoke 1974; George and Simmons 1994; Hopf 1994.

3.2.2. Case.

Cherepovets is the primary research site for this study. It is a city in the Vologda region, 620 km north of Moscow, and 475 km southeast of St. Petersburg (see the maps in Appendix A). It is one of the major industrial towns in the Northwestern part of Russia. A number of the largest Russian enterprises (including one of the largest Russian steel plants – a company called "*Severstal*") are located here.

There are several reasons for the selection of this site (see discussion of the possible limits of case selection based on the dependent variable and my strategy to overcome these limitations below, in the section "Research Limitations"). As many analysts argue, Cherepovets was one of the few Russian localities that succeeded in market policy implementation in the housing and utility sector – both in institutional and technological sub-elements of the market program (Institute for Urban Economics 2003; World Bank 2003). The city was the first one in the country that introduced the full cost-recovery prices on utility services, abandoned the practice of budget subsidies for housing and utility companies and introduced the means-tested housing allowance programs. Overall, the operation of the local heating system is very stable with limited damages to heating pipelines and the absence of major technological breakdowns that have been common in other Russian localities since 2003.

The simple reason for Cherepovets' progress in market reforms is the city's wealth. Unlike many other Russian localities, Cherepovets is one of the few Russian townships that was lucky enough to have financial resources for municipal activities in the housing and utility sector. *Severstal* – the main enterprise not only in the city but also in the Vologda region - is relatively profitable and is one of the four biggest plants in the country. It produces about 18% of the total volume of Russian steel. In addition to the tax revenues from Severstal, Cherepovets received a huge World Bank loan for the reconstruction of its municipal housing stock and improvements of its heating networks in 1996. Thus, at first cut, abundant financial resources appear to be a sufficient explanation of successful implementation in this locality.

However, as the above review of the previous studies demonstrates, money alone is not a sufficient factor for any city's success in market policy delivery. As this study will demonstrate, although Cherepovets succeeded in installing new technologies required by the market program (like heat meters or automatic heat exchangers[29]), there is intra-case variation in the outcomes of such innovations. For instance, new pipes and thermal insulation of residential buildings applied in the city were successful, while heat meters and heat exchangers failed to achieve their goals of energy-savings through a reduction of heat consumption.

What else can explain Cherepovets's achievements in reforming its housing and utility sector? What did the city's officials do in order to improve heating services? Why did some technical innovations in the sector succeed, while others failed? Applying our first analytical model – the implementation framework - we can conduct an analysis of Cherepovets's policy of heating and suggest possible answers to questions about the financial and institutional factors of the reform process and solutions to overcome the heating disaster in other Russian localities. Our second model – the ANT-institutional synthesis approach – will allow us to answer questions about variation in the outcomes of technological innovations. Applying this model, we can conduct an analysis of Cherepovets's controversies with heating equipment and suggest an explanation of why there is still variation in the effect of new technologies in the same locality which enjoys favorable conditions.

To summarize, given that Cherepovets has sufficient funds for reforms but still has problems with some changes in its heating network, the city provides an excellent opportunity to examine the general problem of implementing heating sector market reforms in the Russian localities. Because the case has been selected on the dependent variable – that is, successful implementation of heating reforms in the city, - there is automatically some selection bias and a possible underestimation of the causal effects

[29] A heat exchanger is equipment that automatically controls the temperature level inside a building. An automatic exchanger replaces the Soviet-style manual heat exchanger (equipment that allows only manual control of the temperature level by special repairpersons from housing maintenance companies).

(King et al. 1994). However, there is still great value in such a study because it allows us to generate hypotheses about implementation factors in the housing and utility sector, the validity of which can be tested in future studies.

3.2.3. Data sources.

The discussion of heating policy in Cherepovets makes use of all the information available in the public record. The amount of information available in public sources is extraordinary, for heating problems are the “hot topic” for many in the Russian mass media. As a participant of the Academy of Finland’s research project, “Self-governing associations in Northwestern Russia: Common things as the foundation for Res Publica,”[30] I also conducted interviews during the spring of 2005 and the spring of 2006 with high-level actors in heating policy in Cherepovets (see the list of respondents and the reasons for their selection below and in Appendix B). Moreover, I have had the benefit of extended and repeated conversations with individuals who are not directly involved in housing-utility policy in the city, but who regularly communicate with high-level officials in the sector. And, finally, I have been granted permission to use the results of interviews with a large number of people who are involved in the lower-level operations of the heating and housing sector in Cherepovets that were collected by other participants of the same research project with the Academy of Finland.[31] In order to gain the kind of reliable historical perspective that an interviewing method cannot provide, I also make use of a variety of historical, statistical and budgetary materials that offer valuable information about the development of the heating network in the city and in the country. In short, multiple research sources were cross-checked and evaluated through a “triangulation” process that increases the validity of the research data (Yin 1994).

[30] Academy of Finland, Grant #208170: “Self-governing associations in Northwestern Russia: Common things as the foundation for Res Publica”.

[31] The research was conducted by Dr. Eugenia Popova (Tomsk State University, European University at St. Petersburg) in Fall 2005. All interpretations of collected interviews and data are mine.

Given the above discussion of the relevant research data for our dependent and independent variables suggested by the implementation and the ANT-institutional synthesis models, the story of the Cherepovets's heating policy in this thesis will be documented using the following sources (see Appendix B for detailed list):

- **Interviews** (see a detailed list of respondents in Appendix B):

(1) Interviews conducted by the author with high- and middle-level local officials who are responsible for heating policy in Cherepovets. Interviews were conducted during the spring of 2005 and the spring of 2006 (20 interviews).

(2) Interviews with residents and low-level representatives of the heating and housing sector in the city conducted during the fall of 2005 (9 interviews) (taken from the Academy of Finland project).

Selection of respondents: Regarding the selection of respondents, the procedure varied from purposive sampling to ad-hoc selection based on the availability of respondents. In order to measure independent variables for both approaches, the research required interviews with both high and middle-level (e.g. representatives of the city's administration and the Department of Housing and Utility Services) and low-level officials (e.g. representatives of the heating utility and housing maintenance companies) who are responsible for the operation of the housing and utility sector in the city in Soviet and post-Soviet times. Several respondents were contacted with requests about research; all available officials were interviewed.

- **Mass-media publications:** Publications of one of local newspaper, *Rech*, about the development of the heating sector in Cherepovets (147 sources, 1999, 2004-2005).

Selection of newspaper: This particular newspaper, *Rech*, is the publication of Cherepovets's city administration that articulates official viewpoints of the local decision-makers regarding the operation of the housing and utility sector in the city. This publication helps clarify the principles of the new administrative model that are currently being developed in the sector.

- **Local regulations and programs**:

(1) Annual city's administration reports – city's development in general and housing-utility services in particularly (2001-2004);

(2) Local regulations about prices for utility services (2001-2004);

(3) Local regulations and programs in heating supply sector (2001-2004);

(4) Cherepovets detailed local budget data (2001-2004);

Selection of materials: All materials available to the public, which picture the development of the housing and utility sector in the city, were collected and analyzed. This set of data is used for measures of independent variables suggested by both approaches.

- **Historical data**:

(1) Historical documents of a local heating company – Teploenergiya (1968-1999);

(2) Local heating company's journal published since 2004 – *Vesti,* 12 issues in 2004;

(3) Local archival data about development of the housing and utility sector in the city (1940-1991).

Selection of materials: All materials available to the public, including local historical materials, were collected and analyzed. This set of data was mainly employed for measures of independent variables suggested by the ANT-institutional synthesis model.

- **Statistical data about the development of the housing and utility sector in Cherepovets (1940-1991)**.

Selection of data: All data available to the public, including local statistical materials, were collected and analyzed. In addition, publications by the Federal Statistical Committee which provides national-level data were employed. This set of data was used to evaluate independent variables suggested by the implementation model.

In order to map data to the factors suggested by the implementation and the ANT-institutional synthesis models, Tables 7 and 8 specifies the link between specific data sources and the dependent/independent variables that will be the basis of the analysis of each of the two approaches. As I mentioned above, the internal validity of these measures was checked through "triangulation" (Yin 1994) – the use of several data sources, comparison of which allows me to cross-check the suggested measures.

3.2.4. Methods.

Analysis of the collected data is grounded on a *thick description* (Glaser and Strauss 1967) of the context of the policy in the selected city. These descriptions are based on:

(1) In-depth, semi-structured interviews with the heating sector's agents - policymakers in the Cherepovets mayor's office (representatives of different departments who are responsible for housing and utility services in the city); representatives of the heating utility; representatives of the municipal housing companies; and the end-users of heating services in residential buildings.

(2) Analysis of documents, like mass media discussions, archival data.

(3) When possible, qualitative analysis is confirmed by descriptive statistics and budget data analysis.

Variables	Data
Dependent variable: heating comfort	Statistic data about heat production across localities; Statistics of consumers' complains about the sector submitted to central dispatching office and to the city council.
Independent variable #1: Behavior of implementation actors	Annual city report about the operation of the housing and utility sector; local regulations and programs in the sector; local budget analysis; publications in local mass media that describe implementation of local decisions.
Independent variable #2: Implementation context	
- Financial resources	Local budget analysis.
- Human resources	Statistics of employment structure in the locality and local housing and utility sector.
- Socioeconomic characteristics	Data about salary and employment structure in the locality; local budget analysis.
- Physical characteristics	Statistics of housing structure in the locality.

Table 7. Data sources for measures suggested by the implementation model.

Variables	Data
Dependent variable: **Heating comfort**	Statistic data about heat production across localities; Statistics of consumers' complains about the sector.
Independent variables #1: **Scripts and programs**	
Old scripts	Historical documents that picture the development of heating network in the city during Soviet period; interviews with high- and low-level officials who were responsible for implementation of heating policy in the locality in Soviet times.
New scripts	Annual city reports about the operation of the housing and utility sector; local regulations and programs in the sector; historical documents that picture the development of heating network in the city in post-Soviet times, interviews with high and low-level officials who are responsible for implementation of heating policy in the locality.
Independent variable #2: **Anti-programs (ways invented by end-users to overcome scripts)**	
- Old anti-programs	Historical documents that picture the development of heating network in the city during Soviet period; interviews with low-level officials who were responsible for implementation of heating policy in the city during Soviet times; publications in local newspapers.
- New anti-programs	Interviews with low-level officials who are responsible for implementation of heating policy in the city during Soviet times, e.g. representatives of housing maintenance companies; interviews with residents; publications in local newspapers of the sector.

Table 8. Data sources for measures suggested by the ANT-institutional synthesis model.

3.3. Methodological limitations of the study.

There are at least four general methodological limitations of the study:

<u>One case</u>: The main purpose of this research is to accumulate evidence about the factors affecting the state of heating services in Russian localities, to suggest as much evidence about these factors as possible, and to advance our knowledge about the technological operation at the municipal level. However, explanations in this study will be tested against evidence collected in a single locality while in all of Russia there are a total of 13,383 municipalities. As a result, this research will only try to find the causes that might help us to predict the degree of success a locality will have in dealing with the heating problem, but will not make valid generalizations about such factors. In order to get more generalized conclusions, the findings of this study can be used for further research of technological changes across Russia and, possibly, across other countries that experience the same technological problems.

<u>One country</u>: Another limitation of this presented study is its focus on one country and its "heating disaster." One could easily assume that broken technologies are exclusively the issue for transitional countries that lack the financial resources to reconstruct urban networks. However, as research on urban networks in other countries demonstrates, the problem with rebellious technologies that refuse to serve society is widespread around the world (Graham and Marvin 2001). Thus, the analysis of technological policy and its challenges based on a single case study in Russia can be useful for our reflections about general patterns of interactions and the co-existence of humans and non-humans in urban settings.

<u>Selection of the case on the dependent variable</u>. An additional flaw of the research is the selection on the dependent variable – successful or failed implementation of market reforms in the locality – which leads to a "selection bias" and an underestimation of causal effects, "at least on average" (King et al. 1994, 127). In this thesis, this limitation was overcome through an analysis of additional observations of the dependent and independent variables in other cities. When it was possible to conduct secondary research, hypotheses produced by the detailed study of

Cherepovets were compared with findings from other cases based on the analysis of secondary statistical data. While this strategy does not completely eliminate selection bias or provide evidence that fully confirms my arguments, it permits, at minimum, a development of our theoretical expectations and an exploration of "whether the direction of selection bias will be in favor of, or against" (King et al. 1994, 127) the initial hypotheses. In future studies, the findings of this study can be tested in a project that selects cases on the basis of explanatory variables without regard to the degree of progress in local housing and utility sector reform. In such a design, it will be possible to generalize whether variations in the independent variables (e.g. the motives of the implementation actors, the specifics of the implementation context, scripts and anti-programs) are associated with variation in the dependent variable – e.g. the implementation outcome in the housing and utility sector.

Employed research methods: Lastly, the most serious limitation of the proposed study is that while I apply the theoretical insights of the ANT model to my research, I overlook part of its methodological principles. As mentioned above, true ANT research combines both sociological (interviews and analysis of documents) and anthropological (direct observation) methods. However, difficulties in obtaining access directly to technological artifacts during my field research made it impossible to present the voices of technology in this study. I was granted permission to conduct interviews that explored perceptions about interactions with technologies, but not to observe these interactions directly. In other words, this research is only about what people said about technology, not what they actually did with technology. In this sense, the presented study can only partially demonstrate ANT's potential in policy analysis. I tried to overcome this shortcoming by employing only one factor suggested by the model - *scripts* – which can be analyzed based solely on documents and interviews. These documents reveal how technologies function as actors in networks, the role they play and how they act to empower other actors in the network by imposing specific restraints on others. However, still more information is to be gained through ethnographic research and participatory observation in future ANT studies.

CHAPTER 4

IMPLEMENTATION APPROACH: POLICY IN THE HEATING SECTOR IN THE CITY OF CHEREPOVETS

This chapter will attempt to answer the first research questions: Given that money is not a sufficient explanation, what else can explain heating accidents around the country? Why do some Russian localities succeed in market policy implementation in the sector while others fail?

The ultimate goal of this chapter is to examine heat policy in the selected case, the city of Cherepovets, in light of municipal self-government reforms that were implemented in all Russian localities during the last 15 years. This issue will be studied using the ideas of the implementation model, i.e. through the study of the relationships between Cherepovets's implementers and central decision-makers, federal and regional, and the outcomes of such interactions in the local housing and utility sector[32] from the beginning of the 1990s until now. The analysis will also include considerations of the nature of the existent context in which such interactions are developed.

[32] The heating sector will be analyzed here together with the housing sector because of the impossibility of separating local policies in these domains. As previously mentioned, one of the main features of Russian housing sector management is that the housing and utility sectors are closely intertwined in the eyes of both policymakers and ordinary residents.

It is necessary to note again that the selected conceptual lens obligates the researcher to see, emphasize and worry about certain aspects of reality. When applying the implementation model to the Cherepovets case, we are forced to focus our attention on the limited number of variables and, as a result, to get a picture of local heating policy from a restricted standpoint. As prescribed by this model, the analysis presented below will concentrate primarily on the behavior of the main actors who were responsible for market policy implementation in the sector, representatives of the Cherepovets city administration, their problem-solving strategies, and their interactions with the higher levels of authorities. This analysis will focus on the impact of two explanatory variables, *institutional context* (this includes financial and human resource capacities of the city as well as its socioeconomic and physical characteristics) and *implementation actors* (the behavior of the city's mayor and his offices and the relationships of these "town-level" bureaucrats with federal and regional authorities) on the outcome variable – *success or failure of market reform implementation in the housing and utility sector* (see Figure 2 in Chapter 2).

Chapter 4 consists of six sections. First, I will present a brief overview of the development of the heating sector in the country, summing up the main causes of the heating crisis and the anticipated policy recommendations to improve the situation. Next, in order to explain the origins of the heating disaster and to place the case of Cherepovets in the totality of Russian cities, background about the institutional context of local reforms will be discussed. Then, specific details of the implementation context of reforms in Cherepovets will be presented, followed by analysis of policy in the housing and utility sector in the city. The chapter will conclude with a discussion of the strengths and weaknesses of policy conclusions that can be derived from this case based on the instrumentalism-implementation framework.

4.1. The heating sector in Russia.

4.1.1. Overview.

Russia is a country of centralized pipes and boilers. “A visitor to cities in post-Soviet Russia cannot but be struck by the obtrusive presence of pipes. Thick silver heating pipes up to a meter in diameter emerge suddenly from the ground, in the midst of a park or walkway, often two in parallel” (Collier 2004, 50). The heating system was developed in the 1920s. The earliest networks were erected in Leningrad (where the first heating pipe produced heat for a group of residential buildings and a hospital in 1924) and in Moscow (where the first combined heat and electricity station was built in 1928). Between 1931-1934, combined heat and electricity stations were also constructed in Kyznechk, Berezniki, Yaroslavl, Lipechk, Sverdlovk, and Kazan. In the post-World War II period, centralized heating systems were built in most urban localities around the country (Fedyaev and Fedyaeva 2000). Today, centralized heating systems serve 80-92% of urban and 20% of rural residents, that is, about 63% of the population of the country. The total size of the heating networks is around 202,700 km with 144,800 km located in urban settlements and 57,900 km in rural areas (Federal’noe sobranie 2003).

Historically, the main consumers of district heating were (and are today) industrial enterprises, followed by the housing and utility sector and other industries. In 1990, for instance, industrial enterprises consumed 52.2% of heat; residents 35.4%; agriculture 3.7%; construction 2%; and transportation 1.9% (Fedyaev and Fedyaeva 2000, 20). These groups of consumers are served either by combined heat and electricity stations (today, branches of the Russian energy company RAO EES) or by heat-only boilers (that are under different forms of ownership; most of them are municipally-owned companies). These stations and boilers are the main heating sources, producing 71.5% of the heat in Russia. Inside this group, boilers generate 53.9% and combined heat and electricity stations produce 29.3%. Other sources produce the remaining 28.5% of heat in the country. Among them are small boilers (38.2%) and autonomous heating stations (61.8%) (Federal’noe sobranie 2003).

The questions about the profitability of running these heating sources were never raised during the Soviet period. The operation of the sector was based on cross-sectoral subsidies under which industrial enterprises covered the largest part of the expenses of heat production and residents paid only a small share of the expenses. Like many other economic activities in the Soviet Union, heating was considered a social issue rather than a major economic activity. Therefore, there is virtually no aggregate data about the total volume of subsidies in the sector, profitability of heating sources in different localities or technological conditions of heating pipes and boilers before the 1990s. Even today, exact numbers are not available, and data about sector performance varies across professional reports and academic studies. It is certainly known from stories like Tihvin and Karelia in the winter of 2003, described in the Introduction, that today the system suffers the absence of modern equipment.

As suggested by the experts, the main technological spots that require immediate actions are as follows (Federal'noe sobranie 2003; Makarova 2001):

- Pipelines (it is estimated that their poor condition leads to around 15% (according to other data, 40%) of overall losses of operation in the sector)
- Poor insulation of residential buildings (45% of overall losses)
- Overheating (30%)
- Hot water supply system (10%).

Overheating, for instance, results in huge losses in the structure of heat production. Because there is no regulation of temperature levels in individual apartments, residents cannot turn off the heat even during warm winter days. Their only strategy is to open the windows and, as a representative of Cherepovets's heating utility states, "heat the streets using our very expensive service" (Representative of local utility company. Cherepovets. Personal interview. Spring 2005).

Old pipes lead to huge losses in heat transportation, about 450 million Gcal per year. That figure is around 1/3 of the total heat consumption in the whole country (about 1650 million Gcal per year) or about 58-65 million tons of fuel a year (United Nations 2004, 90). The maximum allowable limit for such losses is only 1/11 of heat production (for the Russian case, about 150 million Gcal per year) (Mihailov and Semenov 2003). In some regions, the actual loss of thermal energy and water in the pipelines is said to be about 55-60%, compared to the normative level of 16% (United Nations 2004, 90). The obsolete pipes lead not only to transportation losses but also to the escalating costs of heating buildings. In Russia, an ordinary five-story residential building requires about 0.22 (Rostov), 0.33 (Sverdlovskaya oblast) and 0.4 (Khabarovsk) Gcal per sq.m., while in Denmark the same building consumes only 0.043 Gcal per sq.m. (Mihailov and Semenov 2003). According to other estimate, the average energy consumption of Soviet-era large panel-block buildings is about 1.1 to 1.7 times higher than that of Finnish energy-efficient multi-story residential buildings (United Nations 2004, 37).

The low efficiency of old pipes requires immediate replacement. As some reports estimate, the total volume of such replacements increases each year. In 1997, 14.4% of all pipelines, or every 7 km, was required to be replaced. In 2000, it was already 16.2% of pipelines, or every 6 km, and in 2003, every 5 km. According to government reports, these data vary substantially across Russian regions. In St. Petersburg, for instance, 23.1% of pipelines require replacement, while in the Krasnoyarsk and Irkytsk regions, 27.4% and 32% respectively need to be replaced (Federal'noe sobranie 2003). According to other sources, between 50% and 60% of the heating and sewage pipes in the country require major repair; the remaining 40-50% need to be replaced altogether (United Nations 2004, 90).

4.1.2. Main causes of the heating crisis.

What are the main reasons behind such poor condition of the heating sector in the country? According to numerous reports, there is a list of potential candidates:

- *State involvement in the sector, extreme centralization and monopolization of the sector.* As many reports indicate, regardless of the announced market transition in the sector, local government is still responsible for the maintenance of the housing and utility sector around the country. In most places, heating utilities have the status of municipal unitary enterprises (*MYP, municipal'no-unitarnoe predpriyatie*). According to Russian Civil Code, this means that these companies are commercial organizations that do not have property rights on equipment and are responsible only for the economic management of the enterprise's assets on behalf of its owner, local administrations.

In practice, housing and utility companies are part of municipal administration. Their activities and budgets are dependent on the mayor's decisions (World Bank 2003; United Nations 2004). As many analysts indicate, this is an unproductive model of the sector's administration which leads to "interference in enterprise management from local politicians, lack of transparency in operation, the inability of enterprise management to optimize the use of assets because of the lack of ownership control over them, and general concerns about the quality of the management" (United Nations 2004, 53). This model also restricts competition, keeps the monopolistic position of local inefficient companies, provides no economic motives for them to reduce costs on the production of heat and deters energy conservation.

- *Low levels of cost recovery in the sector.* The next reason for the poor current condition of Russian heating networks is the low prices on utility services. Low rent and utility bills were the hallmark of the Soviet state commitment to care for its citizens. Most prices for utility services remained frozen from 1927 until the beginning of the 2000s. They did not include capital repair costs and did not cover maintenance costs. As some studies indicate, Soviet households spent more on alcohol and tobacco than on housing or utility services. At the end of the 1980s, for instance, the share of housing and utilities in total household expenditures by workers and employees was 2.5%, while the share of tobacco and alcohol consumption rose from 3.3% to 3.4% of total expenditures during the same period. For state farm workers, these numbers were even worse; they spent 2.2% on housing and 4.7% on alcohol and tobacco (Bertrand 1992, 893).

This Soviet policy of subsidized rents has not changed dramatically over time. During the 1990s, almost everywhere around the country residents paid about 20-40% of the actual expenses of heat production through complicated tariff systems that provided numerous subsidies for around 60-70% of the residents. While this trend is changing slowly (in some regions, residents currently pay 100% of their utility bills, like in the case of Cherepovets, in other areas residents still cover only a part of the actual expenses (like in the city of Ulyanovsk, where residents only pay 70% of the charges for the actual expenses in the utility sector). There is also the issue of political influence on tariffs for mayors are directly involved in the tariff-setting process in many localities. Housing and utility prices are a highly politicized issue in the country, and some mayors resist raising them for fear of public protests and a low future chance for re-elections. With low tariffs on heat services, local utility companies lack sufficient money to cover their operational and transportation expenses and are forced to reduce the volume of heat production for the whole city, causing further deterioration of the existing pipelines (World Bank 2003).

Another side effect of low prices is the absence of incentives for residents to modernize their apartments and install energy-saving equipment. Prices for services are established for norms on the total square meter or the number of rooms in the apartment; they have no correlation with actual heat consumption. Consequently, ordinary residents have no incentive to save water and heat. According to some estimates, Russian households consume about 2-4 times more energy and 50% more water than households in the West (World Bank 2003; United Nations 2004).

- *Large-scale subsidization of housing and utility services.* In addition to low tariffs, huge subsidies are another factor that causes the poor condition of the housing and utility sector in the country. As previously mentioned, due to the fact that this sector was not considered an economic activity in the Soviet Union, consolidated data on aggregate subsidies are difficult to obtain. As some reports note, there are at least two types of subsidies in the sector, implicit and direct. Implicit subsidies are provided through below-cost prices on electricity (42% of real price in 1997) and gas (46.1% of real price in the same year), which are the main fuel source for the majority of boiler-houses around the country. As Table 9 indicates, in 1997 budget expenses on gas subsidies were about 122 million rubles, or around 5.2% of GDP.

	Subsidy level (as % of unit price)	**Potential initial savings if subsidy is eliminated, %**	**Economic losses (million rubles)**	**Budget expenses (million rubles)**
Fuels	9.3	2.4	40.4	3340.0
Oil	1.5	0.7	1.3	283.6
Electricity	42.0	24.3	8689.4	62847.0
Gas	46.1	36.6	30674.1	121908.7
Coal	0.0	0.0	0.0	0.0
Total	32.5	25.7	39405.2	188383.2

Source: World Bank. 2002. *Russian Federation: World Bank assistance in energy sector*. Washington, DC: World Bank (in Russian).

Table 9. Subsidies in the Russian energy sector, 1997.

Regarding direct subsidies, a few surveys provide an estimate of budget transfers to the sector at around 4% of GDP in 1998 (World Bank 2003, 5). That includes direct budget subsidies on utility services and housing maintenance (around 3-4% of GPD) and cross-subsidies (higher charges for enterprises, around 1% of GDP) (Freinkman 1998). Most of these subsidies are expected to be covered through local budgets. Given the fact that most municipalities do not have their own tax basis and thus cannot generate enough financial resources, they do not cover the expenses of heating companies that in turn are left without money to buy fuels, and equipment and to make required repairs.

- *Lack of financial discipline among consumers.* Another problem with the sector is the increasing volume of unpaid utility bills. In some places, consumers do not pay their bills even given their current low level. Again, utility companies are left without financial resources to buy fuel and modernize obsolete pipes: “Non-payments and under-finance from local budget lead to the crisis in engineering infrastructure and the creation of conditions that can destroy the existence of multi-family buildings” (Agroskin 2003). Yet, another problem is the lack of mechanisms to evict non-payers from their apartments. There is no formal and direct contract between heat providers and residents that describes a fixed volume and list of services required from the producer and stipulates the conditions for eviction. “The provider is simply obliged to maintain the housing ‘according to the standards.’ Then in turn the customer does not assume any obligations for the amount and timelines of payments for a contractor’s work. In practice, there is no enforcement mechanism when people do not pay maintenance charges” (United Nations 2004, 53).

All of these factors result in the current obsolete condition of the heating infrastructure: non-efficient operation of utilities, huge losses of energy, water and financial resources; and, in the end, the “communal catastrophe” that has repeated every year around Russian localities since the winter of 2003. As federal government data demonstrates, among other Russian industries, the housing and utility sector is one with constant deficit (starting in 1997) and with the highest percentage of unprofitable companies. The total debt of the companies in the housing and utility sector varies between 2% and 8% of GDP (see Table 10). The share of unprofitable companies increased from 34% in 1992 to 60% in 2004 (see Table 11).

	1995	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Debt as % of GDP	0	0	1.3	5.9	1.9	8.2	4.8	8.5	7.9	6.4

Source: Author's calculations based on data from: Federal'naya Slyzhba Gosydarstvennoi Statistiki. 2006. *Rossiiskii statisticheskii ezhegodnik.* Moscow.

Table 10. Total debt of companies in the housing and utility sector.

	1992	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Average share, in all sectors of Russian economy	15.3	34.2	50.6	50.1	53.2	40.8	39.8	37.9	43.5	43.0	38.1
Housing and utility sector	33.5	42.6	53.8	50.7	60.1	61.4	61.1	59.1	60.8	61.1	60.0

Source: Federal'naya Slyzhba Gosydarstvennoi Statistiki. 2006. *Rossiiskii statisticheskii ezhegodnik.* Moscow. 637.

Table 11. Share of unprofitable companies in the sector, % of companies in all sectors of Russian economy.

4.1.3. What should be done?

The previous studies consider the production and consumption of heating services in the country as classical collective action and free-riding problems. The planned Soviet economy made heat a "common good" for most residents, and the current policy of municipal ownership, low tariffs, and heavy subsidies maintains this image of heat as a free service. Given the common ownership of pipes and engineering infrastructure at the level of multi-family buildings and common consumption with the absence of metering at the level of the individual apartment, a "tragedy of commons" (Hardin 1968) is inevitable in the country: everybody uses heat but nobody wants to pay for it (Agroskin 2003).

The key solution to this tragedy, suggested by most analysts, is the introduction of the market in to the sector to impose the principle of cost recovery user fees, and to be a change stimulus for residents, and alter their habits (World Bank 2003; United Nations 2004). In other places around the world, heating is a private good, and it should be the same for Russian citizens. As many reports argue, only the market can provide efficient and reliable heating services, attract necessary investments, and allow restoration of damaged pipes.

The central issue, then, facing the Russian housing and utility sector is to remove the largest distortions that currently exist by establishing meaningful pricing, privatizing the existing stock, restructuring the flow of funds, instituting individual control over utility consumption, and developing a competitive, decentralized, and diversified production system. The program of utility liberalization and privatization in the sector is usually derived from the experiences of the U.S. and many European countries, which over the last 10-15 years have replaced the traditional model of utility services being supplied by a state-owned monopoly with the new model for the operation of utilities (Bouttes and Leban 1995). As it is proposed, the new model for the Russian housing and utility sector includes the following three main components: supply side, demand side and technological side.[33]

[33] Federal Government Program "Reform and upgrading of the housing and utilities sector in the Russian Federation for 2002-2010," November 17, 2001.

I. Supply side: On the supply side, the main priority is to change the model of administration and operation in the sector.

1) Liberalization: Monopoly elements of the utility network should be separated from potentially competitive elements. Infrastructure networks are monopolies by nature; however, all activities on the supply chain that do not involve transport across the infrastructure should occur in a competitive environment. That includes production of the service (heat generation) and its supply (housing companies that are responsible for maintenance of heating networks at the level of multi-unit buildings).

2) Privatization of some or all of the existing assets: Next, competition should be introduced into the potentially competitive elements of the sector. For that goal, the system should be changed from direct state administration to state regulation, and utility services should be provided by a set of private companies. In many reports, this step is seen as the key instrument for increasing the quality of administration and inducing better pricing and cost recovery in the sector (Bertrand 1992; United Nations 2004).

3) Tariff policy: Recent tariff policy that encourages heating companies to increase heat generation (even if it implies huge transportation losses) in order to increase profits should be changed.[34] Under current conditions, when tariffs are adjusted by different authorities either on the federal, regional, or municipal levels, heat providers have no incentive to lower the costs for utilities. If a service provider were to invest know-how and become more efficient at a relatively lower cost, the authorities would lower the tariffs immediately. Higher operating costs on the other hand imply higher tariffs and higher profits for the heating company. Thus, new tariff policy should be structured to reward efficiency, not high operating costs.

4) Regulation: The role of municipal administration in the sector should be reduced. Instead of direct administration, local authorities should only have regulatory

[34] Federal Law #210 "On foundations of regulation on tariffs of enterprises of housing and utility sectors," December 30, 2004, Russian Government Decree #109 "On tariff policy for electricity and heating in Russian Federation," February 26, 2004.

functions, such as the provision of mortgage credits or presentation of interests of local residents. In addition, functioning institutional and legal frameworks should be created in the sector, for they are a prerequisite for the effective development and implementation of housing and utility policies. The roles, responsibilities and relationships of the different actors at the three levels of government, federal, regional and local, should be defined clearly.

II. Demand side: On the demand side, the main priority is to change the habits of end-users of heating services.

1) Privatization of housing: This step is seen as the key instrument in establishing market relations throughout the sector. Privatization of individual apartments that were state property before 1991 would result in a change in ownership structure by allowing individual tenants to claim ownership over their housing units.

2) Full payments for services: In order to build cost recovery mechanisms and stimulate reduction in heat consumption, a policy of payment for 100% of the charges on utility services should be imposed on residents. All tariffs for the services provided to households should be raised to cost recovery levels. According to expectations of most analysts, full charges will result in higher reliability of the system. This will also provide adequate financial resources for the modernization of the sector and will create conditions for energy-saving programs (World Bank 2003).

3) Elimination of subsidies: The majority of the existing subsidies should be eliminated. In the case of poor residents, subsidies should be replaced by direct assistance programs. Currently, federal laws prescribe numerous subsidies for different groups of the population based on professional or social characteristics rather than on financial needs. As a result, current subsidies are based on consumption rather than income. Current subsidies are also regressive: rich households in large apartments get more subsidies than poor families in smaller units (Posarac and Mansoora 2002; Wilson 1999).

4) Financial discipline: Different methods to penalize the non-payers should be created in order to impose financial discipline on residents and to ensure cash

collection. For example, one possible strategy is eviction from the apartment in the case of non-payment (Freinkman 1998).

III. Technological side: This component of market policy in the sector prescribes the introduction of different technical tools to improve performance in the housing and utility sector. Metering is considered, for example, as one of the main tools that will allow for the calculation of heat consumption in households and will help organize market relations in the sector. This is expected to solve the problem of the "virtual consumption" model widely used now by most heating utilities in the country. Based on the "virtual consumption" model, heat use is calculated on the basis of norms established by heating companies rather than on the basis of real consumption in the building (World Bank 2003).

According to the predictions of most analysts, the practical implementation of such market policy components will be technically complex. Nevertheless, in the end, all these reforms allow the introduction of a more self-regulating market in the Russian housing and utility sector, the improvement of efficiency and the reduction of the costs of infrastructure services. The expectation is that the market will decide whether a particular utility company is profitable or not. It will also solve many problems of the utility and housing sector and lead to the emergence of a diversified and competitive housing and utility production industry in the country (Bertrand 1992; Semenov 2003).

4.1.4. Implementation factors.

How were these policy recommendations implemented across Russian localities? What were the main constraints in carrying out the market policy program in the country? As I indicated in Chapter 2, previous studies recommend analyzing implementation as a negotiation process among the local implementers and central decision-makers within a certain institutional context. They argue that two variables should be the focus of research:

- *Implementation actors*: As previous studies claim, the starting point for analysis of market policy in the housing and utility sector should be the central and regional government decisions to implement a market in the sector and their attempts to control the policy delivery. Then, we should look at the actors involved in this policy implementation at the town level, such as the city's mayor and representatives of local administration, and their incentives to foster or discourage the market policy delivery in their locality. Our main interest is to analyze the interactions between these actors and the outcome of these interactions.
- *Implementation context*: Another important component of analysis is the analysis of the structure of institutions through which the above actors interact and the effect of such context on the negotiation process. As previous studies argue, there is a list of potential conditions of institutional context that can enable or disable market policy implementation in the housing and heating sector in Russia. They include financial capacities, human resource capacities, and socioeconomic and physical characteristics of the locality.

The rest of this chapter will study the influence of these variables in detail with specific reference to the case of the city of Cherepovets.

4.2. Institutional context: Political factors.

Before looking at market policy in the housing and heating sector and analyzing the factors that enable or disable policy implementation in our case, the city of Cherepovets, let us overview the political context of reform implementation in Russian localities in general. We will look at what happened with most Russian townships and their utility sectors during the 1990s. This exercise will allow us to place our case among other Russian municipalities, evaluate its chances of success in the prescribed market policy delivery and fight against a "heating catastrophe."

4.2.1. Local politics and economic affairs in the USSR.[35]

In the 1980s, there were 3,075 semirural *raiony* (rural areas), 2,059 cities, and 3,718 *poselkov gorodskogo tipa* (settlements of the urban type) in the country. According to the Soviet Constitution, the Soviet (legislative body, elected by the residents of the city) was the main authority in each city. Each Soviet elected a local administrative committee, *ispolkom,* that was responsible for local governance between sessions of the Soviet (that, according to the Constitution, met six times a year). The head of the ispolkom served as the chief executive and the highest-ranking official at the local level. There was no formal separation of legislative and executive powers in the country, for the administration was selected by the legislative body. As a result, in practice the legislative body was of no importance at the local level - even when the Soviet was in session, its main goal was to confirm decisions already made by the ispolkom and by the local Communist Party organization.

All local activities were coordinated by the organs of the Communist Party at the same level; candidates for the chief positions in the local administration or in the legislative body were required to get permission from the party organs. Before the Gorbachev period, the center of decision making in the city was the local bureau (buro) of the Communist Party (*buro raikoma* or *gorkoma*). The first secretary of the local party organization was the real mayor of the locality and more high-ranking than the head of the executive committee of the Soviet. The first secretary was liable for economic, political, and social activities in the area.

According to Soviet laws, the city's administration was responsible for the provision of a wide variety of benefits to local residents, such as housing and public and retail services. In comparison with many Western countries, Soviet local administration supplied a broader range of goods and services to the population, for it was responsible for delivery of conventional public services, such as parks, streets, medical facilities, schools, and libraries, but also for the supply of urban housing and control of many retail stores, restaurants, and service shops. However, in practice the

[35] This section is based on Chernyavsky and Vartapetov 2004; Evans 2000; Gelman et al. 2002.

local administration did not have total control in many of these areas. It exerted great control over the level of consumption of local residents, but little influence on production level, for the management of industry and agriculture that produced consumption goods was not under the direct control of the Soviet and the ispolkom. The local Party Secretary and the administrators of relevant Ministries were liable for stimulating local industrial management in order to fulfill targets for production under five-year economic plans.

Even in the housing area, despite the formal prescriptions, the ispolkom was not the chief actor. According to some sources, only 40% of all urban housing was controlled by local Soviets (Lewis 1983). In many localities, housing and some other services (such as schools, kindergartens or hospitals) were provided by local enterprises, which, in turn, were under the control of the relevant Ministries located primarily outside of their specific locality (mostly in Moscow). In Cherepovets, for instance, the main town-forming enterprise, a steel plant that was under the control of the Ministry of Industry, was responsible for construction and everyday maintenance of most residential buildings. Many decisions about investment in new housing and the maintenance of existing electricity, water, and heat facilities in particular cities were up to the ministerial administrators and enterprise management.

To summarize, the Soviet local governance model was characterized by a high level of centralization in two fields:

- The allocation of material benefits. In the USSR, each industrial and agricultural enterprise was under the authority of the relevant ministry rather than being accountable to the local administration. The share of public services in the city that were administered through local administration was subjected to dual subordination, for they were provided both by the local Soviet and by the relevant ministry that directed the distribution of such benefits.
- Budget allocation. The city's administration typically received transfers from higher levels of authority. Only a small proportion of the revenue of a local government came from taxes at the disposal of that level of government.

4.2.2. Post-Soviet changes in localities.

Some attempts to change this governance model and bring decentralization trends into this system were made even before the disintegration of the USSR. On April 9, 1990, the Soviet law "On general principles of self-government and local economic development in the USSR" was issued by the Supreme Soviet. It defined local self-governance as a new principle for political governance, suggested a new term, municipal autonomy (that implied the Soviet's control over the ispolkom), and allowed some tax and budget freedoms for localities. However, this law was repealed after the USSR's collapse (Chernyavsky and Vartapetov 2004; Gelman 2002; Gelman et al. 2002).

Local reforms, Stage I, 1990-1993: In the early 1990s, decentralization was perhaps at its peak. However, decentralization meant the devolution of greater power to the regions and other 'subjects of the federation' and did not imply greater freedoms at the township level. During the first stage of local reform, major governmental institutions of the country were defined. For example, on July 6, 1991, the new law on self-government was passed. It suggested a definition of self-government and proposed local elections of the heads of the administration. As some analysts note, this law was the first attempt to break with the Soviet administrative system at the local level; however, it was never implemented in practice (Kirkow 1997).

The next attempt to reform the local governance model was made in 1993. According to the Russian Constitution, local autonomy was declared as the basic principle of the constitutional system. The administrative system of the Russian Federation was divided into three levels:

- The Central Government.
- The state organs of the subjects of Federation which included 89 regional administrations, among them 21 autonomous republics, 49 regions (*oblast*), 6 territories (*krai*), 2 cities of federal significance (Moscow and St. Petersburg), 10 autonomous districts (*okrug*) and 1 autonomous region.
- The local self-administration.

The Central Government and the governments of 'subjects of the Federation' were labeled as state agencies, while the legislative and executive bodies of the districts (*raiony*), boroughs, towns, *volosts* and villages' legislative and executive bodies were nominated as agencies of 'local self-government.' Article #12 of the Russian Constitution states that "organs of local self-government do not constitute a part of the state bodies." Local administrations were prescribed to be "the independent and responsible activity of the population for the solution of… local issues."[36]

The Constitution also defines the general principle of economic activities at the local level. Article 132 reads: "Local self-governments have autonomy in municipal property management, planning, adoption, and execution of local budgets, regulation, and collection of local taxes and fees." The article also promises to delegate "specific state/federal mandates to local self-governments with the simultaneous provision of appropriate material and financial resources." However, it failed to specify financial conditions to implement policies at the local level. The next two legal acts, also adopted in 1993, Presidential Decree "On abolition of city, village and rural Soviets" (October 9) and the Federal Law "On rights of self-government in Russian Federation" (December 22) transferred all rights and responsibilities of local Soviets to regional heads of administrations, that is governors and mayors.

As a result, the political responsibilities and rights of 13,383 municipalities were more or less successfully defined in 1993. Regarding economic affairs at the local level, after the collapse of the Soviet system, the maintenance of the social infrastructure of housing, utilities, and services primarily became the responsibility of local administrations (Mitchneck 1995). The economic responsibilities of local governments for such social and utility services were defined by the Privatization law (which was adopted in December 1991 and declared separation of federal, regional and municipal property) and in a decree issued by the President in January 1993. This decree allowed "the directors of industrial and agricultural enterprises to divest

[36] Federal Law #154 "On general principles of organization of local self-government in the Russian Federation," August 28, 1995. Article 2. Cit. on: Gelman 2002, 496.

themselves of the housing and services that they formerly had controlled by transferring their apartment buildings, clinics, schools and similar objects to the category of municipal or raion property” (Young 1992, 85). Since enactment of these acts, local enterprises and relevant Ministries were no longer responsible for the provision of public services, and it became the task of city governments to find resources to support housing, social services, and public utilities.

At this point, the rights of localities to financial self-support through local tax extraction were not yet legally defined. In addition, the federal government reduced its centralized financing for social services. The only choice for local governments was to raise the charges to consumers for housing and utility services. However, such a policy option was constrained in practice by the fact that many workers were suffering from the frequent suspension of their wages and, thus, were unable to pay the higher charges.

Results of reform: During Stage I (1990-1993), local governments as bodies operating apart from the system of state authorities were formally established; and their rights and responsibilities were defined by numerous statutes. The main question was whether municipalities would have adequate revenues to realize their rights and to provide public services at the local level. There were some discussions about local tax collection rights and expenditure responsibilities; however, no consistent policy was formulated. Enterprises gradually transferred their social assets to municipalities, which, in turn, struggled to support the provision of social and urban services for local residents.

Local reforms, Stage II, 1994–1998: During the second phase, two laws that suggested further definitions of a self-government model were adopted, Federal Law “On local self-governance” (March 15, 1995) that guaranteed the local level a separate position apart from the state government and another “On the financial foundations of local self-governments” (September 25, 1997).

The local self-government act of 1995, the main law governing the local administration in the country and prescribing the division of all subjects of the Federation into smaller units, so-called districts (*raiony*), has a long history of formulation (Kirkow 1997, 44-45). The initial draft of this law was submitted to the State Duma in the second half of 1994. It reiterated the constitutional right to local autonomy, made local elections obligatory, claimed local government separation from state administration, declared financial independence of territorial self-organization, and prescribed a number of responsibilities to municipalities, including provision and maintenance of housing, electricity, water and heat services, public transportation, retail trade and services, medical care, education, and social policy. As this draft stated, in order to exercise these rights, municipal administrations could use local natural resources (land, soil, water, forests, flora, and fauna) and real estate. It also included the right of localities to define the procedure of municipal privatization by themselves and to establish municipal financial and credit institutions. According to this draft, the new system of local self-governance was supposed to be implemented over a two-year period. However, many important issues were still unclear in this draft, like the separation of federal, regional, and local ownership of land, natural resources, and real state.

During 1994, this draft was heavily discussed in Duma, and finally adopted on March 15, 1995, with detailed specifications of the responsibilities of local administrations, but without any reference to financial resources to exercise such duties. In addition, in practice there were delivery constraints, especially at the regional level. Across different districts, regional authorities delayed implementation of this Federal Act of 1995 for fear that local entities might become too powerful and independent. They did not confer, for instance, the right to control the use of land to local entities regardless of the fact that such a right was mentioned in the initial document.

According to the same Act of 1995, local self-governments of the Russian Federation also comprise units other than the districts, like cities, *volosts*, neighborhoods, small towns, villages and village *soviets*. Most of these units were inherited from Soviet times. The position and financial base of such local units was not clear in practice or by law. Normally, these small units of local administration do not have their own budget or tax revenues. Instead, they usually have some kind of decision-making bodies, such as the 'village seniors' in the village *soviets*. The relation of the districts to the smaller entities is not explicit; mostly the districts take care of some of the coordination functions of the smaller entities. A clear division of tasks and the hierarchical relationship between the districts and the smaller entities was not set in the Act of 1995.

The second law, "On the financial foundations of local government" (1997), was intended to provide the legal basis for the financial independence of local self-government. Initially, the law was passed by the Duma, then was rejected by the Federation Council, and then was passed again by the Duma, which overrode the upper house's vote (Kirkow 1997; Gelman et al. 2002). As one analyst of Russian local politics argues, "the rejection of the bill by the Federation Council served as evidence of the desire by the regional governors and the chairs of the regional legislatures to block the achievement of autonomy by local governments" (Evans 2000, 126). This law allowed municipalities to retain a share of the taxes collected within their territory and, thus, to decrease the proportion of tax revenues sent to the regional governments and the federal center. As it stipulated, the percentages of tax revenues for local governments should be set at fixed rates. The policy objective of this act was very simple – to decrease the dependence of municipalities on transfers from the budget of higher authorities. However, this goal has never been achieved. As some scholars report, in many localities this law has not been enforced at all and was canceled by changes in the Tax Code that prescribes variable rates in tax sharing in the beginning of the 2000s (Evans 2000).

Regarding economic affairs at the local level, the situation has worsened. Local governments carried out the burden of public services that became heavier as many enterprises finally discontinued their financing of these benefits. The regional level of the Subjects of Federation has collected and used most of the taxes coming from the localities. The local level had the right to collect only some small charges and taxes that were usually the most difficult to collect (like charges on dog owners).

Another problem arose from the instability of the federal budget and the interdependence between the budgets of different levels. The basis of all regional and local budgets is the annual federal budget, which is passed by the state Duma without strict time limits. As a result, in some regions, the regional government of the subjects did not enact its budget until the autumn of the same year. Correspondingly, some local administrations could verify their budget only after the regional budget was confirmed and the budget year had already started. Such practice made it difficult to maintain a balance between revenues and expenditures at the local level. Sometimes, municipalities spent money with the belief that future transfers from federal and regional levels were forthcoming and then found out that these grants never materialized (Evans 2000; Kirkow 1997). As Cherepovets City's Council (*Gorodskaya Duma*) materials illustrate, the city recalculated its budget revenues several times per year. For example, not until July of 2002 – that is seven months after the beginning of the budget year - was it finally able to define the exact expenditures in the housing and utility sector for an "additional 6 million rubles were received as a result of the clarification in the regional budget and the promise to increase grants to our city" (Cherepovets. Gorodskaya Duma documents. July 2002).

Left without any chances to increase tax bases and with unpredictable budgets, local governments had inadequate financial resources to support the services they were obligated to provide according to numerous federal laws. Extraordinary difficulties with the provision of public services arose in one-company cities and closed towns, where one or only a few enterprises provided not only the major share of local tax revenues but also social infrastructure and public services. In such cases, many enterprises that have suffered from the deep decline in production could not provide any assistance to local authorities. Overall, most municipalities were in a budget crisis and as a result, the level of social and public services sharply declined across Russian townships (Freinkman et al. 1999).

Under such conditions, one of the possible choices for local governments was to beg for assistance from higher levels of authority. As many scholars demonstrate, local officials not only expected a regular flow of subsidies from the regional and federal levels, but also sought funding from the regional government on a case-by-case basis (Hanson 1996; Teague 1996). Alfred Evans describes such practices in the case of Semenovskii raion in the Nizhnii Novgorod region and demonstrates that the local government submitted frequent requests to the regional government for budgetary allocation, for fuel supply for boiler-houses, the purchase of gasoline and oil for local farms, etc. (Evans 2000).

Results of reform: During Stage II, the rights and duties of local governments were further defined, and some economic and political freedoms at the local level were allowed. However, most of these freedoms existed only as the formal declaration. In practice, the federal government did not delegate powers or resources to lower levels. As a result, local autonomy was strongly limited. Many municipalities were left without financial support and thus were unable to exercise their responsibilities, i.e., to provide basic public and social services for local residents.

Local reforms, Stage III, 1999-2006: During this period, all the trends mentioned above became worse. Several policies that restricted further local economic and political autonomy were implemented. The most obvious result of such policies was the concentration of political and fiscal powers at the federal level.

Throughout 1998-2000, the revised Budget and Tax Codes (Part I in 1999 and Part II in 2000) were formulated. They restructured fiscal federal relations in the country and abolished the financial independence of local governments. The budget process was set out in the following way: a single federal tax body collects all the taxes, transferring the majority of this revenue to the federal budget, where it is subsequently allocated to various regional and local budgets. As a result, today only about 15% of regional and local revenue derives from taxes over which the lower administrations have some sort of decision-making authority. According to these Codes, the federal level determines the vast majority of subnational revenue and expenditure obligations. Most tax relationships in the country are *tax sharing*, in which the lower level receives a set percentage of the amount of tax that is collected (e.g., enterprise income tax or personal income tax). This sharing rate is determined by the federal government in the annual federal budget law, and over time, the share increases in favor of the federal and regional centers.

In addition to financial constraints, there were also numerous attempts to limit the political autonomy of Russian municipalities. In July 2000, Putin addressed the Federal Assembly and suggested a new vision of local governments 'as the lowest level of executive vertical.' The President also proposed several laws on federal reforms that suggested abolishing mayoral elections in cities with a population over 50,000 and returning to the appointment of mayors by regional governors (Gelman 2002). This proposal was rejected by the State Duma. Still, another amendment to the federal law on local government was adopted in August 2000. It states that the President of Russia and regional governors have the right to dismiss local assemblies or chief executives for violations of federal and regional laws.

However, there were also some positive changes in local politics. On August 15, 2001, the Russian government approved "The program of fiscal federalism development for the period up to 2005."[37] This program suggested the principles for the future distribution of expenditures and revenues between all levels of authorities. Since 2001, fiscal federalism and fiscal responsibilities have become the main issues for a special Presidential Commission headed by Dmitrii Kozak. This commission was responsible for the preparation of a draft of the Federal Law "On general principles of the organization of local self-governance in the Russian Federation"[38] that was introduced to the State Duma and after great debate was enacted on October 6, 2003. It presented the overview of mechanisms for municipal fiscal reform and proposed some change to the Budget and Tax Codes. It also introduced a two-tier system of local governments (rural and urban settlements at the lower tier and municipal districts comprising several settlements at the higher tier), each of which can have its own taxes and expenditure responsibilities. There were several delays in the enactment of this law, though it finally became effective from January 1, 2006. While these changes were relatively positive, many issues were still unclear in this Act, like the vague

[37] Government Resolution #584 "Development of budget federalism in Russia until 2005," August 15, 2001.

[38] Federal law #131 "On general principles of the organization of local self-governance in the Russian Federation," October 6, 2003.

definition of asset distribution between different levels of municipalities, the lack of definition of resources to fulfill state expenditure obligations and power over tax administration. Moreover, as many analysts report, at the end of 2006, the Act of 2003 was implemented in practice in only 46 subjects of the Federation.

Regarding economic affairs, the current situation can hardly be considered wholly satisfactory. According to some sources, about 75% of the spending of local governments consists of subsidies for municipal housing, social security, education, and public health. In 2000, municipalities received 25% and were responsible for 30% of all expenditures. Specifically, in 2001, the numbers were 17% and 32%, respectively (Gelman et al. 2002). Overall, in the beginning of the 2000s, most Russian municipalities struggled with constant interruptions in the supply of electricity, natural gas, water and heat to the population and enterprises due to the lack of financial resources.

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As this brief overview of Russian local reforms demonstrates, one of the main problems of local reforms in the country is the imbalance between the obligations of municipalities and their financial capacities (United Nations 2004). State services, including the responsibility "to provide heat for local residents," were transferred to most municipalities between 1993 and 1998. By 1998, these services were supposed to be fully covered by the municipal budgets that were not large enough to finance all expenses. Municipalities were not allowed to create their own tax basis and, thus, could not generate enough resources to modernize and maintain operation of urban networks.

Today, like Soviet local governments, most Russian municipalities are still ineffective and incapable of providing the minimum level of public services for their residents. As in the Soviet period, most localities lack political and economic opportunities to implement public policies or change anything at the local level. They cannot maintain local budgets without financial support from the federal and regional governments and find themselves financially and politically subordinated to the higher levels of authority. They remain heavily dependent on budgetary transfers, subsidies, and soft credits from both regional and federal offices and local enterprises. Some scholars even argue that given Putin changes in federal policy, we can observe the partial restoration of the Soviet subordination hierarchy between federal and local authorities (Evans 2000). While the newly enacted Law "On general principles of municipal self-government" formally confirms the political autonomy of city administrations, the new Budget and Tax Codes eliminate in practice any chances for municipalities to create their own funds by re-distributing most revenues to the budgets of higher authorities.

4.3. Institutional context:
Economic conditions for technological changes at the local level.

In addition to political factors, economic conditions are also important components of the institutional context in which market policy delivery in the housing and utility sector in the country occurred. Let us now look at several federal and local budget indicators that support the conclusion made in the previous section, that is, that the most vivid outcome of current Russian reform of local governance is the lack of financial resources in most Russian municipalities and their inability to exercise local autonomy.[39]

Table 12 presents the distribution of net revenues across different levels of government from 1996-2005. As we can see, there was an increase in revenues for the federal budget. In the 1990s, it accounted for 12-14% of GDP; in the 2000s, 13-15% and in 2005, almost 18%. As some analysts indicate, this growth can be explained by three factors (Chernyavsky and Vartapetov 2004, 253-254):

(1) Tax revenues were reallocated for the benefits of the federal center. The practice of Value Added Tax, VAT, sharing between the budgets of all levels was abolished and new rules for the taxation of resource-extracting industries, favoring the federal level, were

[39] This section is based on Chernyavsky and Vartapetov 2004.

adopted. Today the VAT is the largest tax in total volume of taxes in the federal budget and constitutes 37% of all federal revenues from taxes (Goskomstat 2006, 30).

(2) Federal budget revenues were boosted due to a favorable situation on the international resource markets after the 1998 crisis.

(3) Collection of federal taxes was improved and in-kind payments of taxes at the federal level were terminated.

	Federal budget	**Regional consolidated budgets**[a]	**Regional budgets**	**Local budgets**
1995	13.7	16.9	NA	NA
1996	10.8	15.0	4.9	10.2
1997	10.8	17.5	6.6	10.9
1998	9.7	15.1	6.3	8.75
1999	11.3	13.9	7.1	6.8
2000	15.5	14.6	8.7	6.4
2001	15.1	14.3	7.8	6.5
2002	13.5	14.8	8.3	6.5
2004	15.1	14.4	NA	NA
2005	17.9	11.5	NA	NA

Sources: Author's calculations; Chernyavsky and Vartapetov 2004; Federal'naya Slyzhba Gosydarstvennoi Statistiki. 2006. *Rossiiskii statisticheskii ezhegodnik.* Moscow.
a. Regional consolidated budgets include the regions' regional plus local budgets.

Table 12. The distribution of net revenues (total revenues minus intergovernmental transfers to the lower level budgets) as % of GDP.

These data also demonstrate that the ratio of federal-to-regional consolidated budget revenues and the ratio of regional-to-local revenues have both changed. In

2001, for the first time since 1992, federal revenues exceeded regional consolidated revenues and after that point were constantly higher than regional revenues. Since 1999, regional revenues have constantly exceeded local revenues.

Overall, as these data demonstrate, there is a clear tendency towards fiscal centralization and the reduction of local fiscal autonomy in Russia today. As Table 13 indicates, the share of revenues of the consolidated budget as well as the total share of taxes has increased over time in favor of the federal budget.

<table>
<tr><th></th><th>1995</th><th>2000</th><th>2001</th><th>2002</th><th>2003</th></tr>
<tr><td>Federal budget</td><td>53</td><td>49</td><td>59</td><td>63</td><td>62</td></tr>
<tr><td>Regional budget</td><td rowspan="2">47</td><td>30</td><td>28</td><td>27</td><td rowspan="2">38</td></tr>
<tr><td>Municipal budget</td><td>21</td><td>13</td><td>10</td></tr>
</table>

Source: Federal'naya Slyzhba Gosydarstvennoi Statistiki. 2006. *Rossiiskii statisticheskii ezhegodnik.* Moscow.

Table 13. Distribution of consolidated budget revenues across levels of administration, % of budget.

Recent years are also characterized by re-distribution of tax revenues from regional and local levels to the Federal Center (see Table 14). In 1996, the regional consolidated budget received 52% of total tax revenue and only 36% in 2003, while the corresponding share of the federal budget increased from 46% to 64% in the same period. According to other sources, more than 80% of the tax revenues of regional and local budgets are formed at the expense of deductions from federal taxes. Only 15% of revenues of regional and local budgets are formed by taxes managed in one way or another directly by the locality. Even these taxes are rigidly regulated from above and are the subject to federal ceilings, such as maximum rates. As analysts argue, in this respect, Russia is quite different from other federal states, like Canada or the United Stated, where subnational authorities possess full autonomy in selecting taxes, tax deduction bases and tax rates (Igydin 2004).

	1996	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
Federal budget	46.2	44.2	44.9	50.6	56.5	62.3	64.9	64.1
Regional consolidated budget	51.8	55.8	55.1	49.4	43.5	37.7	35.1	35.9

Source: Federal'naya Slyzhba Gosydarstvennoi Statistiki. 2006. *Finansy Rossii. 2004.* Moscow. 27

Table 14. Distribution of tax revenues across levels of administration, % of total tax volume.

Not surprisingly, the volume of municipal revenues has consistently decreased in the country. As we can see from Table 15, which presents growth rates of local revenues from 1997-2002, municipal revenues dropped by 23-24% over the six years. As some analysts explain, the drop in 1998 can be explained by the Russian national financial crisis. However, later on, the decrease was mostly caused by the shift of revenues from local to regional and federal budgets (Chernyavsky and Vartapetov 2004).

	1997	1998	1999	2000	2001	2002
Local revenue growth rate Previous year=100	112.2	74.2	84.4	101.1	104.8	104.4
Local revenue growth rate 1996=100	112.2	83.1	70.1	70.2	73.5	76.7

Source: Chernyavsky and Vartapetov, 2004

Table 15. Local revenue growth rates.

Table 16 presents the sources of revenue formation in Russian municipal budgets from 1996-2002. As this table indicates, over this time period the ratio between local tax revenues and intergovernmental transfers declined. From 1996-1999, local revenues increased and federal grants decreased. In 1999, after the adoption of new Budget and Tax Codes, this trend changed. From 2000-2002, local revenues decreased while the share of federal grants increased. The enactment of the second part of the Tax Code in 2001 caused a sharp decline in local own-source revenues that remained relatively stable during 1996-2000. This Code eliminated the housing and communal service tax (a turnover tax levied to subsidize housing and communal services enterprises) and changed the process of the VAT and profit tax collection. Today, 100% of the VAT goes to the federal budget, and the profit tax-sharing rate is determined annually. Its larger share goes to the regional and federal centers, where are later allocated on in fixed proportion to municipal budgets.

	1996	1997	1998	1999	2000	2001	2002
Tax revenues, including:	59.5	60.5	63.6	69.4	68.2	61.2	53.5
Value added tax	7.1	7.5	7.9	6.8	5.3	0	0
Profit tax	11.5	9.3	9.1	14.6	13.5	16.7	10.9
Personal income tax	16.95	18.2	18.4	16.6	16.8	21.1	23.3
Property taxes	9.2	8.9	10.0	7.8	6.2	6.7	7.1
Sales tax	-	-	0.02	2.8	2.9	2.8	2.5
Local taxes (excluding individual property tax but including land tax0	NA	NA	11.2	13.4	14.9	5.1	3.1
Non-tax revenues	2.4	2.2	3.7	3.6	3.5	4.3	6.0
Intergovernmental transfers	37.8	37.3	32.5	26.7	28.3	34.2	40.5
Share of own revenue (property taxes, sales tax, local taxes/including land tax and non-tax revenues)	NA	NA	24.9	27.6	27.5	18.9	18.7

Source: Chernyavsky and Vartapetov, 2004.

Table 16. Municipal revenue budgets, % of total budget.

Now let us look at local budget expenditures from 1996-2002 (Table 17). As we can see, administration expenditures increased twice over the six years. Education and the housing and utility sector were the main local expenses in this period. After a rapid increase between 1996-1998, housing and communal service expenditures stabilized and started to decrease from 1999, while education expenses, in turn, began to increase from 2002. As analysts suggest, the change in housing and utility expenditures was caused by the implementation of a federal program of full cost-recovery of prices in the sector (Chernyavsky and Vartapetov 2004). This program aims to increase the residential share of payments for housing and communal services. According to the federal standards, in 1998 residents was supposed to cover 50% of the actual costs of utility production; in 1999, 60%; in 2001, 80%; and in 2002, 90%. Nevertheless, the results of program implementation vary across localities, for not each Russian municipality meets this requirement. In Cherepovets, for instance, residents have paid 100% of the charges since 2001, while in Moscow residents cover only 70% even today.

As a result, despite the announced new tariff policy, expenses of the Russian consolidated budget on housing and utility services were quite stable starting from 1999 (see Table 18). The majority of these expenses are supposed to be covered from local budgets.

Given the above budget data, many analysts conclude that the fundamental contradiction between the politically announced existence of three levels of governance and the highly centralized taxes is a major source of the problems for fiscal federalism in Russia (Lavrov et al. 2001). Most budget revenues are collected at the local level and then go to the federal level. At the same time, most local services have become the responsibility of local administrators during the last ten years. However, local guaranteed revenues are too low to sufficiently provide for these services and, unlike regional authorities, local governments do not have any tax base or rate-setting authority.

	1996	1997	1998	1999	2000	2001	2002
TOTAL	100	100	100	100	100	100	100
Local administration	3.3	4.3	5.3	5.7	6.0	6.5	6.7
Local industries (manufacturing, power supply, construction, farming, transport, roads, communication)	8.3	6.6	7.0	6.3	5.7	10.5	9.9
Housing and utility services	26.6	27.0	30.3	27.4	28.9	24.6	19.5
Social and cultural services, including education	25.6	26.2	28.1	28.1	28.0	28.0	33.2
Culture, arts and cinema	2.1	2.1	2.3	2.5	2.8	2.6	3.0
Public health and fitness	14.5	14.5	15.0	15.8	16.0	14.9	15.5
Social policy	7.3	6.3	5.7	5.5	4.8	6.5	7.6
Other expenditures	12.4	13.0	8.6	8.7	7.8	6.4	4.6

Source: Chernyavsky and Vartapetov, 2004.

Table 17. Local budget expenditure, %, 1996-2002.

	1998	1999	2000	2001	2002	2003	2004	2005
Expenses on the sector	3.9	2.6	2.7	2.2	2.1	2.0	1.7	2.2

Sources: Author's calculations. Federal'naya Slyzhba Gosydarstvennoi Statistiki. 2006. *Rossiiskii statisticheskii ezhegodnik.* Moscow. 606.

Table 18. Expenditures of the Russian consolidated budget on housing and utility services, as % of GDP.

There is the general trend of local reforms in current Russia. However, at least two groups of localities with different patterns of reform can be identified. The first group includes the majority of Russian municipalities (over 75% of the total 13,383) small towns, villages, and rural districts that have no prospects for financial autonomy, at least in the short run, and cannot maintain their budgets without financial support from the federal or regional governments. As in the Soviet period, they are dependent on budgetary transfers from higher-level authorities in order to provide public services for local residents. The efforts of such municipalities are mainly directed at bargaining with regional-federal governments over the amount of grants that the locality can receive rather than at the implementation of market reforms.

Another group includes a small minority of city and district governments that have sufficient financial resources to improve the quality of local services. Most localities that have enough tax revenues are either big cities (mainly the national capital, Moscow or capitals in resource-rich regions, like the Tumen region) or company towns with profitable enterprises (like Surgut with oil and gas companies or Cherepovets with the big steel plant). In such cases, own-source municipal revenues that can be directed to the provision of local services can overcome financial constraints. The prosperity of company towns is rare though, for usually a town with one enterprise that becomes suddenly unprofitable in the post-Soviet period finds itself in a very similar position to poor multi-enterprise localities (Expert Institute 2000).

Even in success stories of one-company towns, municipal officials face attempts by owners of the company within their locality to impose control over local decision-making (and as many analysts demonstrate, these owners, mainly out-of-town residents, are concerned mainly about tax reductions rather that the quality of local services in this locality) (Kirkow 1997). Moreover, the relative prosperity of those successful company towns also depends in many cases on another structural constraint – the nature of the local economy. Oil-rich or steel-rich towns' revenues, for instance, depend heavily on current trends in world markets. If economic conditions change and the prices of oil or steel fall, such towns will find themselves in the same position of economic and political dependency on higher levels of authority as most

Russian municipalities do. In addition, given Putin's proposals about principals of fiscal federal-regional relationships, the trend towards fiscal centralization is likely to continue. Tax Code amendments in 1999 and 2000 that impose new rules for taxation of resource-extracting industries with the largest share going to the federal center is an example of this centralization policy. Under this policy, even rich company towns will possibly find themselves in a difficult situation with decreasing political and economic autonomy.

4.4. Implementation context of local reforms in Cherepovets.

As we can see from the previous description of local reform in Russian townships, today most municipalities lack fiscal and political autonomy. This leads to an inability to change anything in the local housing and utility sector. However, the reform process and its results vary across the country. A number of localities are still lucky enough to have the required financial resources to fulfill their responsibilities to local residents. What happened in such localities with sufficient resources? Do they have the same difficulties with outdated infrastructure and interruptions in heating, hot water, and electricity supply?

In order to answer these questions, let us look at the reform process in a selected township, the city of Cherepovets. In comparison with most Russian municipalities, Cherepovets is both the typical and the outstanding case. On the one hand, it is a typical mid-sized town with a great share of residents living in multi-family buildings, almost 100% of which are connected to the centralized utility networks and about 80% of which were constructed after World War II. On the other hand, Cherepovets, a one-company town with a relatively profitable metallurgical plant, has higher than average salaries and enough internal funds to invest in technological innovations in the city and is lucky enough to receive external financial support for technological changes.

As I have explained already in Chapter 3**,** there are several reasons for the selection of this city as a primary research case. According to several reports, Cherepovets was one of the few Russian localities that succeeded in market policy implementation in the housing and utility sector (United Nations 2004). Following the prescriptions of the market reform program, the city introduced full cost-recovery prices on utility services, abandoned the practice of budget subsidies for housing and utility companies, and introduced means-tested housing allowance programs. It has also made progress in technological innovations and has installed energy-efficient equipment in residential buildings and the city's boiler-houses. Overall, the local heating system operates without the major technological breakdowns that have been widespread across the country since 2003.

What factors explain the relatively advanced position of the city? Why were local politicians in Cherepovets able to implement utility reforms, while executives in many other Russian townships still keep the Soviet model of finance for such services (partial payments from inhabitants, local budget coverage, and federal grants to recover local budget) and struggle with breakdowns in the city's infrastructure? According to previous studies (see the summary in Chapter 2), Cherepovets's success can be explained by several reasons. First, the city enjoyed the "right" incentives of local implementers (the city's mayor and his administration) and stable communications with the regional capital and Moscow. Second, the city benefited from "fit" between the old institutional and physical context and the proposed market policy in the sector. The next sections review these factors in detail, beginning with general information about the location, population, industrial profile and administrative structure of the city.

4.4.1. General information about the case.

Location, history and population: Cherepovets is the biggest city in the Vologda region. It is located on the bank of the Rybinsk reservoir of the Volga River 620 km north of Moscow and 475 km southeast of St. Petersburg (see maps in Appendix A).

Two monks, Afanasiy and Feodosiy, founded the city in 1360 as a monastery. There are different theories of the origins of the city's name. Some sources argue that

"Cherepovets", in the language of the local Veps, means "fish hill," while other sources emphasize the world "Cherep," which means "skull" in Russian. The city has developed throughout the centuries into an important regional center of trade, manufacture, and transportation. In 1777, it received official town status by the order of Empress Catherine the Great.

Today, Cherepovets is one of the most advanced industrial centers in the northwestern part of Russia. The city's development into such an industrial center is reflected by a rapid growth in population. Today, the city has around 311,000 residents, compared with only 6,900 in 1897 (Table 19). Such a great increase in population was caused by the construction of the metallurgic plant center starting from 1948. Today, this plant – company "*Severstal*" – produces about 18% of the total volume of rolled metal and is one of the largest iron-and-steel plants in the country.

1780	538	**1967**	165,000	**1990**	314,500
1897	6,900	**1970**	188,628	**1994**	318,400
1926	22,000	**1973**	213,500	**1998**	322,000
1939	36,173	**1976**	238,100	**2000**	323,500
1947	40,000	**1979**	265,900	**2001**	323,300
1959	92,356	**1980**	278,700	**2002**	311,900
1962	124,000	**1986**	309,000	**2004**	310,800

Sources: Socialno-ekonomicheskii passport goroda Cherepovtsa, 1970-1990, Pasport socialno-ekonomicheskogo razvitiya Cherepovtsa za 2003.

Table 19. Population, Cherepovets, 1780-2004.

The locality is a very typical of a mid-sized Russian city, the representative of one of the most populated groups in the country (see Table 20). As this table demonstrates, Russia is the country of cities. In total, 105 millions of Russians live in one of country's 2,560 urban settlements (cities or *poselki gorodskogo tipa*) and a little less than 39 million live in one of the 155,289 settlements in rural areas.

Cities and rural settlements in Russia	**Number of settlements**	**Number of residents, thousands**
All urban settlements	**2560,000**	**104719,000**
Among them, with population in thousands of people:		
Less than 3	426	715,000
3-4.9	341	1355,000
5-9.9	607	4380,000
10-49.9	859	18862,000
50-99.9	158	10831,000
100-499.9	**135**	**28027,000**
500-999.9	23	14968,000
1 million and more	11	25581,000
All rural settlements	**155,289**	**38737,682**

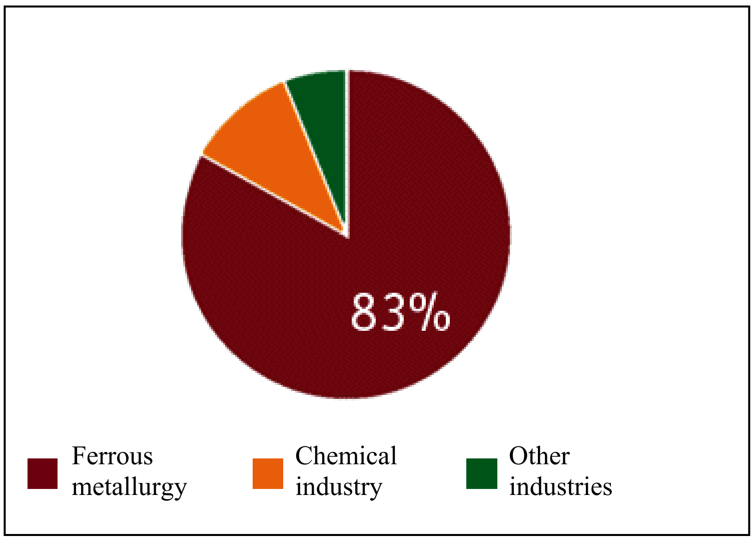
Source: Federal'naya Slyzhba Gosydarstvennoi Statistiki. 2006. Rossiiskii statisticheskii ezhegodnik. Moscow.

Table 20. Number of towns and population in the country, 2005.

Among cities, the most populated groups are the 135 cities with a population of 100,000-499,900 (mid-sized towns, like Cherepovets) and the 11 cities with a population of 1 million or more (mega-polis, like Moscow or St. Petersburg). About 28 millions of Russians reside in mid-sized towns, and 25 millions live in a mega-polis.

Local industrial profile: The main city plant, Severstal and other iron-and-steel plants produce 83% of the total volume of local industrial production (Figure

3).[40] There are some other large factories in the city as well. *Ammofos* and *Cherepovetskii Azot* are chemical plants that produce chemical fertilizers, sulphuric acid, ammonia, and carbamide (about 11% of the total volume of chemical products in the country). The city also has a number of relatively small light, food, woodworking and building materials enterprises, as well as construction and lumber companies.



Source: Web page of the city of Cherepovets.

Figure 3. Production distribution in Cherepovets.

Nowadays, Cherepovets is one of the major mono-industrial towns in Russia. While there are several industries in the city, it can still be considered a one-company town according to indicators suggested by the Expert Institute (2000):

[40] Ferrous metallurgy is also the main industry for the Vologda region in general. The share of this sector in the total industrial volume in the region is 60%.

- The first indicator of a one-company town is the share of the largest enterprise in the locality or a number of enterprises belonging to the same branch of industry as an employer in a given town. In one-company towns, this indicator exceeds 25%. For the case of Cherepovets, 53,000 (44% of the city's labor force in 2003) are employed at Severstal.
- The second indicator of a one-company town is the share of the largest enterprise in the city or a number of enterprises belonging to the same branch of industry in the total volume of production in a given town. In one-company towns, it exceeds 50%. In Cherepovets, metallurgic plants produce 83% the total volume of local industrial production.
- The third indicator is geographical remoteness of the given town from alternative employment markets in big cities. This indicator is not as strong for the case of Cherepovets, for it is located relatively close to Moscow and St. Petersburg. However, this is the only city in the European part of Russia where employment markets of metallurgy-connected jobs are located.

In addition to a city-forming role, Severstal also plays an important part in local budget formation. As Table 21 indicates, in the beginning of the 2000s, Severstal's contribution to the local budget constituted the largest part of the city's tax revenues, 51% in 2001 and 47% in 2002.

	2001	**2002**
Severstal	50.5	47.3
Azot	4.5	2.2
Staleprokatnyi zavod	4.5	3.7
Ammofos	2.9	2.6

Source: Cherepovets. Gorodskaya Duma.

Table 21. Share of taxes from local companies in total volume of tax revenues in Cherepovets.

<u>Structure of local governance and administration in the housing and utility sector</u>: According to the federal local self-government act of 1995, all subjects of the Russian Federation are divided into smaller units, so-called districts (*raiony*). Cherepovets is one of these districts inside the Vologda region, which includes 26 districts, 15 cities, 9 poselkov gorodskogo tipa, and 368 rural settlements. The total region's population was 1,245 million residents in 2002. While not the capital of the region, Cherepovets is the largest city there. It had almost 312,000 residents in 2002, while Vologda, the region's capital, had only 297,000 in the same year. The city is also the main donor in the region; its profits constituted the largest part of the regional budget.

As in many other Russian townships, in Cherepovets there are several laws and decrees that regulate local governance, such as the Constitution of the Russian Federation, Federal Law "On general structure of municipal governance in Russia", Vologda region statutes and laws, and local Cherepovets municipal statutes.[41] According to these regulations, there are three main actors in municipal governance – the City Council, *Gorodskaya Duma* (representative function, elected directly by the citizens every four years); the head of the municipal administration, *Mayor* of the city (representative function, elected directly by the citizens every four years); and the municipal administration, the mayor's office (executive function; formed by the mayor). As the 1993 constitution formally claims, these actors are agencies of local self-government and are not included in the system of the state power that consists of federal and regional agencies.

Figure 4 shows the structure of housing and utility services in the city.

[41] Such as the city charter that was issued on November 28, 1995.

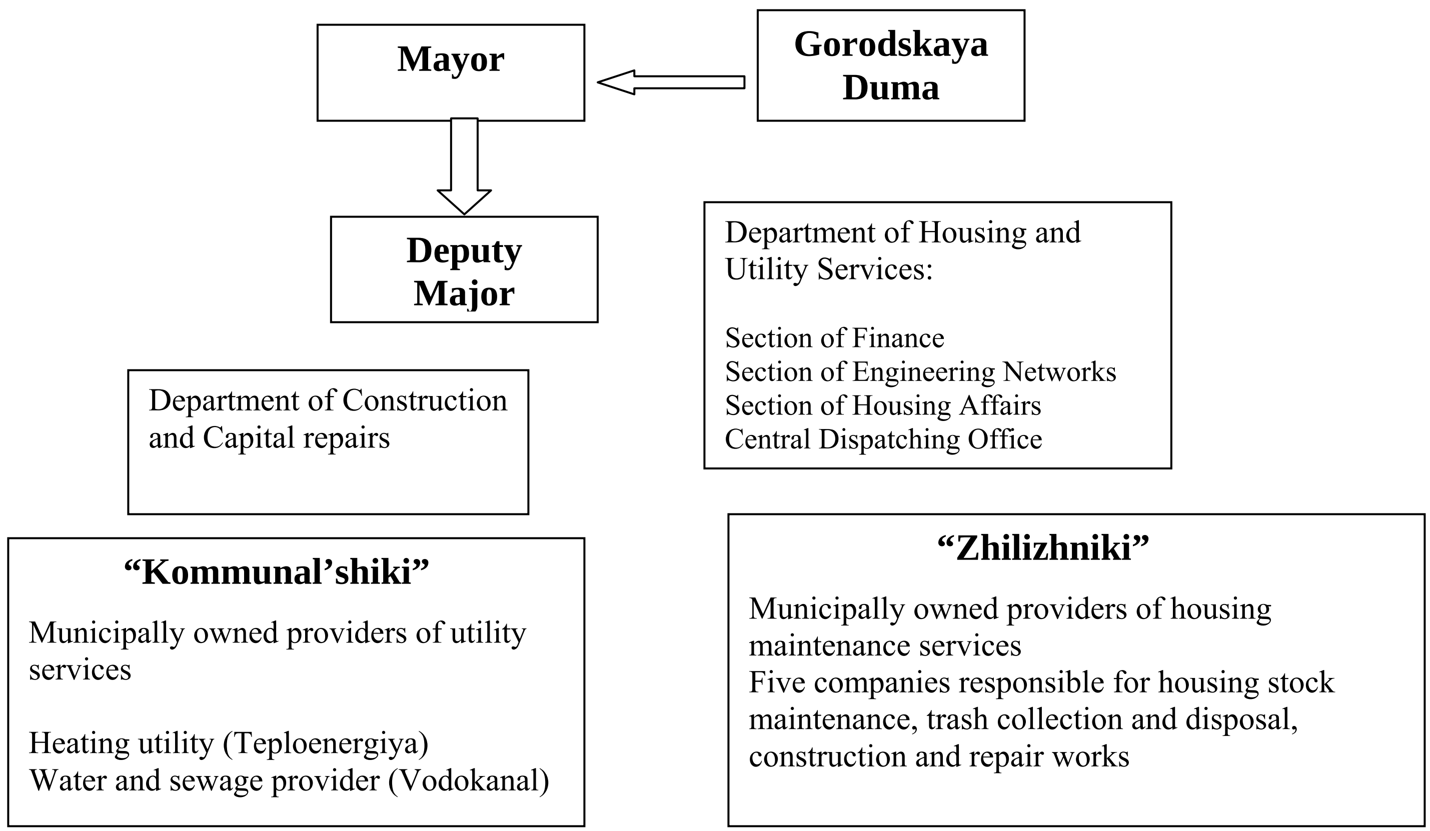


Figure 4. Structure of housing and utility services in the city.

Like other Russian municipalities, Cherepovets's administration has its own housing stock and is responsible for its management and maintenance. Its general responsibilities in the sector include:

1) Administration of municipally owned housing stock and public facilities
2) Planning and development of the municipal territories
3) Organization and administration of municipal electricity, gas, heating, water, and sewage utility companies
4) Provision of heating fuel to residents and municipal budget institutions
5) Building and maintenance of municipal roads
6) Operation of fire emergency services.

The deputy mayor is responsible for the fulfillment of these responsibilities and is accountable directly to the mayor and local Duma. He supervises the activities of two main departments in the sector, the Department of Housing and Utility Services which is the main local agency for market policy implementation in the housing and utility sector, and the Department of Construction and Capital Repairs, which is responsible for major repairs to existing buildings. The housing and utility services are provided through municipally owned companies for housing stock maintenance (in Russian '*zhilizhniki*') and utility (water and heating) companies ('*kommynalshiki'*). They are closely supervised by the Department of Housing and Utility Services and are heavily dependent on financial decisions made by the Department of Capital Repairs.

4.4.2. Financial capacities of the city.

Funding is the first factor that could possibly explain the advanced position of Cherepovets in terms of reform the housing and utility sector. As the previous reports argue, implementation of market reforms depends heavily on local financial capacities (World Bank 2003; United Nations 2004). As we reformulated this argument in terms of institutional theory in Chapter 3, it implies that the market policy, as designed by central decision-makers and delivered by local implementers, has a higher chance of success only in municipalities with sufficient financial resources. As Cherepovets has the required small degree of misfit between new policy and budget capacities, it succeeded in market reform in the sector.

As some analysts note, in comparison with other Russian localities, Cherepovets (together with Vologda, Irkytsk, Kazan and Lipetsk) is characterized by a significant level of budget strength (Chernyavsky 2003). The city is a donor in the Vologda region and has a high economic potential thanks to metallurgical and petrochemical industries. The share of transfers from the federal and regional budgets never exceeds 7% to 8% of city budget revenues. Significant budget revenues make it possible for Cherepovets to allot a significant part of their funds for capital investment. The share of capital spending in total spending in 1999-2001 never decreased below 15% or 18%. The city is also in the group with above average spending on the housing and utility sector.

Let us review the main expenditures and expenses of the city's budget in 2001-2006 to verify these statements. As Table 22 indicates, the local budget was relatively stable, with the budget surplus in most years during 2000-2004.

	Budget revenues, rubles	**Budget expenditures, rubles**
2000	2109500,000	1972500,000
2001	1830788,500	1967594,100
2002	2203300,000	2116700,000
2003	2821042,000	2724317,000
2004[a]	3588263,000	3419800,000

Sources: Cherepovets. Gorodskaya Duma.
a. Proposed budget

Table 22. Cherepovets's budget in 2001-2004.

Overall, revenues of all local budgets in Russia, including Cherepovets, are made up of:

a) The local taxes, fees and penalty charges, allocations from federal and regional taxes;

b) Intergovernmental transfers from the higher levels of authority;

c) Allocations from property privatization, rent of municipal real estate, local loans and lotteries, a certain share of revenues gained by municipal enterprises, organizations and institutions;

d) Subsidies and subvention from federal government.

Regarding the tax part mentioned above, the Tax Code (Part I enacted in 1999 and Part II enacted in 2000) and the Federal Law "On Foundations of the Tax System of the Russian Federation (Articles 19-21) determine types of taxes for all levels of government in the country. According to these statutes, the main federal taxes include the enterprise profit tax, the value-added tax (VAT), excises on specific goods and raw materials, the personal income tax, the tax on extraction of minerals and raw resources, customs and state duties, and contributions to state extra budgetary funds (Part 2 of the Tax Code renamed this tax the consolidated social tax). Regional taxes include taxes on property of organizations, sales, real estate, roads, transportation, and gambling enterprises, and regional license fees. Local taxes include the land tax; individual property, inheritance, and gift taxes; the tax on advertising, and local license fees. For each year, the law on the Federal Budget provides the revenue-sharing proportions between budget levels. In practice, more than 90% of regional and local revenues come from federal tax sharing, and revenues collected by regional and local governments account for less than 15% of their expenditures.

As Table 23 demonstrates, on average in Russia, the major portions in the structure of local budgets are made up of the budget regulation resources: personal income tax (23% in 2002), profit tax (11% in 2002), property tax (7% in 2002) and intergovernmental transfers (41% in 2002). Over time, the tax part of the local budget, both own and re-distributed later on taxes, has decreased. While Table 23, based on the findings of Chernyavsky and Vartapetov (2004), indicates a reduction from 68.2%

in 2000 to 53.5% in 2002, other sources claim the reduction to be from 72% to 60% in the same period (Igydin 2004). Under such conditions as lack of financial self-sufficiency, it is hardly possible to speak about the independence of Russian cities.

In this respect, Cherepovets is in a relatively independent position. Even in comparison with the federal cities of Moscow (53% in 2000 and 67% in 2003) and St. Petersburg (60% in 2000 and 63% in 2003), the share of tax revenues in the local budget is very high – 87% in 2001 to 78% in 2004. Some decrease in tax revenues in this period can be explained by new sharing rates for personal income tax that decrease the amount available to the city, but it still does not change the current overall structure of budget revenues in the city.

As the Table 23 indicates, Cherepovets's administration received a largest share of main taxes (personal income, profit and property taxes) than other Russian localities did during 2001-2002. It is heavily dependent on personal income tax, receiving 42.4% in 2001 and 51% in 2003 of its total revenues from that source. It also received about 27% from the enterprise profit tax (lower than Moscow, with 30% in 2002, but higher than St. Petersburg, with 17% in the same year or Vologda, with 5.4% in 2004) and around 10% from the property tax (more than Moscow and St. Petersburg in 2002). Its overall share of intergovernmental transfers was very low. In comparison with other Russian municipalities, which received 41% in 2002, Cherepovets got only 7.7% in the same year. Some changes in the share of transfers in 2004 can be explained by the overall centralization policy.

	Total revenues from taxes, %	Profit tax	Valued added tax	Personal income tax	Excises on goods	Property tax	Land tax	Other taxes	Non-tax revenues	Intergov transfers
Russia										
2000	68.2	13.5	5.3	16.8	2.9	6.2	14.9	3.5		28.3
2001	61.2	16.7	0	21.1	2.8	6.7	5.1	4.3		34.2
2002	53.5	10.9	0	23.3	2.5	7.1	3.1	6.0		40.5
Moscow										
2000	52.8	21.8	7.6	15.8	1.9	5.5	0.2	47.2		
2001	62	34.2	0	18.5	2.2	6.9	0.2	38.0		
2002	63.1	30.0	0	22.4	2.3	8.2	0.2	36.9		
2003	67	31.6	0	24.6	3.3	7.2	0.3	33.0		
St. Petersburg										
2000	59.7	18.5	7.6	18.4	7.7	6.8	0.7	40.3		
2001	57.3	19.5	0	21.9	8.1	7.3	0.5	42.7		
2002	57.4	16.6	0	24.8	7.3	7.8	0.9	42.6		
2003	62.8	18.9	0	28.2	5.7	8.4	1.6	37.2		
Vologda										
2004	63.4	5.4	0	30.3	6	12.9		NA	NA	32
2005	62	3	0	31	5.7	12.6		47.7	0.9	33
Cherepovets										
2001	87	24.3	0	42.4	1	10.8	1.6	19.9	3.2	4.4
2002	76.5	22.8	0	54.7	1.7	12.7	1.4	6.7	10.2	7.7
2003	80.5	28.3	0	51.1	2	9.9	2.6	6.1	4.5	4.3
2004[a]	78	29.5	0	33	1.2	7.2	3	26.1	4.5	12.9

Source: Author's calculations; Chernyavsky and Vartapetov 2004; Federal'naya Slyzhba Gosydarstvennoi Statistiki. 2006. *Finansy Rossii. 2004.* Moscow.

a. Proposed budget revenues

Table 23. Structure of budget revenues in selected cities, % of total budget revenues.

While Cherepovets currently has a relatively independent local budget, there may be some negative changes in the future. Still, even given such a centralization trend, Cherepovets is more financially autonomous than the capital of its region, Vologda. In 2004, Cherepovets received around 78% of its revenues from taxes and only 13% from higher budget transfers, while Vologda obtained around 63% from taxes and 32% from intergovernmental transfers in the same period.

Regarding budget expenditures, the main trend observed by analysts around the country is the ever-increasing debts of the local budgets and, as a result, delays in the payment of wages and under-financing of the social sphere, the housing and utility sector and transportation (Chernyavsky 2004; Igydin 2004). During 2001-2004, the major items of expenditures of the local budgets included education, the housing and utility sector, public health care and social policy. Table 24 confirms these statements. Due to the implementation of the increasing payments for utility services starting from 1998, overall local expenses for the housing and utility sector decreased significantly from 30% in 1998 to 19.5% in 2002. While quite stable over time, education constitutes the largest item of municipal expense around the country, 32% in 2002. Expenses for public health and social policy were relatively stable from 1998-2002

We can observe the same trend in Cherepovets, where expenses for the housing and utility sector decreased from 31% in 1998 and 38% in 2000 to 18% in 2003 (Table 25). Expenses for education were relatively stable at around 24% in the same period. Currently, expenses for education are the largest item in the local budget – 22% in 2004. Expenses for public health and social policy varied over time, around 19% in 1998-2004 for health care and 8-9% in the same period for social policy.

	Local administration	Local industries (manufacturing, construction)	Social and cultural services	Culture, arts and cinema	Public health	Social policy	Other expenditures
Russia							
1998	5.3	7.0	28.1	2.3	15.0	5.7	8.6
1999	5.7	6.3	28.1	2.5	15.8	5.5	8.7
2000	6.0	5.7	28.0	2.8	16.0	4.8	7.8
2001	6.5	10.5	28.0	2.6	14.9	6.5	6.4
2002	6.7	9.9	32.0	3.0	15.5	7.6	4.6
Moscow							
2000	NA	8	25.5	45.6			
2001	NA	24.5	24.6	35.1			
2002	NA	27.6	26.2	30.0			
2003	NA	31.1	28.4	25.5			
St. Petersburg							
2000	NA	8.6	39.5	30.7			
2001	NA	18.7	38.5	25.0			
2002	NA	16.7	41.7	22.4			
2003	NA	15.1	43.5	22.7			
Vologda							
2004	4.4	9.4	27.7	NA	10.3	9	4.2
2005	4.4	0.9	28.5	1.1	11	8.6	6

Continued

Table 24. Expenditure structure of selected local budgets, % of total budget expense.

Table 24 continued

Cherepovets							
1998	3.4	2.1	23.3	2	24	7.5	6.7
1999	3.3	5	22	2.4	20	6.5	6.8
2000	3.2	3	18	2.4	19	4.2	11.11
2001	5.2	2.8	21.9	2.2	19.5	5.6	13.9
2002	5.2	3.9	30.7	2.7	17.7	6	14.6
2003	4.8	6.0	28.9	2.6	18.2	10.5	10.5
2004[a]	5.4	9.8	21.6	2.7	14	9.1	16.7

Source: Chernyavsky and Vartapetov 2004; Federal'naya Slyzhba Gosydarstvennoi Statistiki. 2006. *Finansy Rossii. 2004.* Moscow; Web-site of Vologda City Administration; Gorodskaya Duma, Cherepovets. Decree #51 "Local budget in 2001," April 23, 2002; Decree #18 "Local budget in 2002," April 14, 2003; Decree #76 "Local budget in 2003," June 1, 2004; Decree #154 "Changes in local budget in 2004," December 17, 2004; Decree #159 "Local budget in 2005," December 28, 2004; Social' no ekonomicheskoe polozhenie g. Cherepovtsa v 2005 g.

a. Proposed budget expenses

	1998	1999	2000	2001	2002	2003	2004	2005
Russia	30.3	27.4	28.9	24.6	19.5	na	na	na
Moscow	NA	NA	20.9	15.8	16.2	15.0	na	na
St. Petersburg	NA	NA	21.2	17.8	19.2	18.7	na	na
Vologda	NA						35	36.2
Cherepovets	31	34	38	29.1	19.2	18.3	20.2[a]	NA

Source: Chernyavsky and Vartapetov 2004; Federal'naya Slyzhba Gosydarstvennoi Statistiki. 2006. *Finansy Rossii. 2004.* Moscow; Web-site of Vologda City Administration; Gorodskaya Duma, Cherepovets. Decree #51 "Local budget in 2001," April 23, 2002; Decree #18 "Local budget in 2002," April 14, 2003; Decree #76 "Local budget in 2003," June 1, 2004; Decree #154 "Changes in local budget in 2004," December 17, 2004; Decree #159 "Local budget in 2005," December 28, 2004; Social' no ekonomicheskoe polozhenie g. Cherepovtsa v 2005 g.
a. Proposed budget expenses

Table 25. Expenses for the local housing and utility sector, % of total budget expenses.

As Table 25 indicates, overall Cherepovets spent more funds on the housing and utility sector than Russian municipalities in general in 1998-2002 and more than Moscow and St. Petersburg in 2000-2003. There is an interesting contradiction between the expenses of the regional capital, Vologda, and Cherepovets in the sector in 2004. Vologda spent 35% of its budget on this item, while Cherepovets spent only 20%. That difference can be explained by the more advanced position of Cherepovets in terms of implementation of full cost-recovery price policy. It introduced 100% utility charges in 2001, while Vologda still covering part of the residents' expenses (about 13%) from the budget.

The additional indicator of the city's financial capacity is the per capita budget measure. Since the collapse of the Soviet Union, differences among the regions in per capita budgetary income have increased significantly. Many analysts note that the ratio of maximum to minimum budgetary incomes per person among regions increased from 11.6 in 1991 to 30 in 1998 (Chernyavsky 2004). The data in Table 26 provides the evidence that in comparison with Moscow and St. Petersburg, the budget capacity in Cherepovets is not very high. During 2001-2003, the per capita budget revenues in the city were much lower than in federal cities.

In addition, according to other studies, regardless of their special status in the country, these cities are not the richest in the country in terms of budget strength. In 2001, for instance, budget revenues per capita in some one-company towns producing raw materials were much larger than in these cities. In Norilsk, this indicator was around 45,000 rubles and in Surgut, it was 30,000 rubles. However, in comparison with other cities, Cherepovets's budget capacity in 2001 was relatively good, for most cities had per capita budget revenues below 3,000 rubles in the same period (such as the city of Omsk with a budget capacity of 2,500 rubles) (Chernyavsky 2004, 22).

Per capita budget revenues, rubles	**2001**	**2002**	**2003**	**2004**
Russia	18,434	24,269	28,703	37,840
Moscow	27,332	27,835	32,635	NA
St. Petersburg	11,273	14,292	16,589	NA
Vologda	NA	NA	NA	9,270
Cherepovets	5,673	7,062	9,042	11,538[a]

Sources: Author's calculations; Goskomstat Rossii. 2002. *Regiony Rossii: Osnovnye charakteristiki syb'ektov Rossiiskoi Federachii.* Moscow; Federal'naya Slyzhba Gosydarstvennoi Statistiki. 2006. *Rossiiskii statisticheskii ezhegodnik.* Moscow; Federal'naya Slyzhba Gosydarstvennoi Statistiki. 2006. *Finansy Rossii 2004.* Moscow; Web-sites of Vologda City Administration and Cherepovets City Administration; Vologodskaya Gorodskaya Duma. "Ot utverzhdenii otcheta ob ispolnenii budgeta goroda Vologdy za 2005 god", enacted on June 22, 2008, #103; Cherepovets. Gorodskaya Duma documents.

a. Proposed budget

Table 26. Budget revenues per capita in selected cities and regions.

Another indicator of a city's financial capacities is the percent of total local budget expenditures for capital investments. As many analysts argue, use of resources for capital investments is one of the most representative indicators of a city's capacity for self-development. As can be seen from Table 27, Cherepovets spent about 15-24% of its total budget on capital investments in the city. While consistent data about other cities is not available, we can still compare Cherepovets's spending with Vologda and Tomsk. In 2005, Vologda spent a much lower percentage of its budget on capital repairs (only 10%) than our city did in the previous years. In Tomsk in 2004, capital construction and rehabilitation constituted an even lower share, only 8% of total budget spending.

	2001	**2002**	**2003**	**2004**	**2005**
Cherepovets	19.8	15	22	23.5	NA
Tomsk	NA			8	NA
Vologda	NA				10.4

Sources: Gorodskaya Duma, Cherepovets. Decree #51 "Local budget in 2001," April 23, 2002, Decree #18 "Local budget in 2002," April 14, 2003, Decree #76 "Local budget in 2003," June 1, 2004, Decree #154 "Changes in local budget in 2004," December 17, 2004; Georgia State University Consortium 2003.

Table 27. Local budget expenditures for capital investments, % of total budget spending.

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As this review of budget data demonstrates, Cherepovets has relatively high financial capacities. The city's budget is characterized by a large share of tax revenues (73-87% in 2001-2004) and a small share of intergovernmental transfers (4-13% in 2001-2004). Such a revenue structure makes the city more self-sufficient and more financially autonomous from the higher levels of authorities in comparison with most Russian municipalities. The higher fiscal autonomy implies a higher degree of political autonomy; during the last few years, the city was not forced to enter into endless financial negotiations with the regional and federal centers. In terms of budget capacity, despite the lower per capita budget revenues than in oil-based company towns or federal cities, Cherepovets was relatively strong. The city can also be characterized by relatively higher budget expenses on the housing and utility sector and capital investments than other places. This implies that unlike other places where costs of repair and replacement in the sector will almost certainly increase substantially in the future, Cherepovets will escape this fate by splitting out expenses on capital construction and rehabilitation over time.

4.4.3. Human resource capacities.

In addition to financial capacities, the next factor that can explain Cherepovets's advanced position in market policy delivery is the number of professionals capable of running activities in the housing and utility sector. As previous studies argue, a lack of specialists with the required training can eliminate the lucky fit between new policy and budget capacities and slow down the progress of market reform in the locality (Chernyavsky 2003; Institute for Urban Economics 2003; Nachional'nyi Doklad 2002; United Nations 2004). In terms of institutional theory, this implies that in order for market policy in the housing and utility sector to be successful, not only should financial capacities but also human capacities and the new policy should have a small degree of misfit. Because Cherepovets has both high financial and human resource capacities, it was able to succeed in market policy delivery in the sector.

In the country overall, only a small percentage of the labor force works in the housing and utility sector (see Table 28). During 1990-2004, industry (around 23% of the total labor force) and agriculture (13%) had the largest number of the employed. The distribution of the employed across sectors did not change much in comparison with the Soviet period. In 1970, industry (33% of the employed) and agriculture (19%)

were the largest sectors in terms of the total labor force. The housing and utility sector, together with communications, education and forestry, has had a relatively stable percentage of the employees, 3.1% in 1970, 4.3% in 1990 and 4.8% in 2004.

	1970	1990	1995	2000	2001	2002	2003	2004
Total	100	100	100	100	100	100	100	100
Housing and utility sector	3.1	4.3	4.5	5.3	5.0	4.9	4.9	4.8
Communications	1.3	1.2	1.3	1.4	1.4	1.4	1.4	1.4
Bank sector	0.4	0.5	1.2	1.2	1.2	1.3	1.3	1.4
Education	6.6	7.9	9.3	9.1	9.0	9.0	9.1	9.0
Agriculture	19.1	12.9	14.7	13.0	12.3	11.8	11.0	10.4
Industry	33.1	30.3	25.8	22.6	22.7	22.2	21.9	21.5
Science	3.3	3.7	2.5	1.9	1.8	1.8	1.9	1.8
Forestry	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4

Sources: Rosstat. 2006. *Tryd i zanyatost v Rossii.* Moscow: Federal Agency of State Statistics

Table 28. Average annual number of the employees across selected sectors, %, 1970-2004.

Cherepovets's employment structure in the sector has the same trend as overall in the country (see Table 29). About 5% of the city's labor force worked in the housing and utility sector during 1999-2003.

	1999	2000	2001	2002	2003
Total	100	100	100	100	100
Industry	60.4	60.4	61	59	59
Agriculture	0.02	0.02	0.02	NA	NA
Forestry	NA	NA	NA	0.1	NA
Transportation	5.7	5.7	5.4	4.4	5
Commun-s	1.5	1.4	1.4	1.4	1.3
Construction	5	5.1	5.1	5.7	5.3
Services	1.8	1.9	2	2.3	1.6
Housing and utility sector	5.3	5.1	4.9	4.8	4.3
Social services	7.5	7.7	7.8	7.8	8.1
Education	8.5	8.4	8.3	9.7	10
Finance sector	0.7	0.6	0.6	0.7	0.7
Administration	0.9	0.9	0.9	1.1	1.2

Source: Passport goroda Cherepovetsa, 1990-2003.

Table 29. Employment structure in Cherepovets, % of employees among sector of economy, 1999-2003.

The next question is whether the housing and utility sector is an attractive activity for employees given the level of salaries and percentage of labor turnover there. Overall, the housing and utility sector is not a very appealing employment field. Since Soviet times, it has been characterized by a high percent of labor turnover, low share of professionals with university-level education, and low wages.

As Tables 30 and 31 suggest, like in Soviet times, the sector had one of the highest levels of labor turnover during 1995-2004. In 2004, for instance, 44% of new workers entered the sector and 49% of the old employees quit their jobs, while the average levels across all sectors of the Russian economy were 29% and 31%, respectively. Among the employees who left their jobs in the sector, only 8% were fired by the employer. The housing and utility sector, together with other non-prestigious sectors, such as agriculture and forestry, has also had one of the highest levels of employees with only a high school education – 30% of the total number of workers in 2004 (see Table 32). It was also among the sectors with the lowest level of workers with university-level training – 12% in 2004.

As Table 33 demonstrates, like in Soviet times, the level of wages in the housing and utility sector was only 81-85% of the average salary for the country. While this level is considerably higher than in education, agriculture, or forestry, it is still lower than rates in sectors like finance (247% of the average salary in the country in 2004) or communications (133% in 2004). On average in the country, about 65.7% of workers in the housing and utility sector had a salary at or below the average salary in the sector (Goskomstat 2006).

	1995	2000	2003	2004
Average % in all sectors	22.6	26.9	29.2	29.2
Housing and utility sector	39.7	41.4	46.9	44.1
Communications	29.0	31.0	34.2	59.8
Bank sector	25.2	20.5	28.1	24.9
Education	17.1	16.6	19.1	18.4
Agriculture	12.7	20.3	28.5	31.5
Industry	21.1	30.1	29.7	30.3
Science	12.8	17.0	16.9	16.8
Forestry	31.5	36.1	33.2	30.4

Source: Rosstat. 2006. *Tryd i zanyatost v Rossii*. Moscow: Federal Agency of State Statistics.

Table 30. New workers per year, across selected sectors, % of total labor force in the country, 1995-2004.

	1995	2000	2003	2004
Average in all sectors	25.7	27.8	31.3	31.2
Housing and utility sector	30.2	42.1	47.2	48.6
Communications	28.9	31.3	35.2	54.6
Bank sector	19.8	21.3	19.7	20.2
Education	15.3	17.9	17.9	17.7
Agriculture	18.5	26.3	38.8	40.2
Industry	28.4	29.5	35.3	35.3
Science	22.4	17.1	17.6	17.5
Forestry	32.8	36.8	34.2	33.3

Source: Rosstat. 2006. *Tryd i zanyatost v Rossii*. Moscow: Federal Agency of State Statistics.

Table 31. Quitted workers per year, across sectors, % of total labor force in the country, 1995-2004.

	Total	University-level	Incomplete University-level	College level	Incomplete college level	High school	Middle school	No education
Average in all sectors	100	24.9	2.0	26.1	17.6	22.6	6.2	0.5
Housing and utility sector	100	12.1	1.8	21.9	25.6	29.6	8.2	0.6
Communications	100	22.4	3.0	30.0	15.1	23.0	6.1	0.4
Bank sector	100	58.4	2.6	26.7	4.6	7.2	0.4	0.2
Education	100	50.1	2.0	27.1	8.5	10.7	3.4	0.2
Agriculture	100	6.7	0.8	14.8	16.4	36.8	21.1	3.4
Forestry	100	11.1	2.6	28.5	13.3	32.7	11.8	0.0
Science	100	63.9	1.5	15.3	5.8	11.6	1.8	0.2

Source: Rosstat. 2006. *Tryd i zanyatost v Rossii*. Moscow: Federal Agency of State Statistics.

Table 32. Distribution of employed by education, % of total labor force in selected sectors, 2004.

	1970	1995	2000	2001	2002	2003	2004
Average salary in the country	100	100	100	100	100	100	100
Housing and utility sector	81	102	88	86	85	85	85
Communications	83	124	129	127	130	133	133
Bank sector	97	163	244	286	285	270	247
Education	90	65	56	56	67	62	62
Agriculture	74	50	40	40	40	39	41
Industry	112	112	123	124	118	117	117
Science	115	77	122	126	126	127	129
Forestry	NA	68	60	58	64	59	61

Source: Rosstat. 2006. *Tryd i zanyatost v Rossii*. Moscow: Federal Agency of State Statistics.

Table 33. Trends in salary changes in selected sectors of Russian economy, %, 1995-2004.

The next question is whether the same trend of low prestige of the sector with high percentage of labor turnover, low level of professionals with university-level education and low salaries can be found in different places in the country. Unfortunately, very limited data is available about the housing and utility sector employment structure across Russian localities. As the restricted data from Cherepovets indicates, the level of labor turnover in the heating sector was not as high in 2003-2004. The local utility company, Teploenergiya, hired 823 workers in 2003 and 780 in 2004. Only 43 employees (5% of workers in 2003, compared to an average in the country of 47% in the same year) quit their jobs in this period (Vesti 2004, 39).

More extended data is available regarding the level of wages in selected cities and regions. As Table 34 indicates, salary in the sector varied considerably across cases in 2004. If in St. Petersburg and Moscow salaries were slightly higher than average salaries in other cities, in other regions and across federal districts overall the rate was lower than the typical one. In the richest oil-based regions in the country, the salaries in the housing and utility sector were even lower than the usual rate in the country – only 71% of the average salary in the Tumen region and 61% in Khanty-Mansiiskii okryg. In comparison with other regions, Cherepovets has one of the highest levels of average salaries in the sector. It is comparable with the federal cities of Moscow and St. Petersburg.

	Average monthly salary, rubles	Salary in housing and utility sector, rubles	% of average salary
Russia	6738.5	5747.1	85.3
Central Federal District	7276.3	6560.1	90.2
Moscow	10634.0	10733.0	101
Northwestern Federal District	7518.1	6256.4	83.2
St. Petersburg	7931.1	8143.8	103
Vologda region	6970.6	5185.9	74.4
Cherepovets	10164.4	10057[a]	99
Southern Federal District	4648.4	4175.6	90
Volga Federal District	5149,9	4453.4	86.5
Ural Federal District	9692.5	7325.5	76
Tumen region	16956.5	12020.8	71
Khanty-Mansiiskii avtonomnyi okryg	19660.0	12060.1	61
Siberia Federal District	6507.8	5034.8	77
Far East Federal District	9115.2	7004.9	77

Sources: Goskomstat Rossii. 2001. Moskva, 1992-2001. Kratkii statisticheskii spravochnik. Moscow: Moskovskii gorodskoi komitet gosydarstvennoi statistiki; Rosstat. 2006. *Tryd i zanyatost v Rossii*. Moscow: Federal Agency of State Statistics; Web-Site of Vologda City Administration; Vesti 2004, 11.
a. Data for 9 months in 2004.

Table 34. Average salary in the housing and utility sector in selected towns and regions, 2004.

The city's average salary in the housing and utility sector is also much higher than the average rate in the country. Inside the city, while the level in the sector was lower than in the finance sector (139% of the average wage in the city in 2004) and industry (114%), it is considerably higher than in education (45%) or public health care (50%) (Table 35).

	Average salary in the city, rubles	Average salary in bank sector, rubles	Average salary in industry, rubles	Average salary in education, rubles	Average salary in health care, rubles
2004	10164,4 (100%)	14129 (139%)	11570 (114%)	4548,7 (45%)	5096,8 (50%)

Source: Cherepovets. Gorodskaya Duma documents. 2005.

Table 35. Average salaries in selected sectors in Cherepovets, 2004.

Although this quantitative data suggests only a limited overview of the human resources situation in the city, there are also some qualitative indicators of the presence of highly trained employees in the local utility company. In 2003, the city's administration hired the former director of Severstal's boiler-house, who has two university-level degrees in energy systems engineering and management as the new Teploenergiya's head. He brought with him highly qualified economists with whom he had worked at Severstal and almost completely replaced the staff of financial and personnel sections of the company. As these newcomers note,

> Before 2002, the company did not have any planning system, not even in tariff policy. There was no consistent economic or financial policy. You can feel it everywhere. Many heads of departments inside the company did not even know what planning or quality evaluation was. When they solved technological problems, they did not think about the cost-benefit analysis of such decisions. We are trying to introduce a new planning system in our company…While there are still many gaps in our new system, we have achieved something. We reorganized the financial structure; introduced an office of financial analysis, which is responsible for training in capital repair policy, inside company audits, etc…We also created the planning office, which is responsible for the company's budget evaluation. We can predict the future debts or profits of the company…well, only for four months because of the instability of the city's budget. However, it is still progress. How did they operate before 2002? They got results that shocked them and then continued the same policy! This was a terrible way to run the company. Now, because we have at least a limited analysis of the financial situation, we can correct our decisions (Vesti 2002, 12-13).

In addition to financial changes, the new director is also concerned about the creation of public image of the heating company in the city. In Soviet times, most residents considered utility technologies as an essential part of urban life. Paying quite small charges for services, they had no interest in knowing anything about the condition or operation of heating pipelines or boilers in the city. The company is trying to change such attitudes by publishing numerous articles in local newspapers and creating reports on local radio and TV stations to explain to the public the current technical conditions of heating equipment, financial requirements to support them in fair condition, endless changes in fuel prices that directly affect the prices of heat and hot water and the increases in residents' tariff on these services.

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While this section presents only limited data about our case, it still allows us to conclude that we can expect a higher than the average level of the required human resource capacities in the city. The local heating sector is characterized by a low percent of labor turnover and a high level of salaries. As we can predict, such relatively high wages allow the city to attract a larger numbers of qualified workers for the operation of the heating networks.

4.4.4. Socioeconomic characteristics of the city.

In addition to financial and human resource capacities, another factor that can account for Cherepovets's success in market policy delivery in the housing and utility sector is the socioeconomic characteristics of the locality. As previous studies indicate, the high share of people whose income is lower than the subsistence minimum in the city can slow down progress in market policy implementation (Freinkman 1998; United Nations 2004). A high percentage of poor people (both unemployed and those with low incomes) and low average wages imply high chances for social protests against one of the major elements of reform, the full cost-recovery prices on utility services. It also implies higher municipal expenses on housing and utility assistance programs for residents who cannot afford to pay the full cost-recovery rents and, correspondingly, less money for capital investments and repairs. Lower expenditures on maintenance of the existent urban networks, in the end, result in their poor condition and endless damages.

This was not, however, the case for Cherepovets where, according to the predictions of the hybrid theory, we should observe a small percent of poor people, high average salaries and lower municipal expenses to support poor people. Because this city has a small degree of misfit between the old context (i.e., in addition to high budget and human resource capacities, a low share of poor residents and high average salaries among its employees) and new market policy, it was able to implement the required program of changes in the sector.

The first task is the evaluation of salary level in the city. As Table 36 indicates, average monthly nominal accrued wages in the city were higher than in the Vologda region and the country in general. Until 2002, this indicator in Cherepovets was even higher than in Moscow and St. Petersburg, and after that year, it was still near the level of Moscow salaries. Such a high level of salaries can be explained by the fact that most employees in the city work at Severstal, a very profitable steel company. While many other Russian one-company towns became suddenly unprofitable and poor in the post-Soviet period, in terms of salaries, Cherepovets is a relatively rich locality. However, comparing our case with two rich oil-based Siberian regions with numerous company towns, Tumen oblast' and Khanty-Mansiiskii okrug, we can see that their average salaries were 1.5-2 times higher than in Cherepovets. Still, the city is one of the richest in the European part of Russia.

	2000	2001	2002	2003	2004	2006
Russia	2223	3240	4360	5499	6740	11127
Central Federal District	2173	3266	4433	5873	7276	12826
Moscow	3229	4924	6388	8612	10634	19549
Northwestern Federal District	2532	3655	5068	6144	7518	12135
St. Petersburg	2512	3695	5435	6468	7931	13251
Vologda region	2562	3511	4497	5498	6971	10885
Vologda	2493	3444	NA	NA	NA	11180
Cherepovets	3813	5258	6809	8207	10164	14985
Southern Federal District	148	2159	2974	3699	4648	7719
Volga Federal District	1783	2562	3412	4235	5150	8586
Ural Federal District	3487	5169	6589	8086	9693	14457
Tumen region	6707	9980	12083	14584	16957	23056
Khanty-Mansiiskii avtonomnyi okryg	8492	12590	14634	17209	19660	25841
Siberia Federal District	1248	1902	4310	5325	6508	10239
Far East Federal District	3114	4298	5979	7555	9115	14216

Sources: Federal State Statistics Service. 2006. *Russia in figures. 2006*. Moscow; Goskomstat Rossii. 2002. *Regiony Rossii: Osnovnye charakteristiki syb'ektov Rossiiskoi Federachii*. Moscow; Federal'naya Slyzhba Gosydarstvennoi Statistiki. 2006. *Rossiiskii statisticheskii ezhegodnik*. Moscow. Rosstat. 2006. *Tryd i zanyatost v Rossii*. Moscow: Federal Agency of State Statistics; Web-site of Vologda City Administration.

Table 36. Average monthly nominal accrued wages, rubles (thousands of rubles before 2000), 2000-2004, 2006.

Cherepovets also has a smaller share of people with a low income than the country does on average (see Table 37).

The city has a very low share of unemployed residents. As we can see from Table 38, in 2002-2004 the level of unemployment in the city was only 0.5-0.9%, in comparison with an average of 8% in the country.

	2000	2001	2002	2003	2004
Russia	29.0	27.5	24.2	20.6	17.8
Moscow	23.6	21.8	20.7	18.6	16.0
St. Petersburg	27.3	23.8	21.2	15.6	13.5
Vologda region	25.5	23.1	22.8	20.0	17.9
Cherepovets	NA	NA	NA	18	15
Tumen region	21.3	15.4	15.8	12.7	12.8
Khanty-Mansiiskii okryg	11.8	9.3	11.6	10.6	10.9

Source: Federal'naya Slyzhba Gosydarstvennoi Statistiki. 2006. *Rossiiskii statisticheskii ezhegodnik.* Moscow; Federal State Statistics Service. 2006. *Russia in figures. 2006*. Moscow; World Bank macroeconomic indicators, Russia.

Table 37. Population with low income in selected towns and regions, 2000-2004, % of total population.

	2002	2003	2004
Russia	8.1	8.6	8.2
Central Federal District	5.4	5.1	4.6
Moscow	1.4	1.3	1.6
Northwestern Federal District	6.3	7.0	6.0
St. Petersburg	3.4	4.2	2.7
Vologda region	6.0	4.7	6.3
Cherepovets	0.9	0.5	0.9
Southern Federal District	12.9	15.5	15.4
Volga Federal District	7.7	7.6	7.8
Ural Federal District	8.2	7.5	7.5
Tumen region	8.7	8.3	8.7
Khanty-Mansiiskii avtonomnyi okryg	10.2	9.2	9.7
Siberia Federal District	10.1	11.7	10.0
Far East Federal District	8.6	8.5	8.8

Sources: Federal State Statistics Service. 2006. *Russia in figures. 2006*. Moscow; Federal'naya Slyzhba Gosydarstvennoi Statistiki. 2006. *Rossiiskii statisticheskii ezhegodnik.* Moscow; Web-site of Vologda and Cherepovets City Administration; World Development Indicators, 2006.

Table 38. Number of unemployed, % of total labor force in selected Russian regions, 2002-2004.

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As this section demonstrates, another component of the old context in the city, the socioeconomic situation, was also in fitting with the proposed market changes in the housing and utility sector. Cherepovets has relatively high salaries among employees, a low percentage of residents with income below the minimum level, and a low share of the unemployed. All of these factors imply the small municipal expenditures on subsidy programs for the poor, higher spending on capital repairs of local heating networks and, in the end, an escape from the fate of a "heating disaster."

4.4.5. Physical characteristics of the city.

The last element of the old context in the city, which is required to be in a small degree of misfit with the market policy, is the physical characteristics of the city. As predicted by the previous studies, in addition to financial and human resource capacities and favorable socioeconomic conditions, the successful market policy delivery in a locality is determined also by its location in a less extreme cold climate zone, a small share of older buildings and run-down housing stock, and a small share of public housing in the city.

Geographical location of the city implies lower or higher costs of heat production and, correspondingly, lower or higher expenses from households or the municipal budgets. Even a locality with other favorable conditions but which located in an extremely cold climate where heating is required 10-11 months per year may find it difficult to support the operation of its urban system – both in financial and human resources terms (Freinkman 1998; Hill and Gaddy 2003). Most Siberian cities are the most vivid examples: they cannot find the money to support their utility systems in fair condition and suffer from constant interruptions in the supply of heat and hot water services to their residents.

Other physical characteristics of the city, like the average age of residential buildings and the ration of private to public housing stock, can also alter the implementation outcomes. A large share of old buildings means high municipal spending on the required maintenance and modernization of inside-house engineering infrastructure (United Nations 2004). In turn, a large share of public housing also presupposes high spending from the local budget that again makes it harder to succeed in market policy delivery in the locality (Chernyavsky 2003).

As predicted by the hybrid theory of implementation, Cherepovets should be "lucky" in physical terms. While officially the city claims to be part of the "Russian North," in comparison with many other Russian cities, it is still located in a relatively warm climate. The average January temperatures there are relatively mild, about -13°C (in comparison with -10.3°C in Moscow and - 43°C in Yakutsk).

In terms of housing amenities, Cherepovets has higher than average conditions. As Table 39 indicates, almost 99% of households in Cherepovets are living in buildings connected to centralized water and heat networks. Coverage by centralized networks (99%) is higher in the city than in the country in general (e.g., 80% of the average urban population lives in houses with central heating) and is even higher than in Moscow (98%) and St. Petersburg (96%). That can be explained by the difference in the age of the cities: Cherepovets turned into a big city only after World War II, when the steel plant was constructed and when multi-family buildings were built throughout the city (see Table 40). In other words, the heating (and all other utility) networks and the town itself were constructed simultaneously. In Moscow and St. Petersburg, heating networks were installed in the already existing physical infrastructure.

Country/Region/City	Running cold water	Sewage	Central heating	Fixed baths	Running hot water
Russia, total urban and rural population	75	71	76	65	62
Among them in: urban settlements	87	85	89	80	78
Moscow	99	99	98	98	94
St. Petersburg	98	98	96	94	78
Vologda region	68	63	63	60	50
Vologda	94.8	94.4	94.2	91.2	91.2
Cherepovets	99.1	99	99	98.8	98.9

Sources: Goskomstat RF. Vserossiskaya perepis naseleniya, 2002; Goskomstat RF Vologodskoi oblasti. 2001. *Municipal'nye obrazovaniya Vologodskoi oblasti. Social'no-ekonomicheskie pokazateli. 1995-2002*. Vologda.

Table 39. Housing amenities, % of households, 2002.

	1959	1965	1970	1977	1980	1985	1990
% of housing buildings with central heating	57.8	81.7	88.6	95	95	99.2	99.32

Source: Chentral'noe Statisticheskoe ypravlenie SSSR. *Social'no-ekonomicheskii passport goroda, 1970-1990*

Table 40. Changes in heating system connections in Cherepovets, 1959-1990.

In terms of the age of the housing stock, Cherepovets is a relatively typical Russian city (see Table 41). Most of the city's apartment buildings (88% of the total housing stock) were constructed between 1960 and 1985, a period of massive construction around the country. While aggregate data about the age of housing stock in the country is not available, as data from Moscow and St. Petersburg demonstrate, the most of the residential buildings there were built after 1946, 95% and 88%, respectively. As the same table indicates, in comparison with the European Union, the Russian housing stock is relatively new, but due to the low quality of construction and poor maintenance, it is wearing out quickly. As analysts note, the energy efficiency of most residential buildings is generally poor and the thermal insulation of the pre-cast panel walls does not meet modern standards. In most 9, 12, and 22 floor buildings, the water supply does not always reach past the seventh or eighth floor (United Nations 2003).

Country/Region/City	**Number of buildings, %**			
	Built before 1917	Built in 1918-1945	Built in 1946-1975	Built in 1976 and later
EU, 2001	32	NA	40	28
Moscow, 2002	2	3	52	43
St. Petersburg, 2001	19	3	43	35
Cherepovets, 2004	5	7	40	48

Sources: Goskomstat. Vserossiskaya perepis naseleniya 2002; United Nations 2004. Country Profiles on the housing sector: Russian Federation. New York and Geneva: United Nations; Cherepovetstechinventarizachiya. Svedeniya o zhilom fonde za 2004, February 21, 2005.

Table 41. Age of the housing stock, 2001-2004, % of buildings.

Today, most of the buildings built in 1946-1975 (40% in Cherepovets, 52% in Moscow, and 43% in St. Petersburg) require at least some or, in some cases, major modernizations. This group typically includes the first generation of five-story residential panel buildings, so-called *khrushchevky,* built between 1959 and 1969 (about 10% of residential buildings in the country), and the second generation of nine-story buildings, so-called *75 seriya,* built between 1961 and 1975. Most of these buildings are in a poor state of repair and must be renovated within the next 10-15 years. Cherepovets is in a relatively better situation in this aspect, for among the buildings constructed after 1946 (88%), the largest part (46%) was built after 1976 and do not require intensive investments right now.

Another sign of the physical condition of a city's buildings is the type of material from which they were built. The Russian urban housing stock today consists mainly of a few standard building types. As Table 42 illustrates, in Russia most households (38% in each of the following two types) live in buildings that were built either from brick (*khrushchevky*, buildings with external walls of silicate of baked clay bricks and flat roofs; standard designs include 4-5, 9 and 12 floors) or large panels (*75-ya seriya*, panel buildings with external walls of precast concrete panes and flat roofs; standard designs are from 5 to 9 floors). There is also a relatively large share of wooden construction. In most cities, this part of the stock is in particularly poor technical condition, as many such buildings were built in the pre-revolutionary years and require immediate restoration nowadays. While in Moscow and St. Petersburg only a small percentage of households lives in such houses, in Russia overall is about 11.4%.

In Cherepovets, the share of wooden houses is the biggest part of the city's housing stock (see Table 43). However, unlike in other places, these buildings were constructed after 1946 and are not in very bad condition now.

	Brick	Large panels	Blocks	Wood	Mixed material	Other materials
Russia	38	38	7	11.4	3.8	1.1
Moscow	25.3	57	14	0.1	0.7	0.4
St. Petersburg	42	39.3	15	1.1	1.1	0.2

Sources: Federal'naya Slyzhba Gosydarstvennoi Statistiki. 2005.

Table 42. The construction types of residential buildings, % of households, 2002.

	Brick	Large panels	Blocks	Wood	Mixed materials	Other materials
Cherepovets, 2004	36	24	-	39.2	0.2	0.7

Source: Federal'noe Gossydarstvennoe nabludenie. 2005. *Svedeniya o zhilizhnom fonde za 2004 g.* GP BO Cherepovetstechinventarizachiya.

Table 43. The types of residential buildings in Cherepovets, 2004, % of all buildings in the city.

As Table 44 indicates, in 2004, around 52% of the city's housing stock was in relatively good condition and only 4.5% of the buildings had a wear-and-tear rate of 65% or higher, meaning they require immediate modernization. In comparison, on average around the country, about 11% of the housing stock needs urgent renovation, nd 9% should be demolished completely (United Nations 2004, 35).

	Total number of residential buildings in the city	**Wear-and-tear rate**		
		0-30%	**31-65%**	**>65%**
Cherepovets	2838 (100%)	1474 (52%)	1235 (44%)	129 (4.5%)

Source: Federal'noe Gossydarstvennoe nabludenie. 2005. *Svedeniya o zhilizhnom fonde za 2004 g.* GP BO Cherepovetstechinventarizachiya.

Table 44. Run-down and dilapidated housing stock in Cherepovets, 2004, number of buildings and % in total volume.

Tables 45 and 46 indicate changes in tenure structure in the city and on average in the country. As we can observe in 2003, in comparison with the average in the country (23% of housing stock in the 's property) and the level in the Vologda region (39%), Cherepovets has a relatively high share of municipally-owned housing stock (42%). It also has a lower than average percentage of privately-owned (national average level, 70%; in the city, 55%) and enterprise-owned houses (national average level, 6.5%; in the city, 0.9%).

The relatively large share of municipal housing can be explained by the fact that Cherepovets is a one-company town. According to federal statutes, residential buildings, most of which belonged to the steel plant in Soviet times, were transferred to the city's administration during 1993-1995. During that time, the rate of privatization of this housing stock by residents was very low.

	2003
Russia, urban and rural population	
Private property	70
Cooperative property	
Enterprises' stock	6.5
Municipal stock	23
Vologda region	
Private property	48.3
Cooperative property	4.0
Enterprises' stock	2.5
Municipal stock	39.0
Cherepovets	
Private property	55
Cooperative property	
Enterprises' stock	0.9
Municipal stock	42

Sources: Passport socialno-ekonomicheskogo razvitiya goroda Cherepovetsha za 2003 g,; Goskomstat Rossii. Vologodskii oblastnoi komitet gosydarstvennoi statistiki. 2002.

Table 45. Ownership of the housing stock, % of total housing stock.

As we can see from Table 46, in 2003 only 46% of apartments subject to privatization were actually privatized in Cherepovets. In comparison, during the same year in Russia overall, 69.4% of all housing units were private property, while 53% of units were privatized in Moscow in 2000.

	1995	2001	2002
Russia, average level	56.2	67.7	69.4
Moscow	NA	52.7	NA
Cherepovets	27	45.5	46

Sources: Federal State Statistics Service. 2006. *Russia in figures. 2006*. Moscow; Goskomstat Rossii. 2001. Moskva, 1992-2001. Kratkii statisticheskii spravochnik. Moscow; Federal'naya Slyzhba Gosydarstvennoi Statistiki. 2006. *Rossiiskii statisticheskii ezhegodnik.* Moscow.

Table 46. Privatization of housing units, % of total number of apartments subject to privatization.

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To sum up the main findings of this section, the city of Cherepovets is both a typical and a unique Russian city. It is representative of the most populated group of Russian towns, mid-sized towns; 83% of the residents there live in multi-unit buildings, and the survival of 99% of households is dependent on the operation of centralized utility networks. It is also a unique case, for it is a relatively profitable one-company town with higher than average financial and human resource capacities, high salaries, and a low percentage of poor people. In terms of physical characteristics, it also has mainly good indicators: most of the residential buildings in the city were constructed after 1976, and the share of run-down and dilapidated buildings is low.

As the applied hybrid theory of implementation predicts, these favorable conditions can partly explain the advanced position of Cherepovets in terms of market policy implementation in the housing and utility sector. As these elements of the old context in the city and the proposed program of market changes have a small degree of misfit, the city was able to succeed in market policy delivery in the sector. The only deviation from our assumptions is the higher than average share of municipally-owned housing units in the city. According to the expectations of our theory, such a large percentage of public housing implies a higher than average spending on the housing and utility sector (that is, indeed, the case for our city) and correspondingly, delays in market policy delivery. Whether this factor slows down the city's progress in market reforming or not is one of the points of the next section, in which we will review the current policy decisions in the city's housing and utility sector.

4.5. Policy in the housing and utility sector in Cherepovets.

Overall, there are three main steps in Cherepovets's market policy in the sector. As the city's program "Development in the housing and utility sector in 2002-2010 (3rd stage)" indicates, the first stage (1992-1998) included a policy common for all other Russian places: local enterprises' housing stock was transferred to the local administration. During the second stage (1998-2001), the city implemented the full cost-recovery tariff policy in the sector and introduced a new social assistance system. During the last stage (2001-2010), the city hopes to increase the quality of housing and heating services, eliminate the cross-subsidies policy and improve technological infrastructure. Like other urban infrastructure, the heating system is one of the elements of urban networks that support the city's activities and life. Therefore, the policy of heat will be considered below as part of the overall market policy in the housing and utility sector in Cherepovets rather than as a separate policy area. I will focus on some specific decisions made in the heating sector; however, an overall explanation of heating reforms and results can be found throughout the analysis of the city's housing and utility policy in general.

4.5.1. History of the sector's administration.

As in many other Russian localities, in Cherepovets, reforms in the housing and utility sector started in 1992, when the "On delimitation of state property in the Russian Federation" (and a subsequent act in 1992) Act was enacted. This act prescribed the transfer of corresponding infrastructure, housing maintenance, and repair and construction organizations from industrial enterprises to municipalities. As I mentioned above, in Soviet times housing and other social services (like schools or hospitals) were supplied by local enterprises around the country.

These local enterprises administrated houses and provided their maintenance and utility services. Overall, local enterprises had the highest percentage of building construction (51% in 1990 and 41% in 1991) and carried the burden of financing housing and utility systems (69% in 1988 and 73% of all investments in 1989) (see Tables 47 and 48).

In Cherepovets in the 1960s, for instance, out of the total sum of 10.7 million rubles, the local Sovety invested only 0.4-0.9 million rubles in the construction of residential buildings, while local enterprises spent 8.8 million rubles (Table 49).

Local administrations were responsible for only 40% of all housing stock and urban networks. In Cherepovets, for instance, the city owned about 30% of all houses. In 1955, there were 4,524 houses of different types, among which 2,845 were private houses, 1,009 were enterprise stock, and only 670 houses were the city property. During 1940-1955, the number of city-owned buildings increased very slowly from 621 buildings in 1940 to 670 in 1955, while the number of enterprise-owned houses increased dramatically in the same period - from 356 in 1940 to 1,009 in 1955 (Cherepovets Archives. Svedeniya o ZhKH za 1955).

Types of housing	**1990**	**1991**
Individual housing	5.5	4.7
Cooperative housing	2.9	2.4
Enterprise housing	52.1	41.2
Total production	60.5	48.3

Source: Bertrand 1992, 887.

Table 47. Housing production by type in 1990-1991, % of total production.

Source of funds	1988	1989
Direct state and enterprises' capital investment	69	73
State farms	7	0
Cooperative funds	8	8
Population savings	16	19

Source: Bertrand 1992, 892.

Table 48. Sources of housing funds in 1988-1989, % of total volume, Soviet Union.

	1961	1962	1963	1964
Total investments in construction of residential buildings, million rubles Among them:	10.7	9.9	11.0	11.6
Ministries	8.8	8.4	4.8	7.0
Local Sovety	0.8	0.4	0.9	0.9

Source: Osnovnye pokazateli razvitiay zhozyistva i kyltyry goroda Cherepovetsha v 1960e gg.

Table 49. Total investments in the construction of residential buildings in Cherepovets during the 1960s, in million of rubles.

	Cherepovets, 1985	Cherepovets, 1987	Cherepovets, 1989	Cherepovets, 1990	Russian Federation, 1990	Moscow, 1990
Property of local Sovety	8.1	8.8	9.7	10.1	25	70
Property of local enterprises	86	84	83.4	83.2	42	20
Cooperative property	5.1	5.5	6.4	6.7	4	10
Private property	3	2.3	1.8	NA	26	0

Source: Chentral'noe Statisticheskoe ypravlenie SSSR. *Social'no-ekonomicheskii passport goroda, 1970-1990;* Struyk and Kosareva 1994.

Table 50. Number of apartments by property type, % of total number in Russian Federation, Moscow and Cherepovets.

In the 1980s, the city possessed only about 8-10% of all residential units, while local enterprises owned 83-86% of the city's apartments (see Table 50). As the city was a company town, the enterprise share in Cherepovets (83% in 1990) was two times higher than average in the Russian Federation (42% in 1990) and over four times higher than in Moscow (20% in 1990).

In the city, most apartments buildings were the property of the metallurgic plant as well as other local enterprises, like the chemical plant or construction companies:

> Well… our city is industrial. So there is, for instance, a shipbuilding plant and its housing stock, or Severstal and its housing stock. Say, all industrial part of the city, where we are now, is populated by the former houses of the metallurgic plant (Local journalist. Personal interview. Cherepovets. Spring 2005).

If we look at the quantitative indicators in Table 51, in 1965 the metallurgic plant owned 23% of all housing stock in the city and this share increased to 33% in 1974.

	1965	1966	1967	1974
Total housing stock, sq.m.	100	100	100	100
Metallurgic plant	23	24.1	24.3	33.2
Trest "Metallyrgstroi"	15	15	13	18.4
Metallurgprokatmontazh	1.4	1.8	1.9	3.2
Shipbuilding plant	1.3	1.3	1.3	2.1
Port	0.9	0.8	0.7	NA
Gorzhilypravlenie (Local Sovety stock)	4.2	4.5	4.9	6.6

Source: Osnovnye pokazateli razvitiay zhozyistva i kyltyry goroda Cherepovetsha v 1960e gg.

Table 51. % of total housing stock among local enterprises in Cherepovets, 1965-1974.

Even small factories, like the plywood factory, had their own housing stock. As our respondents indicated, regardless of the financial burden, it was still very profitable for any city's factory to have its own houses. Residential buildings meant power. Any plant owning apartments was able to invite the highly skilled workers by offering apartments in exchange for the job and could then control their job migration until retirement. *Order* (in the Soviet Union, a certificate of residence in your apartment that gave you the right to live in the place but did not grant you the right of ownership) was usually given only after fifteen years of service at a certain factory. That means that the high-skilled worker could leave the factory only near retirement age, sometimes which they, of course, preferred not to do:

> Many houses were the property of enterprises. For example, there was a factory, even a very small factory, say… a plywood factory. It was responsible for the maintenance of its housing stock and its financial support. It was very profitable for the plant to have its own houses. In this case, it could bargain with professionals. It could invite them to work at this plant and give the apartment in exchange for the job. Therefore, it was profitable to construct residential buildings. Apartments gave you bargaining power. Moreover, the plant was able to control the migration of experts. Only while did the working at the plant, professional have the right to live in the assigned apartment or the dormitory room. Only near retirement - after 10 or sometimes 15 years of employment, could he get this apartment in his own property and leave the plant. *Order* was issued for him. It was so before… Any enterprise had its own houses in order to attract professionals (Representative of Department of Housing and Utility Services. Personal interview. Cherepovets. Fall 2005).

During 1992-1994, all enterprise buildings (together with inside-house engineering infrastructure) were transferred to the property of the city. As one respondent explains, such policy had benefits both for local enterprises and for the city's administration. In a market economy, enterprises have different mechanisms for attracting high-skilled specialists. If previously they provided apartments, now they can suggest higher salaries or better benefits. For most companies, houses become a real financial burden with no apparent reason to keep them. Local administration, in turn, receives control over all residential buildings in the city, a move that makes investment decision-making an easy process:

> [Enterprise housing divestiture] began during revolution times in 1991-1993. What was the reason? All enterprises quickly became joint-stock companies, for which housing stock was an unnecessary financial burden. Why should they keep these houses if they now have good salaries to attract professionals? With good wages, you can buy an apartment or rent it, right? The new market mechanism appears and housing stock becomes a burden. Now they realize that houses should be maintained using companies' profits. And they begin to reject houses. How? A new law was enacted, according to which they should only pay tax to the municipality… I do not remember the exact rate of tax… And it was profitable for the enterprise to transfer houses to the city, which had no other choice but to accept them. On the one hand, yes, it was hard for the city; on the other hand, the city decided that maybe it was a very wise decision... Why? The city could count all buildings and made right investments. Because nowadays, housing stock is also urban infrastructure like roads, dumps and transport. Houses are also components of the city's communications. The city's administration was interested in such transfer because now it could make investment decisions (Representative of Department of Housing and Utility Services. Personal interview. Cherepovets. Fall 2005).

If in Soviet times the city administration, Cherepovets's *gorispolkom*, was responsible for maintenance of 500,000 sq. meters of housing, after the housing divestiture program it was in charge of almost 7,000,000 sq.m. The rate of this transfer is presented in Table 52.

In 2003, the total living space of residential apartments was 6,427,400 sq. m., among which 2,701,800 sq.m. (42%) was the property of local administration and 3,512,000 sq.m. (55%) was private property. Only 57,200 sq.m. (0.9%) was still the property of local enterprises (Cherepovets Local Archives. Passport goroda za 2003). From 2002-2003, in Cherepovets, there were 1,729 residential buildings, among which 1,252 were the city's property and 477 private property (cooperative and individual housing) (Svedeniya o zhilom fonde 2004).

Year	Total number of sq. meters in property of the city
1992	556,705
1993	617,100
1995	5023,100
2001	6680,000

Sources: City Program 2000 "Development…"

Table 52. The total number of sq. meters in the control of Cherepovets's city administration.

Of course, the transfer process was not at all easy. The majority of the housing stock and its engineering infrastructure were relatively young (i.e., built during 1960s); however, they were without major repairs for almost thirty years at the beginning of 1992. Enterprises had tried to get rid of the outdated 'social assets' very quickly without intensive investments in their reconstruction:

> When in the mid-1990s enterprises realized that it was very expensive to maintain houses, they transferred everything to the city… lock, stock and barrel…They cried: "Take them, for goodness' sake!" They just transferred all these houses together with residents, old pipes, etc. (Local journalist. Personal interview. Cherepovets. Spring 2005).

As many respondents report, it was a process of mutual agreement between the city's administration and local companies. Enterprises tried to transfer the "naked" houses, sometimes even without supporting material infrastructure, such as repair tools and required transportation:

> Houses were in terrible condition, Azot [the local chemical plant] transferred its stock literally without anything! They took even the last nail! When maintenance workers changed their jobs from the plant to the housing company, they were forced to return their hammers and all other toolware to the plant…It was impossible to go down to the houses' basements – we could do that only wearing gas-masks (Representative of housing maintenance company. Personal interview. Cherepovets. Spring 2005).

In turn, the city's administration resisted such practices and tried to argue about everything. As the respondent from the Department of Housing and Utility Services reports, enterprises tried to transfer only the buildings' frames, but the city did not accept that. Law stated that enterprises should transfer houses in 'good condition,' which meant buildings in a fair state with relevant repairs and transportation equipment. When the city made the decision whether to accept or reject a certain house, it bargained about everything. It took around two to four months to turn over the housing stock of each enterprise.

First, the city checked every house, evaluated its condition, and reported that the enterprise was required to repair certain elements in the inspected house:

> It was very painful…Enterprises tried to transfer only the buildings' frames, but we did not accept that. In law, it was stated that they should transfer houses in 'good condition.' They should also transfer houses with relevant equipment – repair tools and required transport. And when we made the decision whether to accept a certain house, we argued about everything. First, we explored the houses and counted all the expenses that the city should make to reconstruct it, i.e., roofs should be repaired, the in-house boiler should operate well, the condition of the stairs, the building's front and backyards should be in a fair condition, etc. Then, we made plans for what should be done by the enterprise that was required to pay for the maintenance expenses in the house...It was a titanic task that required intensive human and time expenses… something like 2-4 months for each enterprise. Because, first, we checked every house, commented on its condition and explained that the enterprise should repair this and this in the house. The price of repairs is X, you can pay us for repairs either by money, building materials, or equipment… but in the range of the indicated sum of expenses (Representative of Department of Housing and Utility Services. Personal interview. Cherepovets. Fall 2005).

If the enterprise could not invest money in the reconstruction of the building, the city took everything that could be useful for maintenance of the houses – spares, transport, building materials, etc.:

> We insisted on our interests, and they agreed to help us. If they could not give us equipment, we took building materials. If they could not give us materials, OK, we decided something else. Say, I did not have the required type of transportation equipment but instead had a mini van. You can take it, sell it, and use this money to buy a snow plow, for instance. If it was a shipbuilding plant, then we took plates, windows… everything that we could use to repair the building. Because it was a period of formation of joint-stock companies, they understood that it was very unprofitable to keep houses and agreed to help us (Representative of Department of Housing and Utility Services. Personal interview. Cherepovets. Fall 2005).

> The company that took houses could get bribes from the enterprise. For instance, I took ten houses and could get bribed for that, like with an additional salary for a sanitary technician, with bricks, nails…When they took a house from my company and gave it to another housing company, I kept these bribes, so the new company would receive only the naked house... therefore, we did not exchange houses among housing companies. Or we exchanged the naked house for the naked house… through a gentleman's agreement (Representative of the housing maintenance company. Personal interview. Cherepovets. Spring 2005).

However, even with the financial help of local enterprises, the city faced with a huge problem. It was forced to accept buildings with deteriorating infrastructure and assume responsibility for the operation of all local housing and utility companies. As a result, the city's expenses for the maintenance of housing stock proliferated. In 2006, the city's administration owned 1,221 houses in the city, that is, 53% of all housing stock in Cherepovets. Its expenses increased from 7-12% of the total budget in the 1960s to 31% in the 1990s.

Moreover, houses were transferred from the enterprises not only with inside engineering systems but also with outside networks. In 1994-1996, as utility company archives indicate, 83.5 km of heating networks (around 42% of total heating pipelines in Cherepovets) were transferred from local plants to the city. Before 1992, the metallurgic plant was responsible for the construction of the main pipelines in the city (like heating or water networks) and their maintenance. For heating networks, for instance, a special department was created inside the plant to take responsibility for heat production in the city. The municipal heating utility, formerly *Predpriyatie teplovyh setei*, today *Teploenergiya,* was responsible only for the heat production for the city's housing stock (i.e., 30% of all houses), while the other 70% of houses were served by the housing companies funded by the steel plant as well as by other local enterprises. Like with the houses, the engineering infrastructure was also in terrible condition, with outdated boilers, deteriorating pipes, broken cables, etc.

Therefore, the main question over technological changes in the city was financial resources. Where and how could the city get the money to reconstruct this obsolete housing stock and engineering infrastructure?

4.5.2. Money for the sector: the full cost-recovery tariff policy.

The most obvious path for obtaining the required resources is to increase payments for housing and utility services to the full cost-recovery levels. While looking like a very simple and obvious step, such a tariff policy was a hard decision to make for most municipalities around the country.

As I mentioned above, the central planning system was characterized by the universal and virtually free provision of utility and housing services for all residents. The rent control system has not changed since 1928. 13.2 kopecks per square meter of living area per month were charged with some minor adjustment for building quality (such as elevators, garbage chutes, etc.), and 16.5 kopecks a month per sq.m. for floor space above the norm (the official sanitary norm was 9 square meters per person). There was no adjustment for location or quality of the neighborhood. Rents and utility bills covered much less than 40% of the costs of the very low maintenance levels (Bertrand 1992; Struyk and Kosareva 1994). The rest of the funds for housing maintenance and utilities came from state funds (about 80-90% of the total budget of the housing and utility enterprises): 60% from the state budget and enterprise funds and 20% from the income of housing maintenance companies including rents from commercial space (Struyk and Kosareva 1994, 6).

Rent-income ratios, which reflect the price residents paid for state-provided housing, were extremely low. In 1980, the rent-income ratio was 3.7%, of which 1.1% was for rent and 2.5% was for utilities (see Table 53).

	1980	1985	1990
Alcohol	5.4	4.6	5.0
Housing bills	1.2	1.2	1.0
Utility bills	2.5	2.7	2.1

Source: Federal'naya Slyzhba Gosydarstvennoi Statistiki. 2006. *Rossiiskii statisticheskii ezhegodnik.* Moscow. 226.

Table 53. Expenses for goods in households' income in 1980-1990, % of total expenses.

Even in comparison with Eastern European countries, these ratios were very low. In 1989 in Bulgaria, for instance, total payments were 12.1% of the average income, including 7.6% for rent and 4.5% for utilities; in Hungary, the rent-income ratio was 8.7%, including 1.6% for rent and 7.1% for utilities (Bertrand 1992, 882).

The situation with the low rent and utility charges did not change radically in the post-Soviet period. In 1995, most households paid only 4.3% of their total expenses for housing and utility bills. While this share increased over time, it is still lower than in most other countries around the world at only 8.3% of households' expenses in 2005 (see Table 54).

1995	1997	1998	1999	2000	2001	2002	2003	2004	2005
4.3	5.1	5.2	4.7	4.6	5.2	6.2	7.2	7.7	8.3

Sources: Kratkii statisticheskii spravochnik. Moscow: Moskovskii gorodskoi komitet gosydarsvtennoi statistiki; Federal State Statistics Service. 2006. *Russia in figures. 2006*. Moscow; Federal'naya Slyzhba Gosydarstvennoi Statistiki. 2006. *Rossiiskii statisticheskii ezhegodnik.* Moscow.

Table 54. Expenses for housing and utility bills in a household's income in Russia, 1995-2005, % of total expenses.

Paying less than 7% of their salary for all utility bills, Soviet residents were not concerned very much about the operation and condition of heating pipes and boilers. For them, urban technologies were an obvious element of the city's life. Most of the time, utility production and financial support were unquestioned, as if they had always been there. As respondents in Cherepovets indicate, most urban services, like water, heat, and cleaned roads, were considered as a "Godsend" by most residents:

> The resident is not interested or concerned in any way about utility services. The only things he notices are damages. If we disconnect heating in winter, this is an emergency and everybody became aware of the existence of heating and water networks in the city (Representative of the local administration. Personal interview. Cherepovets. Spring 2005).
>
> You see… residents do not have time to be concerned about such evident thing as heat or water in the apartment. He comes home, opens the tap – there is the water. He touches the radiator, it is hot – there is the heat. What else should concern him? (Local journalist. Personal interview. Cherepovets. Spring 2005).

These urban services have been turned into something inevitably inscribed in urban settings. As Figure 5 illustrates, even paying charges for heat services, residents did not have direct contact with the heating utility. All payments went first to the housing maintenance companies, and then those companies paid the heating utility. Expenses for maintenance of inside-house heating pipelines were not reflected in the utility bills but instead implicitly integrated in the invoice for "maintenance of the building" paid to the housing company.

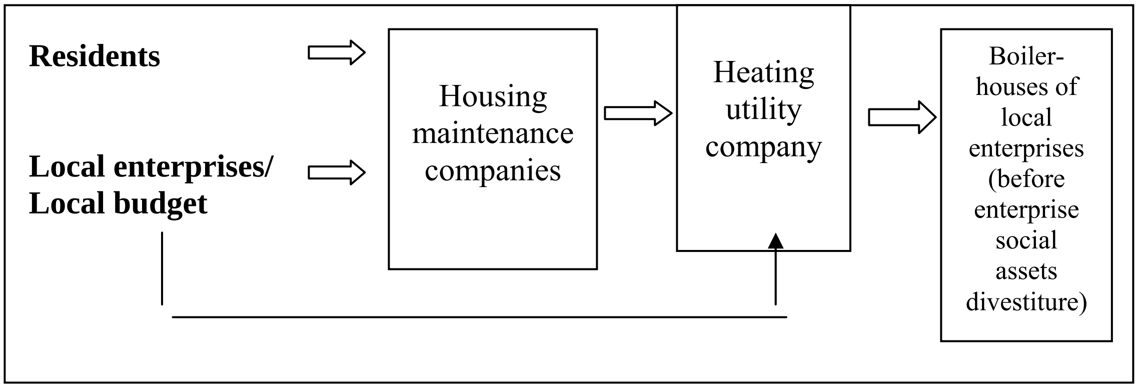

Figure 5. Model of payments for heating services in Russia.

The poor condition of the outdated heating and water equipment in many places around the country has required city administrations to increase the low resident payments. However, with images of heat and other utilities as free and self-evident services, the full cost-recovery tariff decision-making had quickly become a highly politicized issue in many localities. As one Cherepovets's respondent vividly describes the residents' attitude toward new tariff policy:

> Well… before that the price for services was minimal. I remember when I was assigned to a one-bedroom apartment, I paid about seven rubles for all the utilities there while my salary was about 200 Rubles. There was no question of paying that. Even if they raised this price and I should pay… say 8 or 9 rubles… no question again. However, now the proportion is quite different and of course, even slight increases in tariffs lead to great social protest. Why should I pay them if they were free in the past?! (Representative of the local administration. Personal interview. Cherepovets. Fall 2005).

The politicized nature of the new tariff policy in the housing and utility sector became especially visible at the beginning of the new heating and re-election season of 2003-2004. Breakdowns in district heating services in Russia during the frigid winters of 2001-2002 and again in 2002-2003 grabbed headlines in Russian newspapers and provoked political activity around the "heating issue." Every political party employed the Soviet image of free service and had its own recipe of how to unfreeze the country.

As one report summarizes, “what is a better way to attract the electorate than a promise of warm homes and low tariffs? Also, mobilizing budget finds for the purpose is not a bad idea – there will be enough money to spend” (Institute for Urban Economics 2003, 14-15).

As many reports indicate, most Russian mayors were not in a hurry to increase housing and utility rates. They feared causing social protests in the city. “Politicians, as well as mass media, when opposing the increase of rates of housing and utility services, argue that the population is unable to pay. Local self-governments are also frightened by the possibility of a sharp reduction in the collection of payments for housing and utility services” (Institute for Urban Economics 2003, 54).

However, some localities still recognize the urgent necessity of raising utility prices despite the threat of non-election. As one survey of city heads indicates, some respondents reported a growing understanding of the sectors’ woes even among the city Duma deputies who realized that unpopular measures have been taken (Institute for Urban Economics 2003, 14-15). As the same report admits, such examples were rare. One of the prominent examples is our case, the city of Cherepovets, which was one of the first Russian cities to make the transition to full coverage of the cost of housing and utility services by the residents and to face the consequences of such a step.

Like in other places, in Cherepovets the local municipality was facing the reduction of the revenue part of the city's budget (due to downtime in the economic activities of Severstal and other big local enterprises) and the subsequent inability to subsidize the housing and utility sector during the 1990s.[42]. On June 3, 1998, the local administration enacted Decree #1629 “On changes in tariffs in housing and utility services” that prescribed some increases in residents’ payments for these services: for cold water, heating and hot water supply, 30% of actual costs, and for maintenance of the buildings, 100%. After this statute, the rates of housing and utility payments were

[42] This overview of Cherepovets’s situation in 1998-2000 is based on Institute for Urban Economics 2003, 48-49.

frozen until 2002, and the real increase in the cost of services was compensated by the increase in budget subsidies. In 2000 and the first six months of 2001, subsidies to cover the difference in the prices of heat formed 70-75% of the total revenues for the heating company, 422,692,200 rubles in 2000 and 209,252,900 rubles in 2001 (City's Program "Development," 4). As the same document indicates, residents paid only 14% of the actual production costs of utility services.

Strong budget capacity allowed the city to cover the price difference. In 2000, budget revenues in Cherepovets had increased significantly due to the favorable financial situation of the biggest taxpayer in the city, Severstal, and allowed the local administration to increase the city's subsidies for housing maintenance and utility companies, while keeping the old rates for the residents. Unlike many other Russian municipalities, where in 2000 serious financial problems (especially an inability to cover fuel provision) were revealed, Cherepovets managed to avoid these difficulties. The local budget not only financed current expenses, but also repaid credit indebtedness from previous years.

Nonetheless, growth of funds provided to the housing and utility sector combined with frozen rates of payments by the residents increased the budget burden considerably. Moreover, in 2001, the budget had relatively modest financial capabilities due to changes in tax and budget legislation. Two main taxes, the VAT and housing turnover tax, were eliminated as sources of local revenue and caused some reductions in the city's income. Another reason for the low profits was the drop in profits of key city enterprises. Severstal's income decreased significantly in this period due to a reduction in steel prices on the world market.

At that point, the city's administration made the decision to transition to full payment for utility and housing services (Local Decree #2114 "On change in prices on housing and utility services", June 14, 2001). Beginning on July 1, 2001, residents of Cherepovets pay 100% of the charges for most utilities' services, including heating and hot water. This is one of the highest levels in the country (see Table 55).

	1995	1997	1998	1999	2000	2001	2002	2003
National standard (according to Federal statutes)	NA	35	50	60	70	80	90	90
Average in Russia	NA	38	50.4	53.5	54	59	66	76
Cherepovets	40	43	50.6	50	36	100	100	100

Source: World Bank 2004, 8.

Table 55. Cost recovery from households for housing maintenance and utility services (without capital repair cost).

It should be noted that because of peculiarities in the tariff policy in the sector inherited from Soviet times, the residents' charges do not mean full fees for utility services. They cover only actual costs of heat and water production but do not include expenses on capital repairs and renovation of networks. As Cherepovets's documents indicate, it is about 63% of the total operating costs in the non-heating season and 80% in the heating season. The rest is covered by the local budget or foreign investments. In 2001, for instance, capital repairs in the city (almost 16 million rubles) were funded by the local budget (7,175,000 rubles) and by the World Bank loan "Enterprises housing stock divestiture" (7,914,000 rubles). This remains the plan for the city to make a full 100% cost-recovery price in the future.

The dynamics of the total payments by residents for utility services are demonstrated in Table 56. The increase of resident contributions can also be seen through the dynamics of ruble payments for heating and hot water services in the city.

Year	Total payments (technical maintenance)	Major repairs	Trash collection	Heating	Gas	Water supply and sewage system
1998	100	0	NA	30	30	30
1999	100	0	NA	30	30	30
2000	100	0	100	30	21	30
2001	100	0	100	100	21	36
2002	100	0	100	100	NA	50
2003	100	0	100	100	NA	100

Source: Kytakova, 2001.

a. Residents' tariff includes only actual costs of service's production but not expenses on capital repairs.

Table 56. Residents' share in total housing expenditures in Cherepovets, 1998-2003[a].

As Table 57 indicates, there was a dramatic increase in utility prices in the city during 1995-2004: from 0.92 rubles in 1998 (adjusted to 1995 prices) to 18.2 rubles in 2004 (adjusted to 1995 prices) per square meter for heating services and from 10.75 rubles in 1998 to 153 rubles in 2004 per person for hot water. This rate is slightly higher than the national average, where prices on heating services changed from 1.15 rubles (adjusted to 1995 prices) in 1998 to 15.16 rubles per square meter in 2004.

What happened in the city after new prices on utility services were announced? According to the predictions of most studies, two possible outcomes of the implemented full-recovery tariff policy could be expected:

1) Failed implementation – the retreat of local authorities caused by social protests of residents who will resist the new policy and reject paying new charges for services.
2) Successful implementation resulting in a decrease in municipal spending in the sector.

The first outcome was the most common one. After the announcement of the new tariff policy and immediately following protests, most Russian localities stepped back and restored the old utility prices (Institute for Urban Economics 2003; World Bank 2003).

	1995	1998	1999	2000	2001	2002	2003	2004
Russia, heating per one sq. m. of living space, real prices	NA	0.92	1.1	1.6	2.87	4.55	6.13	7.32
Adjusted to 1995 prices	-	1.15	1.9	3.1	5.60	9.14	12.7	15.16
Heating, per 1 m² of living space, Cherepovets, real prices	0.74	0.74	0.7	0.7	4.64	4.64	5.93	8.78
Adjusted to 1995 prices	-	0.92	1.3	1.4	9.05	9.32	12.3	18.2
Cherepovets Hot water, Per month/person, real prices	10.60	10.8	10.8	10.8	69.2	69.2	85.1	73.76
Adjusted to 1995 prices	-	13.5	18.2	20.7	135	139	176	153

Sources: Author's calculations, Federal State Statistics Service. 2006. *Russia in figures. 2006*. Moscow; Federal'naya Slyzhba Gosydarstvennoi Statistiki. 2006. *Rossiiskii statisticheskii ezhegodnik.* Moscow. 685.

Table 57. Dynamics of tariffs on heating and hot water services in Cherepovets, 1995-2004 (end of the year).

Like in other places, massive protests and non-payments were expected in Cherepovets when the 100% tariff policy was introduced. The new policy was not welcome in the city. As the results of a local survey demonstrate, around 30% of residents (37% of respondents in October 2001, 29% in November 2001, and 28% in December 2001) were against the introduction of full cost-recovery prices (*Kommercheskii vestnik* January 23, 2002; *Golos Cherepovtsa* January 16, 2002). 60% of residents agreed that housing and utility reforms in the city were implemented too fast. Despite that fact, most residents (93%) pay their housing bills on time (in comparison, in Moscow only 80% of bills were paid on time in 2002) (United Nations 2004, 93). Only 12% of Cherepovets's residents have been ready to participate in protests against the new policy, however, they have never done that in practice.

As predicted by the previous studies, the introduction of full payment in 2001 enabled the city to save 400 million rubles, which was approximately one quarter of the city budget in that year. In general, total expenses from the local budget in the sector decreased from 38% in 2000 to 19-20% in 2002-2005 (see Table 58). The budget subsidies to housing and utility enterprises decreased significantly – from 16.5% (including subsidies for all residents and expenses of repairs) of total local budget expenses in 2001 to 5.4% in 2002 (only expenses on capital repairs). The city also optimized budget expenses, reducing them considerably and targeting them to social assistance to low-income families (that aspect will be discussed below), while increasing the volume of capital repairs of housing.

1996	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004[a]**	**2005[a]**
26	31	30.1	34	38	29	19.2	18.3	20.7	20.2

Sources: Gorodskaya Duma, Cherepovets. Decree #51 "Local budget in 2001," April 23, 2002; Decree #18 "Local budget in 2002," April 14, 2003; Decree #76 "Local budget in 2003," June 1, 2004; Social' no ekonomicheskoe polozhenie g. Cherepovtsa v 2005 g; World Bank 2004, 46.
a. Proposed budget expenses

Table 58. Local budget expenses in the housing and utility sector in 1996-2005, % of total budget expenses.

Capital investments in the sector were raised from 28% of the total expenses on capital repairs in the city in 2001 to 40-48% in 2002-2003 (Table 59).

As Table 60 shows, spending on repairs and maintenance, especially in the utility sector, increased from 5.3% of total expenses in the sector in 2002 to 20% in 2001 and 71% in 2002.

	2001	2002	2003	2004
Capital investments in the sector, % of total volume of capital investments	28	48	39.5	34

Sources: Gorodskaya Duma, Cherepovets

Table 59. Capital investments in the housing and utility sector in 2001-2004, Cherepovets.

	1998	1999	2000	2001	2002
Utility sector among them expenses on maintenance	6.1	6.4	5.3	20	71
Subsidies (on electricity, heating, and hot water services)	NA			69	21

Sources: Gorodskaya Duma, Cherepovets

Table 60. Expenses on repairs in the utility sector, % of expenses in the sector.

Why were Cherepovets's authorities able to succeed in the implementation of the unpopular tariff policy in the city? Why were there no massive resident protests against higher utility bills like in other places? The obvious explanation may be the high income among residents of the city. As I discussed above, a share of population with income higher than the subsistence level is one of the main determinants of the success of housing and utility reforms in the country, as people with high salaries are more able to pay 100% of the housing and utility costs. Cherepovets seems to fall into the category of the rich one-company town with relatively high average salaries and only a 15% rate of poor residents who are not able to cover the new expenses for utilities.

However, as our comparison of local average wages across selected towns and regions indicates (Table 36), Cherepovets is not the only outstanding case. In Moscow, for instance, the average wage rate is higher than Cherepovets's level; however, the full-recovery tariffs have not yet been introduced in the city and are planned to be implemented in 2008. In January 2002, half a year later than Cherepovets's administration, Moscow's authorities tried to implement a "pilot project of the full-recovery tariffs." Moscow's Mayor Yuri Lyzhkov called on people with income above $280 per household member per month to pay 100% of housing and utility costs on a voluntary basis. Thousands of families were given a choice to pay one of the two bills: a "voluntary" (full price) bill and a usual bill (that charged only 60% of the full price). Only 44 families (less than 1%) decided to pay the voluntary bill (United Nations 2004, 95). Currently, residents of Moscow cover about 62% of the production costs of housing and utility services.

In addition to favorable socioeconomic conditions, what else can explain the outcome of tariff policy implementation in Cherepovets? As the previous reports argue, the next variables we should look at are the behavior of the local mayor and his commitment to market reforms in the sector and the nature of his interactions with regional and federal authorities. "The city is quite rich by Russian standards and could have afforded to continue the subsidization of the housing sector and delay of institutional reforms. Reforms were not an unavoidable necessity, but the conscious choice of the city's leadership" (World Bank 2004, 48).

Before analyzing the actions of the local mayor, we need to consider the nature of the interactions between the city and region. As other studies demonstrate, the character of the relationship between the region's governor and the municipal unit's head (in the case of Cherepovets, the mayor) varies a lot between different regions, as well as within them. In general, the bigger towns inside the region have greater economic independence, while the rural districts are more dependent on the regional administration. Towns having a stronger taxation base have consequently more independence than other local self-governed bodies (World Bank 2006). As many respondents indicate, unlike other regions, Vologda and Cherepovets found the happy medium in their interactions:

> The main thing for any local self-government is a stable revenue system. I believed in that even when I was the mayor of Cherepovets. Now, as the region's governor I know that tax rates should be enough to stimulate local activities to raise the own revenues in the city. Regarding Cherepovets, nobody from the region's administration is going to take its money. Everything depends on the profits of the city's companies (Vychyaslav Pozgalev. Vologda region's governor. *Rech*. March 3, 2005).

> Our relations with the region are remarkable… complicated, right, very complicated ,but remarkably are based on rational considerations…. Everything is pragmatic. Even when it is not very pleasant, but should be done… decisions are made. It is a common agreement between city and regional elites in all fields of activities. This consensus is very hard to reach, but it exists… well, at the federal level or in other places, all these networks are broken but here we have them (Representative of the local administration. Personal interview. Cherepovets. Spring 2005).

Such rational interactions are very exceptional for most Russian localities, where governors and mayors are typically in endless debates about almost every local decision. The usual results of such debates are under-payment and delays in regional transfers to localities and the resulting poor condition of urban infrastructure in the region's municipalities, like damaged roads, broken street lights, under-operating boiler-houses due to lack of fuels, etc. One possible explanation for the Vologda-Cherepovets extraordinary situation may be parochial relationships: The current governor of the Vologda region, Vychyaslav Pozgalev, is the former mayor of

Cherepovets, who held the office in 1992-1996 and, thus, is more eager to help his home city.[43] However, such an explanation was rejected by most respondents:

> Well... when they moved to Vologda, they totally forgot about the origins of their roots...They said: "We should care about the whole region now." That is totally understandable, by the way (Local Journalist. Personal interview. Cherepovets. Spring 2005).

The dominant explanations for the rational interactions between the region and the city are the mayor's ability to cooperate with regional authorities and his willingness to take on all expenses that are related with most local decisions:

> The city usually takes care of its own business. The local authority understands that we cannot wait for help either from Russia or Vologda (Local journalist. Personal interview. Cherepovets. Spring 2005).

Many other interviews conducted in Cherepovets also reveal that one of the main factors that explain the successful implementation of such an unpopular decision in the city, was the political will of the city's mayor, Mihail Stavrovskii. He is the second mayor of Cherepovets and has held this position for over nine years, beginning in 1996:

> Our reforms are associated, first, with the city's mayor. He was and is the main face of our progress. And the main decision he made was, of course, the increase in tariffs (Local journalist. Personal interview. Cherepovets. Spring 2005).

As respondents indicate, the mayor was implementing reasonable socio-economic policy and possessed significant political resources, which allowed him to adopt this rather unpopular decision:

> We should give our mayor his due. He has never left the city without urban services… even during difficult times, when the city was without any resources to do that… but still decisions were made, something was done…However, for all that he has never blackmailed the residents like, "I will disconnect all urban services if you do not pay the bills." He has never used such threats. He has always stated: "Houses should be heated against all odds!" (Representative of Department of Housing and Utility Services. Personal interview. Cherepovets. Spring 2005).

Before introducing full payments for services, within a year and a half, the city administration and experts performed a thorough analysis of the state of the housing

[43] Before taking the mayor's office, Pozgalev was a deputy director of Severstal.

stock and engineering infrastructure, population income, financial situation of enterprises and budget capabilities. A new, more progressive system of tariff regulation was designed and implemented:

> It is one more thing that explains why we have no problems with the housing and utility sector. Our mayor is the most knowledgeable person in this sector. He knows everything… he knows more than I do, more than any city's committee or department. Of course, he does not know exact numbers but he understands everything. He knows more than the Gosstroi [a federal agency, the State Committee of Construction, which is responsible for policy in the housing and utility sector in the country] does. At least, he sees the core of the problem…He concerns about these problems and frequently travels to Moscow to report about them (Representative of Department of Housing and Utility Services. Personal interview. Cherepovets. Spring 2005).

The city administration was also concerned with informing the population about the new charges in advance (thus reducing public opposition in the future). The mayor set up a special phone line for the residents who could call there and receive explanations regarding the new prices:

> When the direct call line to the heating company was organized, the mayor participated also…He talked with residents and explained to them everything about the charges for heating services (Local journalist. Personal interview. Cherepovets. Spring 2005).

The increase in the level of residents payments for housing and utility services was also accompanied by strong social assistance. Based on analysis of the level of income of the population, it was established that the share of housing and utility payments should not exceed 10% of a household's total expenses (in comparison with the federal standard of 22%,[44] the average level in the Vologda region, 18%; and the 10% level in Moscow):

> We understand that if we included all the expenses on repairs in our tariffs it would be a terrible price for some residents. We decided to cover this difference from the city's budget. We undertook these expenses. It is a so-called social protection zone. The mayor decided that we needed to think about people: that is, they should not starve to death because of our reforms, they should have money to buy food and clothes. There are two strategies that we use. First, we subsidize repairs… well, residents have never appreciated this policy, and you can tell them every day about these expenses

[44] 22% is the Federal Standard for the maximum share of expenditures of the aggregate income of a family within the limits of the social norm in a residential area and the norms for consumption of housing and utility services.

and expect no thanks for that. They believe that it should be in this way. Second, it is our local policy for subsidy-level. While the federal level is 22%, our level is 10% (Representative of the local administration. Personal interview. Cherepovets. Spring 2005).

We took into account everything, conducted surveys among households, and determined this 10%. We did not make it up. We analyzed households' expenses, how many families would need assistance if we introduced 22% or 15%? And our 10% level is not accidental. We calculated our budget capacities, whether we could subsidize repairs, etc. These calculations were very complicated (Deputy of the city's council. Personal interview. Cherepovets. Spring 2005).

Special surveys were conducted; groups of residents who require assistance were determined. On the basis of these surveys, 10% level was established (Local journalist. Personal interview. Cherepovets. Spring 2005).

In order to simplify the application for social assistance, the city transferred the housing allowance office from the Department of Housing and Utility Sector to the Department of Social Policy, which allows for optimizing and ensures regular financing of the housing allowance program. The usual level of subsidies per family in Cherepovets (234 rubles per receiving household in 2003) was higher than the country's average levels (150 rubles in 2003) (see Table 61).

	2000	**2001**	**2002**	**2003**
Russia, average level	NA	NA	NA	150
Cherepovets	60.17	142.11	296.20	233.70

Sources: Goskomstat Rossii. Vologodskii oblastnoi komitet gosydarstvennoi statistiki. 2002. *Statisticheskii ezhegodnik Vologodskoi oblasti. 1995 – 2001.* Vologda; Goskomstat RF Vologodskoi oblasti. 2001. *Municipal'nye obrazovaniya Vologodskoi oblasti. Social'no-ekonomicheskie pokazateli. 1995-2002.* Vologda; http://www.regnum.ru/news/727232.html; World Bank 2004, 45.

Table 61. Average amount of subsidies per receiving household for housing and utility services, 2000-2002, rubles.

The local decision about the 10% level meant that actual payments for housing and utility services have decreased for a considerable number of city residents with a relatively low income. The number of recipients of housing allowances in the period from January to December 2001 increased from 5.3% to 19.3%, but by July 2002 the number of citizens applying for allowances had already dropped to 16%.

> Well, our surveys demonstrated that even if we introduced 100% charges for utility services and gave assistance to low-income families, the residents would not suffer a lot. Surveys demonstrated that more than 50% of residents were ready to pay these prices even before the reform and they have always said: "We do not care, we will pay the price that you set up." (Deputy of the City's Council. Personal interview. Cherepovets. Spring 2005).

The 10% level policy also implies that the local administration increased the burden on the budget, as a higher percentage of families were eligible to apply for the housing allowances in the city. As Table 62 indicates, the share of families that received housing subsidies was much higher in Cherepovets than on average in Russia after 2001; 16% in 2002, 18% in 2003, and 19.7% in 2005.

	1997	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Russia	4.2	7.1	6.5	7.7	9.1	11.4	15.2	13.7	NA
Petrozavodsk	14	14	13.6	6.8	5.6	8.1	7.5	NA	NA
Orenburg	13.8	16	12.9	3.7	3.9	3.5	4	NA	NA
Cherepovets	1.9	3.5	5.4	5.5	12.5	16	18	NA	19.7

Sources: Federal'naya Slyzhba Gosydarstvennoi Statistiki. 2006. *Rossiiskii statisticheskii ezhegodnik.* Moscow. 233; Goskomstat Rossii. Vologodskii oblastnoi komitet gosydarstvennoi statistiki. 2002. *Statisticheskii ezhegodnik Vologodskoi oblasti. 1995 – 2001.* Vologda; Goskomstat RF Vologodskoi oblasti. 2001. *Municipal'nye obrazovaniya Vologodskoi oblasti. Social'no-ekonomicheskie pokazateli. 1995-2002.* Vologda; World Bank 2004, 45.

Table 62. Share of families receiving social assistance for housing and utility expenses in selected cities, 1996-2005.

However, in practice, the introduction and gradual increase of housing allowances was a small burden for the city, which spent more on housing when subsidized housing services were provided to all residents regardless of income. In 2003, in Cherepovets for instance, the city budget expenditures for housing allowances reached 2.04%, while the overall budgetary expenditures related to housing decreased by 20% (from 38% in 2000 to 18% in 2003) (Table 63). While spending on targeted subsidies is higher than the average level across Russian localities (in the country, 1.83% of total budget expenses in 2003), Cherepovets's expenditures in the housing and utility sector is much lower than average rate (24.3% in the country in 2003).

	1996	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
Russia, average expenses in the utility sector	33.3	32.8	35	32.6	37.1	33.1	31.6	24.3
Cherepovets, Expenses in the housing and utility sector	25.8	31	30.1	34	38	29	19.2	18.3
Russia, average targeted housing allowances	0.16	0.38	0.49	0.42	1.25	1.20	0.89	1.83
Cherepovets, targeted housing allowances	NA	NA	0.19	0.26	0.23	0.79	1.31	2.04

Source: World Bank 2004, 44, 46.

Table 63. Budget expenditures on the housing sector and social programs, % of budget expenditures.

One would think that the full cost-recovery policy implemented by local authorities in full compliance with central decisions would receive full approval and support from regional and federal authorities. However, this was not the case. The local decision about the 100% tariff policy was met with strong opposition from authorities at all levels. Shortly after the introduction of full payments for housing and utility services in the city, German Gref, the Minister of Economic Development and Trade, made public statements on TV and radio announcing that regardless of all federal government propositions, the population would never pay 100% of the costs.

These declarations have led to the aggravation of the residents regarding the housing and utility payment policy implemented by Cherepovets's city administration. The levels of payment collected and the mayor's rating have dropped almost three times. There were also public protests:

> Of course, there were mass public protests against this policy. Just think, you pay nominal charges and now should pay 2-3 times more! And moreover, federal officials announced on TV that our policy is wrong and nobody should pay these charges! (Local journalist. Personal interview. Cherepovets. Spring 2005).
>
> In the transition period, after Gref's announcement, we had pensioners' movement, which advanced the slogan: "We will pay for utility charges as before!"…Of course, residents were protesting against these prices! You can explain to them every day that it is a service, you should pay for the service, like in the shop… all these explanations are senseless. Residents still think: "Okay, you level up prices… now they are 30% more… ok… 50% more… all right…But 100% more?! (Representative of the local administration. Personal interview. Cherepovets. Spring 2005).

As a result, instead of being supported at the federal level, the mayor was criticized as a local leader who had rushed to make a wrong decision. The mayor of Cherepovets became a hostage of political games, as officials at all levels of authority kept trying to play the game of "state care for the housing needs of all residents" and announced the cancellation of the city's decision on the transition to the full cost-recovery payments. The heads of the Ministry of Economic Development, Gosstroi and Vologda regional Administration discussed the city's transition to full payment by the residents as a mistake by the mayor.

However, despite this pressure, the policy of full charges was still implemented in the city while many other Russian localities began to introduce the same policy only starting from 2004-2006:

> Well… our beloved federal government was the main obstacle. I mean their unpredictable behavior, one morning they announced that reforms are inevitable. Another morning they said: "No. We have changed our minds! Please, do not threaten people! The local government did everything wrong, don't believe it!" Then, they threatened our governor and he declared that Cherepovets should stop its reforms… However, the reforms were still implemented (Deputy of the city council. Personal interview. Cherepovets. Spring 2005).

The same situation with Mayor Stavrovskii, becoming a hostage of political games happened again in the winter of 2005. It was a period of introduction of new federal policy of in-cash subsidies for low-income families and confirmation of the old rates for the allowance amounts, that is, 22% of the total household's income in order to be qualified for the social assistance program. Public protests against the introduced policies were used by the city's administration to insist on preservation of the previous level of allowances for poor families, at 10% of the total family income:

> It would be nice if our federal government remembers what they did before yesterday's party… and didn't change their decisions a year later…. They allowed it initially, and we introduced policy…Calculations that we made about the subsidy level were very complicated. We spent weeks and weeks to get them. When we introduced this 10% level, we included everything – our tariff practices, our prices, and salaries of our population…To break such a system …to introduce 22%… why? No explanations. Only because someone does not think and forgets what he promised before…It is frightful! (Representative of the local administration. Personal interview. Cherepovets. Spring 2005).

There was a great debate between the mayor and the governor about keeping this old level, as governor rejected Cherepovets's policy arguing that there was no money in the regional budget. According to the new policy, the regional budget is responsible for covering the local expenses on subsidies; keeping 10% in Cherepovets means paying more regional money to the city's budget to cover housing allowances for additional families. At the same time, Stavrovskii insisted on the preservation of the old level and stated, "I personally prefer to maintain 10%. If the region accepts our proposal, we are going to keep such a level" (*Rech* January 18, 2005). The following solution was reached after long debates with the region's administration: Cherepovets was allowed to keep the 10%-level of the household's income but was responsible for paying for the difference between subsidies from the regional budget (that is, for the 22%-level) and covered it from its own funds (*Rech* January 27, 2005). Then, at the end of February of 2005, the regional administration decided to set up Cherepovets's 10%-limit of a household's expenses throughout the region (*Rech* February 16, 2005).

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To sum up the above discussion, there are two main explanations for Cherepovets's advanced position in implementation of the full cost-recovery tariffs in the city. The first factor is the high income among the city's residents who were then able to pay higher fees on housing and utility services. While income is the decisive element of successful market reforming in the sector, this factor does not solely explain why Cherepovets decides to implement the new tariff policy while other rich Russian cities, like Moscow, still covers the residents' share from the local budget. Another explanation for Cherepovets's success, suggested by previous studies and most respondents, was the city mayor's incentive to implement market reforms in the city and his consistent policies to achieve this goal.

4.5.3. Technical innovations.

As we see from the above description, the political will of the city's mayor was presented by many respondents as one of the major factors that explain the city's progress in housing and utility reforms. Implementation of the unpopular policy of full recovery tariffs was one of the main strategies to obtain funds for improvements of urban networks at the local level. In addition to mobilization of internal resources, the mayor of Cherepovets was also capable to attract external resources to modernize the city's infrastructure. During the 1990s, the city's administration was the recipient of many federal and foreign investment projects. As many respondents in Cherepovets indicated, the mayor's activities were the main factor in explaining the city's progress in receiving external funds:

> He spent time in different committees in the Gosstroi, actively participated in different activities there. Of course, Severstal was our main trump card; everyone knows the company and believes that the city will be able to pay back loans. But the mayor is also an important figure in these negotiations (Representative of Department of Housing and Utility Services. Personal interview. Cherepovets. Spring 2005).

One of the largest projects in which Cherepovets participated during 1996-2003, was the World Bank "Enterprise Housing Divestiture Project." The project proposed to financially support the transfer of ownership, financing, and management of the housing stock to the private sector. The particular goals of the project were as follows:

1) Housing privatization, including condominium creation. It was expected that this step would prevent the massive transfer of the former enterprise housing stock to the municipality.
2) Full cost-recovery prices on housing maintenance and utility. The underlying logic was to decrease the financial burden of cities' administrations and rationalize the flow of funds in the housing sector.
3) Targeted social assistance programs in order to protect poor residents in the context of increased housing and utility fees.
4) Competitive bidding for the maintenance contract of the housing in order to increase private sector participation in the provision of services in the housing sector.
5) Improved energy efficiency in divested housing stock in order to reduce the costs of maintaining housing (World Bank 2004, 2005).

The last component included building retrofits (like insulation in the ceiling and basement and around pipes, caulking around doors and windows, building-level heat-point controls and heat meters, thermostatic controls and gas meters at the apartment level, lighting retrofits, and water conservation measures) and upstream investments in the divested utility networks (like upgrading or replacing district heating and domestic hot water pipe insulation, new equipment for automatic control and regulation for the boiler houses and central heart substations, and renovation of district heating pumps and motors with variable-speed drives). In Cherepovets, the project proposed to reconstruct about 678 residential buildings (with 67,433 apartments and 173,732 residents) during the six years. Total expenses on one apartment were calculated to be around $600-1000.

Background of the loan: A number of agreements between the World Bank and Russian federal government specified the total sum of loan, $300 million and its distribution: administrations of the participating townships would receive $290 million (repayable and fixed-date rules) and the federal budget would receive $10 million.[45] The selection of potential participants was conducted in 1995 by a special government group that included representatives from the Ministry of Economy, Ministry of Finance, and Ministry of Construction, as well as from the administration of the Russian government and the State Committee of Property. The list of potential localities was created by these representatives and approved by World Bank officials. Selection criteria included partial implementation of the full cost-recovery tariffs on housing and utility services (at least 30% of total payments in July 1995, 40% in December 1995), a number of privatized apartments, and condominium creation.

The State Committee of Construction received applications from 76 Russian townships. Initially, the following 22 localities were chosen as finalists: Pskov, Smolensk, Orel, Nal'chik, Votkinsk, Kansk, Sochi, Petrozavodsk, Murmansk, Pechora, Gagarin, Tobol'sk, Cheboksary, Vladimir, Volhov, Vologda, Nizhnii Tagil, Otradnyi, Orsk, Tver', and Nahodka. Then, six cities were selected, including Ryazan', Vladimir, Petrozavodsk (Republic of Karelia), Volhov (Leningrad region), Orenburg and Novocherkassk (Rostov region). In June 1996, the Rostov region administration declined to participate in project implementation, and Cherepovets was suggested as the new project locality (in the list, this township was the first amongst possible finalists; other localities included Novgorod, Gys'-Hrystal'nyi (Vladimir region) and Zelenodolsk (Tatarstan)). In October 1996, the Ministries of Finance and

[45] Russian Government Decree #565 "Agreement about World Bank loan to finance municipal housing sector", May 8, 1996; "Agreement about loan" #4012-RU, July 29, 1996; Russian Government Decree #1083 "Agreement about World Bank loan", September 13, 1996.

Economy, administrations of participating localities, and the regional administrations signed agreements about the project implementation in the selected localities. The allocation of the total sum of the loan was as follows: Ryazan' and Orenburg received $69.8 million; Vladimir $64.3 million; Petrozavodsk $41.1 million; Cherepovets $32.2 million and Volhov $12.7 million.

In order to control project implementation in the locality, it was required a special local group be created in each selected mayor's office, which was obliged to fund its activities from the local budget. In Cherepovets, this group was called the Local Enterprise Housing Divestiture Group, *Mesnaya gryppa po realizachii proekta peredachi vedomstvenogo zhilizhnogo fonda*. At the federal level, the same coordination group was created, the Noncommercial Foundation of Enterprise Reconstruction (FER), which included representatives of the Ministry of Finance, Ministry of Economy, Ministry of Construction, Central Bank, and special Government Committee.

Conditions of the loan: Project implementation began on November 18, 1996, with an initial end date of December 31, 2002. The program was divided into several steps. Evaluation of the project's implementation at each step was performed by World Bank officials. Payments were distributed to each city only after implementation of each program's step in all six participating townships. As a result, the pace of the project in a separate locality did not have an effect on the timing of the payments; it was forced to wait on the implementation of each step in other places.

Meanwhile, the World Bank's loan was placed in an accredited local bank, and the participants were supposed to pay annual charges of 0.25%.[46] The total sum of the received loan was required to be returned between November 15, 2002 and May 15, 2017 (one payment per six months; total number of payments 16). In the case of payment delay, the locality was expected to pay late payment fees (up to 2% per year). Some resources for implementing the project's sub-programs were distributed directly by local utility companies (rather than paid for out of the loan). For instance,

[46] For Cherepovets, this sum is $80,000 per year (*Golos Cherepovetsa*, June 23, 2000).

Cherepovets's water utility, *Vodokanal,* financed the installation of water meters in all participating municipal buildings using its own resources. In such a case, the locality could re-arrange its contract with the World Bank and redistribute the money for the installation of another technology.

During the project implementation, the Special Commission enacted several decisions, according to which the total sum of the loan was reduced. In November 1999, the loan for all localities was reduced to $276.8 million, in September 2000 to $256.4 million and finally in September 2002 to $134.3 million. The end date of the project implementation was postponed until December 31, 2003. Local sums were also changed. During 2000-2002, the Orenburg loan was reduced to $17.6 million, the Petrozavodsk to $23.5 million, the Vladimir to $19.6 million, the Volhov to $4.5 million, and the Ryazan to $9.8 million. Only Cherepovets decided to use the total sum of the initial loan $32 million.

Technological improvements: Outcomes of this project were contradictory. According to World Bank internal reports, the project results were highly unsatisfactory. As these reports state, the initial design of the project was weak, aiming to help the cities in enterprise housing stock divestiture when this process was largely completed by the time the project started. In Cherepovets for instance, the majority of enterprise buildings were transferred to the city before 1996 when the project had just reached its implementation phase. In 1992, total housing stock in the city consisted of 3,723 building; among which 787 were city-owned and 1,088 were enterprise-owned. At the end of 1995, before the World Bank project started, the city already owned 1,766 buildings and enterprises only 109 buildings. In 2003, at the end of project implementation, the city owned 1,811 buildings and enterprises, 59. As the World Bank reports: "The primary objective of accelerating the sustainable divestiture of enterprise housing was only a caricature of what a project objective should be. It was aiming for what had been already been achieved *before* the project had even started. By then most enterprise housing in Russia had already been divested" (World Bank 2005, 4).

The project also failed to accomplish other goals as well. It did not promote housing privatization. In the participating cities, the share of privatized apartments (in Cherepovets, for instance, 46% in 2001) was even lower than on average in Russia, which had an average of 68% in the same year. It also failed to implement the full cost-recovery prices in the cities and achieved energy efficiency levels much below the initial expectations.

Although the overall project performance was assessed as unsatisfactory, the participating cities received different evaluations of their achievements. As the World Bank report states, the project was most successfully implemented in Cherepovets (World Bank 2004). At the beginning of the project, the city was the least reformed city among the participants. It had good divestiture results, but a very low level of cost recovery. At the end of the project, the city was one of the acknowledged leaders in housing reform. It introduced full cost-recovery and stable social assistance policies. It also succeeded in technical innovations.

Overall, 678 buildings were retrofitted; energy- and water-saving technologies and automatic individual boilers were installed, and heating and water pipelines were modernized. The main equipment installed included 1,137 heat exchangers, 735 building-level heat and DHW meters, 66 building-level cold-water meters, and 2 cold-water booster pumps. In addition, 792 heat point rooms were reconstructed, entrance doors for 797 buildings were installed, and stairway lighting in 674 buildings was replaced (World Bank 2004, 57). As the city's reports indicate, the following financial savings from the installed technologies were achieved: 18% on heating, 13% on water, and 20-36% on gas (Komarov 2001). New heating technologies, such as heat exchangers and heat point rooms, for instance, allowed reduced consumption of heating at a rate of 4-24% and kept a stable average apartment temperature at 20°C and hot water supply at 55°C. Modernization of the water supply network allowed reduced water consumption at a rate of 10-15% (City Program "Development," 28-30).

Therefore, while the World Bank report indicates unsatisfactory outcomes of the project realization, mainly because of "poor Bank performance both at the design stage and during implementation" (World Bank 2005, 7), it still admits that some technological innovations were made in the city which resulted in the more efficient operation of heating and water systems:

> You know when you can demonstrate how much heat cost before and how much less it costs now… well, there are no questions. We decided to do it our way: using this money, we did everything we could do for the long-run benefits. When the Bank's representatives understood that we did that cheaper and simpler … well, we still realized the energy-saving goal, right? We achieved it without any doubts. It was the goal that we were expected to reach (Representative of the local administration. Personal interview. Cherepovets. Spring 2005).

The overall purpose of these technological innovations was not only the installation of energy-saving equipment but also the introduction of a market-oriented model of utility provision in the city. Heat meters at the level of each building or cold and hot water meters[47] at the level of apartments, for instance, were the first step in imposing market discipline both on utility companies and on consumers. It was expected that utility companies would be forced to implement water- and energy-saving programs. If they report production of a certain amount of services while the building meter demonstrates that a lower amount was received in the house, then the losses were probably due to leaking pipes, and companies are forced to charge only for the consumed rather than for the produced water and heat. For consumers, meters are the device that allows measuring of utility consumption and aids in calculating the benefits of consuming more or less of the services.

4.5.4. Intermediate outcomes of market reforms in the city.

While the reforms are continuing nowadays, and many other stories can be reported, these two events in the history of the city's housing and utility sector – the 100% tariff policy and participation in the World's Bank project – are presented by most respondents as the key decisions that allowed the city to succeed in implementation of market policy in the sector. They have permitted the city to reduce budget expenses on subsidies, allocate more money on the required repairs and capital

[47] While the loan was supposed to cover installation of water meters in Cherepovets, water company installed them before the beginning of the project using their own resources.

investments, and to install the new energy-saving technologies. However, there is still an open question of whether all this money, collected both internally (through new tariffs on services) and externally (through World's Bank loan), allows city to improve performance in the heating sector.

Successful technologies: Cherepovets's experience provides both positive and negative answers to this question. In some cases, financial resources collected by the city's administration do result in overall improvements in the sector's operation. For instance, due to the decreased expenses on subsidies to all residents, the city was able to spend additional funds on the connections of all pipelines in the city (so called centralization and interconnections projects[48]), on replacement of the old cast pipelines, and on the installation of new plastic pipes with a longer lifetime and lower percentage of damages. The city also installed a new leakage detection system with electronically controlled indicators on plastic pipes that allow the heating company to find out the place of damage automatically. Thermal insulation of the buildings installed during the World Bank project resulted in overall reduction in heat consumption:

> All these innovations lead to a reduction in heat consumption. Depending on the type of buildings, the reduction was 6%, 30%, and even 84%. As experts argue, after the end of project implementation in 2004, the city will have reduced the volume of the produced heat by 16% (*Rech* March 5, 2003).

As Table 64 confirms, these innovations indeed resulted in considerable energy savings and overall reduction in heat production in the city. Thanks to the centralization project, the city reduced the number of heating sources from 25 in 2000 to 13 in 2001. Until 2000, the city produced about 4,500,000-4,800,000 Gcal per year; nowadays this number has decreased considerably due to the installation of new technologies. While having more residents, the city also produces less heat (2,701,000 Gcal in 2002) than the region's capital, Vologda (3,986,000 Gcal in the same year).

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[48] Centralization is the project of reduction in the number of heating sources, i.e., elimination of small boiler houses and creation of only large boiler-houses that will supply heating services for greater number of consumers. Interconnection is the project of connections between four city's heating stations that allow Cherepovets to provide security of heat production even in the case of damage of one boiler.

	1985	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003
Vologda region	na	na	12866	13152	13835	13273	13613	13333	11350	11248	na
Vologda region, population, thousands	1334,3	1356,4	1345	1339	1334	1328	1319	1311	1301	1290	na
Vologda	na	na	3029	3111	3491	3735	3595	3362	3589	3986	na
Vologda, population, thousands	275	298	306	308	309	311	309	307	305	303	na
Cherepovets	4166	4500	4613	4511	4930	4767	4831	4828	2728	2701	2228
Cherepovets, population, thousands	309	314.5	318	319	320	322	323	323.5	323.3	311.9	310.8

Sources: Goskomstat RF Vologodskoi oblasti. 2001. *Municipal'nye obrazovaniya Vologodskoi oblasti, 1991-2000.* Vologda, 376; Chentral'noe Statisticheskoe ypravlenie SSSR. *Social'no-ekonomicheskii passport goroda, 1970-1990;* Passport socialno-ekonomicheskogo razvitiya goroda Cherepovetsha za 2003 g, Goskomstat Rossii. Vologodskii oblastnoi komitet gosydarstvennoi statistiki. 2002. *Statisticheskii ezhegodnik Vologodskoi oblasti. 1995 – 2001.* Vologda.

Table 64. The volume of produced heat, thousands of Gcal per year in the Vologda region, 1985-2002.

This sudden decrease in heat production in the city in the 2000s can also have an alternative explanation: despite the official announcements of improving performance in energy efficiency, the city instead simply reduces the volume of produced heat and leaves its citizens in largely under-heated apartments. However, this is not the case. If we look at changes in residents' complaints about the housing and utility sector over time, we can observe an actual decrease in the number of complaints.

As Table 65 demonstrates, residents' calls regarding problems with heating services and hot water to the central dispatching office in the Department of Housing and Utility Services (responsible for operation of the emergency networks 24/7 in the city) dropped in 2004. The numbers fell from 937 calls about heating system breakdowns in 2003 to 894 calls in 2004 and from 2,247 calls about the hot water supply delays in 2003 to 1,402 calls in 2004.

The next tables that summarize residents' complaints to the city's cou4ncil demonstrate that residents' concerns in the sector were shifted from breakdowns and delays in the heat and hot water supply to financial issues (Tables 66 and 67).

Number of complaints regarding:	**2003**	**2004**
Heating services	937	894
Hot water	2247	1402

Source: Gorodskaya Duma, Cherepovets.

Table 65. Residents' complaints to central dispatching office in Cherepovets, 2003-2004.

	1995	1996	1997	1998	1999	2000	2001	2002	2003[a]	2004[a]	2005[b]
Total number of complaints	468	460	410	329	270	254	300	373	172	235	64
Among them: about utility sector, %	10	17	8.5	19.7	8.1	15.3	18.3	28.3	28.9	40.4	31
About housing sector, %	24.5	26	24.3	29.6	29.6	36.6	33.3	25.4	22.7	23.4	22

Source: Cherepovets. Gorodskaya Duma materials, 2002.

a. Due to difficulties to access information during field trip, only data for first six months of the years is presented in the table.

b. Only data for January-February 2005 is presented.

Table 66. Distribution of residents' complains to deputies of the local Duma, 1995-2002.

	Total number of complaints about the sector	Among them:			
		Heating, water supply	Utility bills	Capital repairs of residential buildings	Other issues
2002	143 (100%)	36 (25%)	54 (38%)	40 (28%)	13 (9%)
The first 6 months of 2003	51 (100%)	10 (19.6%)	21 (41%)	10 (19.6%)	10 (19.6%)
The first 6 months of 2004	95 (100%)	15 (16%)	15 (16%)	50 (52%)	15 (16%)
January-February 2005	16 (100%)	2 (13%)	9 (56%)		5 (28.8%)

Source: Cherepovets. Gorodskaya Duma materials, 2002.

Table 67. Distribution of residents' complains about the utility sector to the local Duma, numbers and % of total volume of complaints in the sector, 2002-2005.

As we can see, the number of complaints in general decreased continually from 460 in 1996 to 254 in 2000 and increased after 2000; 300 cases in 2001 and 373 cases in 2002. As local officials explain, such an increase was caused by the new 100% tariff policy enacted in the city in July 2001. The new tariff policy implementation led to a dramatic increase in residents' protests against new higher prices on heating and water services. Until 2002, complaints about the housing sector constituted the largest group of residents' applications to the local Duma, reaching almost 37% in 2000. Then, in 2002 we can observe the increase in complaints about the utility sector (from about 15% during 1995-2001 to 40% in first six months of 2004).

As the next table confirms, inside the group of housing-utility sector applications, utility bills were the main issue of the complaints during 2000-2003 (42% in 2002 and 35% in 2003); then, capital repairs applications replaced them in 2004, with 53% of the total complaints.

Complaints about the quality of heating and water supply services, however, dropped in the same period – from 25% in 2002 to 13% in January-February of 2005:

> If we look at statistics of complaints submitted to the duma, the majority are about the new bills and capital repairs. There are virtually no complaints about the water quality. There are no complaints that water did not reach the highest floors in the building. Maybe, some cases… when repairpersons did not do their work right. About capital repairs – the highest percentage of complaints are about roofs (Deputy of the city council. Personal interviews. Cherepovets. Spring 2005).

While the number of complaints submitted to the city's council or dispatching office is only an approximate indicator, it still demonstrates the overall stable performance of the heating sector in the city. As one respondent indicates,

> During last years, the situation became much better. They are repairing constantly something - buildings, roads… They change utility networks. There are no huge problems with heating or water supply in the city (Local journalist. Personal interview. Cherepovets. Spring 2005).

Failed technologies: At the same time, the arguments of the implementation model fails to explain the variation in performance of different elements of the heating system in the city. While some technology, like new types of pipes or the thermal insulation in the residential buildings installed during the World Bank project implementation, do work successfully and have lead to a decrease in the number of breakdowns and an increase in overall heating performance, other technologies, like heat meters or heat automatic exchangers, have no positive effect.

Heating meters installed in 60% of the municipally owned residential buildings in the city are one of the examples of such failed devices. These meters are usually presented as an indicator of progressing market reforms in the housing sector, for they allow the imposition of self-discipline on consumers who are expected to calculate their expenses based on meters' readings and be immediately frugal with heat consumption. As it was expected, the installation of such measuring and control devices could boost efficiency by 20% and reduce heat consumption by 30%. However, individual metering would require rearrangement of the pipework and major intrusions into the shell of the buildings in addition to the costs of the installation of the metering and billing system. The payback period would be very high and the marginal savings on heat would unlikely to justify the investment (Kazakevicius et al. 1998). Therefore, like in other Russian localities, heat meters in Cherepovets were only installed at the level of the building and sometimes the group of buildings (in the exchange point from the nearest boiler-house). As it will be outlined in the next chapter, contrary to expected outcomes, the building's meter promoted free-riding behavior among consumers rather than frugality, for individual heat consumption was not calculated and could be easily increased by the household by installing additional radiators in the apartment.

Another example of the failed technology that will be discussed in detail in Chapter 5 is the new heat exchange equipment that was expected to reduce heat consumption in the building. As no thermostatic controls were installed in the individual apartments, the equipment did not resolve the Soviet-age problem of unbalanced heat distribution inside the building, i.e., overheating and underheating in different units. Some households still receive more heat and have to use different strategies to lower the temperature (such as opening windows during the winters; putting ice on the radiators, etc.). At the same time, other families receive less heat and are also forced to adapt (plug in additional heating equipment; put more clothes on, etc.).

Table 68 summarizes some of the outcomes of technological changes in Cherepovets. As it demonstrates, thermal insulation and plastic pipes were successful in the city. They achieved the initial goal of increasing the reliability of the system and allowed the city to reduce heat transportation losses by 15-20%. At the same time, automatic heat exchangers and heat meters failed in Cherepovets. This equipment was supposed to reduce average heat consumption in residential buildings; however, they have never achieved this goal. Why were some heating technologies successful, while other installations failed? This question is left open in the most reports that employed the instrumentalism-implementation approach to analyze the market policy implementation in the housing and utility sector across Russian localities.

	1. Successful case	2. Successful case	3. Failed case	4. Failed case
New technology	Thermal insulation inside buildings (new windows, entrance doors, roofs)	Plastic pipes	Automatic heat exchangers (equipment that automatically controls temperature levels inside the buildings)	Heat meters
Old technology	Replace old types of insulation	Replace cast pipes	Replace manual heat exchanger (temperature level was controlled by repairpersons)	No analog of heat meters in old heating system
Goals of the new technology	a) Reduction in heat transportation losses, b) Increase in reliability of system	a) Better pipeline insulation, b) Reduction in heat transportation losses, c) Increase in reliability of system	a) Automatic regulation of temperature level inside the residential building, b) Reduction in average heat consumption in the building	a) First step to introduce full cost-recovery prices on services; b) Introduction of metering of the heat consumption by the final consumer – household; c) Eliminate "normative billing" employed today by utility company – i.e. average heat provision to the city

Continued

Table 68. Some examples of Cherepovets's technological innovations.

Table 68 continued

Expected economic benefits	20% reduction in heat losses	Reduce heat transportation losses in 2-3 times	20-30% reduction in losses on overheating (During Fall and Spring period, reduction is estimated to be 50-70%)	Installation of measuring and control devices could boost efficiency by 20% and reduce heat consumption by 30%.
Result of installation in practice	20% reduction in heat losses	15% reduction in transportation losses	Due to unbalanced heat inside the building (caused by the higher than required number of radiators in individual apartments), the equipment did not solve problem of overheating and underheating in different units	New billing is based on the volume of heat consumed by the building or group of buildings; this number, then, is divided on the floor area of individual apartments in the building(s). This leads to free-riding behavior and creates no incentives for a household to lower its heat consumption.

4.6. Policy conclusions and analytical limitations of the implementation model.

This chapter tries to answer the question of what can explain the successful or failed market policy delivery in the housing and utility sector across Russian localities. As the applied instrumentalism-implementation model predicts, several factors affected the implementation outcome in the selected case, the city of Cherepovets. The impact of some of the factors was already discussed in the numerous reports and was confirmed in the analysis of the presented case. There are still other factors, the impact of which, while predicted by some reports, was not confirmed in this study.

Confirmed factors: The status of having enough financial resources, the main threshold factor in most studies, also explains Cherepovets's progress in housing and utility reforms. Money gives the city's administration a good bargaining position and allows it to implement the necessary but quite unpopular decision about the full cost-recovery charges for housing and utility services. Other factors that support the city's progress in market reforming in the housing and utility sector were relatively high human resource capacities, favorable geographic location and physical conditions. Confirming hybrid theory expectations, our analysis allows the conclusion that a city must have a small degree of misfit between its initial capacities and new market policy, i.e., it must have enough financial and human resources, must not be located in an extremely cold climate, and must have only a small share of old building and run-down housing stock in order to succeed in the reconstruction of its urban networks and to escape the heating disaster, common for other localities around the country.

However, as this chapter also tries to demonstrate, these factors alone are not the only explanatory variables. Of course, any municipality needs money, people, and favorable physical conditions to succeed in improving the operation of urban networks, but the main puzzle here is over the capacity to obtain the necessary resources and use them wisely. As the presented analysis indicates, the answer to our initial question of what explained this city's capacity to save its heating network is the political will of the Cherepovets's mayor. His ability to mobilize internal and external resources for reconstruction of the heating system (i.e., his willingness to accept social protests and a decrease of public trust, his capacity to cooperate with regional and federal authorities, and the thoughtful design of the new tariff policy) is presented by most respondents as the major factor in the city's reforms.

Disproved factors: Two predictions proposed by our model were disproved in the suggested study:

As we expected, a large share of people whose income is lower than the subsistence minimum can affect a city's progress in market policy implementation. A lower percentage of poor people mean a lower chance of social protests against the full recovery price policy. It also implies less municipal expenses on housing allowance programs for residents and makes it possible for local authorities to spend extra money on repairs and capital investments. While initially Cherepovets had favorable socioeconomic conditions (i.e., higher than average salaries and a lower percentage of poor people), the local administration artificially changed this balance by decreasing the limit of households' expenses on housing and utility services, from 22% to 10%. As a result, the share of people eligible to apply for housing allowances as well as the burden on the local budget increased significantly. As Cherepovets's experience demonstrates, such a high share of the artificially "poor people" was not the obstacle to market reform in the city. Introducing the full cost-recovery tariffs and correspondingly, eliminating the direct subsidies to local utilities, the city was able to cover the additional expenses on social assistance programs.

Another factor that was disproved in this study was the volume of private housing versus public. We predicted the large share of public housing meant higher spending from the local budget which would make it hard for the locality to succeed in market reforming. However, as the Cherepovets's case with its higher than average level of municipally owned housing stock demonstrates, this is not the decisive factor in explaining the variation in market policy delivery across localities.

To conclude the overview of the instrumentalism-implementation model as applied for our case, this framework enables us to praise (or blame) certain policy actors one by one and step by step – first the mayor, then region's administration, Moscow, etc. It also suggests focusing on the political economy of their interactions, that is, the alignments of economic, political and physical factors that either allow reforms to proceed or block them. In the case of Cherepovets, the combinations of different factors, like a rich budget and high human resource capacities, favorable physical conditions, the political will of the mayor, and pragmatic relations with the region, allow the city to implement reforms in the housing and heating sector and, unlike other places, escape the fate of heating disaster.

Limitations of the approach: Although the presented account looks very promising to apply for other Russian localities, it still has some limitations. Its focus on interactions between human actors has diverted analytic attention from the problem of revealing other participants of the urban heating networks, - the technology itself.

Regarding the role of technology in this process, most instrumentalist studies share one basic belief: the city's technologies and the public policy around them are separate substances. While technology evolves under the impetus of some inner technological logic and is, in a sense, 'apolitical' and free from city officials' influence, local, regional and federal politics are the chief explanations for current technological breakdowns in Russia. Implementation context (like the lack of money and investments or nature of communication between levels of authority) and implementation actors (the city's officials and their behavior) are the factors that should be analyzed in the study about the successful and failed operation of public utilities across Russian cities. Technology is usually considered an insignificant element of implementation background and as an instrument in human hands. As our application of this model illustrates, it may be mentioned as a decisive agent in reform process (e.g. many reports state that technologies allow Cherepovets to improve the quality of heating services for residents) but at the same time still considered a separate from the political world. As a result, technology is considered a black box, which is in itself not in need of further analysis in studies of post-Soviet transitions to market. For its part, the implementation model can suggest only an "assessment method" – an approach to evaluate the economic costs and benefits of new technologies (e.g. the costs of installation of heat meters and their proposed savings for the city) but not its influence on human interactions (e.g. how residents and representatives of housing and utility companies in Cherepovets exactly use new equipment installed using the World's Bank money).

Given such perceptions of the role of technology in policy process, in the Russian case such framework suggests to us no explanation of what happened with the new heating technology after its installation. Why were some installed technologies successful while others were meaningless? Who was responsible for such failure - policy actors, who choose the "wrong" policy design, engineers, who installed the "wrong" equipment or technical defects of the installed tools? These questions are left untouched in the chapter that employs the conventional implementation model of policy-making to explain the case of Cherepovets's reforms.

CHAPTER 5

THE ANT-INSTITUTIONAL APPROACH: MATERIAL ENTITIES AND THE POLICY OF HEATING IN THE CITY OF CHEREPOVETS

5.1. Introduction.

This chapter seeks to answer the questions left open in the previous analysis. It applies an alternative analytical model derived from the field of science and technology studies (STS) and examines transformations that do not fit easily into the traditional picture of post-communist market transitions. Its guiding questions are as follows: What is the role of technology in the market policy delivery in the housing and heating sector in Russia? Why do certain technological changes affect the operation of the heating network in some ways, while other strategies fail to do that? How are the actions of city policy makers shaped by the technologies around them?

It is worth noting that the focus on technology is nothing new in many studies that are concerned with the analysis of the housing and heating sector in current Russia. Under the umbrella of the implementation model, many works describe technological constraints of market reforms in former Soviet republics (World Bank 2003; United Nations 2004).

Still, they do not suggest specific concepts and tools to describe the effect of technologies on policy implementation and, by and large, consider technical details as a nuisance of human interactions, i.e., as background structure that, of course, surrounds policy actors but otherwise has no impact on the outcomes of their actions.

In this chapter, I attempt to introduce new language to describe the market policy implementation and suggest an alternative account about events in the city of Cherepovets. The approach I employ is actor-network theory (ANT), one of the STS elaborations, that allows us to consider the role of both human (the mayor and his office) and non-human (heating system) factors on current reforms in the sector. As I will try to demonstrate, ANT is more suitable for analyzing the policy of heat at the local level, as urban technologies are in the primary position for framing political action in any post-Soviet city. The idea of ANT encourages us to think in terms of complex chains of mutual interactions rather than separate actions of discrete entities either human or nonhuman. This symmetrical analysis of humans and nonhumans is one of the most important merits of ANT and, as many studies demonstrate, has undoubtedly shed new light on the way technology configures everyday practices and enacts or disables a certain policy decision. The empirical data collected for this research project shows that material components of the utility system (together with other actors, like humans, institutions, and organizations) form the basis for the city's politics, not only in a passive way as a background for human interactions, but as the active participants in the policy process. How can, for instance, a financial sub-program of market-oriented changes in the utility sector (i.e., the full cost-recovery charges for utility services) be implemented, if the technological specifications of reforming equipment (i.e., absence of control equipment on individual radiators) are not taken into account?

5.1.1. Main argument and concepts.

In the following analysis, I will discuss the effect of artifacts and defend the thesis that things do matter in analysis of outcomes of policy implementation. As Ulrich Beck argues, "we look for politics in the wrong place, with the wrong terms, on the wrong floors of offices and on the wrong pages of the newspapers" (Beck 1997, 99) and because of that, miss the possible role of material entities in policy-making process. First, material entities do reflect the complex interplay of social relations and the power mechanisms which were inscribed in them and in turn, can impose these mechanisms, replacing older forms of coordination and discipline, with a much longer life span than their creators. Technology created in the Soviet collectivistic society, for instance, is carrying all its values to the new democratic and market society, which most Russian localities, including the case of Cherepovets, are trying to build now.

Secondly, it should be remembered that as a human artifact, these technologies and their inscribed values could come into existence only through their constant usage and application by humans. In other words, while certain principles can be attributed to a particular artifact, such values are not inherent to it and largely are relational. Humans can follow the technology's values and thus, maintain the Soviet institutional context in which these artifacts were constructed. Consumers can also use the technology in unpredictable ways and transform its initial meanings and correspondingly, the institutional context that these technologies are supposed to sustain. As Chapter 2 describes, what exactly consumers will be able to do with the artifact and whether a particular technology will have positive or negative effects can be explored only through an in-depth analysis of the context of interactions between humans and things. For such analysis, three major points require our specific attention: 1) the physical nature of a particular technology, 2) the context in which a technology was developed and the context in which it is currently used, and 3) the interests of human actors that utilize this technology.

In order to pursue such analysis, I will mix ideas of historical intuitionalism that suggest insights into the role of context of social interactions and the actor-network approach that allows us to acknowledge the crucial role of material objects (whether things, artifacts or technological systems) in the production of social order. As I mentioned in Chapter 2, the ANT main proposition is that technological artifacts are not passive and inert entities around human relations but rather active participants in human interactions. While traditional social theory claims that the capacity for acting belongs only to humans, ANT argues that the "capacity to influence others" is not an a priori given feature of a human actor but is the outcome of interactions between the human and non-human actants. Technological artifacts cannot only distribute agency among people and things, but also delegate action to specific groups of users and not to others. In short, contrary to traditional social studies that focus only on the domain of human interactions and overlook the areas in which artifacts can be also one of the key players, ANT suggests considering all participants of society – irrespective of their being a human or a thing.

There are four specific ANT categories around which my analysis will be constructed in this chapter: *scripts, delegation, programs* and *anti-programs*.[49] Products have "scripts" that influence the way in which people do things, like "shut the door," "pay your taxes" or "calculate the gross pay." Far from being neutral, they can ask in compelling ways for specific paths of being used; they can contain their own implicit application manual. Such scripts may also contribute to asymmetry in ability to act among different groups of users.

Moreover, as technology is characterized by superior stability and predictability, in many societies imposition of social norms is "delegated" to machines. As many ANT studies demonstrate, moral imperatives are often not left to humans to follow on their own but are materialized in objects (Latour 1987). Products are usually constructed with what may be called "programs" or "topography of use" (Shields 1997), i.e., elements that encourage or discourage particular uses. "As designers work, they are constantly trying to predict how the structure they are trying build will behave given particular arrangements. In theory derived from the textbooks of the natural and engineering sciences, they should be able to do such predictions. Of course, this is only in theory" (Bucciarelli 1994).

[49] Just a reminder: "Scripts" are a series of instructions on how to act, the scenarios, or roles played by human or nonhuman actors in a setting when they obey the various prescriptions inscribed in a scene. "Delegation" is a process by which certain actions performed by one or more actants are transferred to other actants that perform them more effectively. "Programs" are what a setting/a specific actant forbids or permits particular actants do. "Anti-programs" are programs of action of actants that are in conflict with the program of actions chosen as the point of departure of the analysis.

As ANT argues, while scripts are imperative, they still do not have intentions; actors do. Some actors may avoid “programs” by following an “anti-program,” the set of actions that change the initial meaning of the situation or the prescribed usage of the artifact. “While during design process engineers burdened with the design of large hybrid technological systems, like urban water supplies or heating systems, try to master the future behavior of the technology, it is very difficult for them to predict the exact ways an artifact will turn out, i.e., its ‘societal career’” (Disco 2005, 38). While designers are constantly trying to map possible ways to use technology and create limitations that will convince users to behave according to the dictates of the artifact-system (like with a heating system, not opening windows in order not to break the ventilation system), they often fail to do that (Fleck 1999). The result of such interactions between humans and artifacts is not only the change in technology itself but also in the social context of its use.

5.1.2. Cases of technological innovations in the city.

Employing the above concepts, this study will pursue two empirical goals: 1) to describe what has happened with the new technology (introduced according to prescriptions of market reform program) after its installation in our case, the city of Cherepovets, and 2) to explain why some new technologies work while others fail in the same locality. As I clarified in Chapter 2, an explanation of why heating technologies produce different outcomes is predicated on a degree of their fitting with old institutional and technological contexts (or expectations about human-nonhuman interactions embedded in the network) and the level of its physical prescriptions. Our main arguments are as follows: if the new technology, both with weak and strong scripts, is congruent with the old context, in most cases, we can expect it to achieve prescribed goals. If the new technology is derived from new context, our expectation is that it will probably fail in cases of weak scripts and will work in cases of strong scripts.

Our main focus will be on the exploration of the impact of two explanatory variables: 1) fit with the previous administrative and technical context, and 2) physical nature of the artifact on the effect of technological innovation in the locality (i.e., whether it will realize the prescribed principle of interactions between people or not). The cases of technological innovations in the city that will be analyzed in this chapter are summarized in Table 69.

As our model predicts, only new technology from cell #3 with a weak script and a large degree of misfit with the old context will fail, while other innovations will be successful in most cases.

The rest of this chapter will study the effect and history of these technologies' installation in our chosen case.

	Fitting with old context	**Incongruence with old context**
Weak script in technology	**#1** **Theoretical expectation: Successful case** Buildings' thermal insulation (plastic windows, new entrance doors, new roofs)	**#3** **Theoretical expectation: Failed case** I. Automatic heat exchanger II. Heat meter at the level of building
Strong script in technology	**#2** **Theoretical expectation: Successful case** Plastic pipes	**#4** **Theoretical expectation: Successful case** Hot water meters at the level of apartment

Table 69. Technological innovations in the city.

5.2. Background about housing and utility sector administration in USSR.

Before looking at specific cases of technological innovations, background about the context in which Soviet heating systems in general were developed will be provided. This exercise will allow us to understand the general principles according to which the heating system was constructed and identify the main actors, both human and non-human, in the Soviet housing and utility sector.

5.2.1. Administration over the housing and utility sector in the Soviet period.

As I have already discussed in Chapter 4, the main characteristic of local governance in the Soviet Union was its heavy dependence on higher-level administrations in almost all activities. The housing and utility sector in the average Soviet locality, for instance, was subjected to dual subordination and managed by a variety of administrations. Formally, the local administration, *ispolkom,* was the main actor in the sector. However, it had a limited capacity to coordinate the provision of benefits for local residents and lacked financial resources to do anything with the city's material infrastructure. The real agents in charge were the local enterprises that provided housing and utility services as well as some other services (schools, kindergartens, hospitals, etc.).

As some analysts note, such a power distribution is explained by the fact that most Soviet cities were developed only in order to provide the fixed stock of labor for local factories, mines, and oil-gas fields (Hill and Gaddy 2003). These cities were planned as "concentration points for social infrastructure and as supply or residential centers for extractive industries in isolated areas… They were less social or economic entities than physical collection points, repositories and supply centers – utilitarian in the extreme. Cities were functional mechanisms for "storing," funneling through, and directing labor and supplies for the huge planned industries of the region. Their size and municipal profiles, including population mix and infrastructure, were designed in relationship to specific industrial enterprises. They were thus built to suit the needs of industry and the state, not the needs (apart from the most basic), or desires, or preferences of their populations" (Hill and Gaddy 2003, 91).

While Hill and Gaddy's quote was about cities in Siberia, Cherepovets is also one example of such industry-based locality in the European part of the country. As data about the city's population in Chapter 4 indicates, in practice Cherepovets became a city only after the steel plant was constructed there. This plant was the main provider of local housing and utilities and owner of about 50-70% of the residential buildings for a very long period of the city's development. It was responsible for the city's growth as well as for its operation, planning, construction and maintenance of heat and water pipelines, sewage disposal plants and sewage network. Much of these urban technologies were built only for the needs of the plant, and residential services were merely a supplement to industrial activities. The plant's combined electricity and heat station, for instance, was constructed primarily in order to supply the factory with the required energy. Only a small part of energy production was used for the heating of residential buildings located near the plant:

> If you would visit our city at the end of Soviet times, you could not recognize the industrial part at all. You could not literally see it. I exaggerate, of course, but in a certain sense, it is true. There were leakages everywhere! The city was terrible!…. traffic could not move because of running water. It was the networks of the industrial part. You see, it was a position of the metallurgic plant. Yes, they had a power-heat combined station and owned city's heating networks, but they were nothing for the plant. Steel was their main concern. Of course, it was the right position but they were still ruining engineering infrastructure every day(Representative of the local heating company. Personal interview. Cherepovets. Fall 2005).

Like in many one-company towns built in the Soviet period, Cherepovets's utility system was an indivisible "agglomeration of huge individual factories with single power and heating supplies and water and sanitation units" (Hill and Gaddy 2003, 163). Serving the city as a whole, such a utility system was not allowed to cut off individual apartments, a building, or even a whole neighborhood from the basic system. The city could be either served as one organism or be shut off entirely and die.

5.2.2. Main everyday agents in the sector.

In everyday operation of the housing and utility sector in the city (as well as in the country in general), there were (and are nowadays) two main actors: housing companies (*zhilizhniki*) that were responsible for maintenance of residential buildings, and their in-house engineering infrastructure and utility companies (*kommynalshiki*) that produced water, heat, electricity and gas services. As the next section will demonstrate, these two were the most powerful agents in the sector, while another actor, the end-users or residents, were the most powerless.

Human actors in the housing sector: In many localities around the country, the management of multi-unit stock was carried by the ispolkom-owned management and maintenance companies, *zhilizhno-eksplyatachionnye-kombinaty*, *ZhEKi*. For the convenience of the residents, they were usually located in the parts of city that they were serving. Their responsibilities included maintenance of buildings and equipment at the level of buildings.

However, in other localities, enterprises created their own housing companies in order to manage their housing stock which was not concentrated in one part of the city. In Cherepovets, for instance, there were four housing companies: *Cherepovetszhilremstroi*, *Predpriyatie zhilizhnoe zhozyaistvo*, *Metallurg* and *Komfort*:

> Their names were originated from the names of their owners. Metallurg comes from the metallurgic plant; Cherepovetszhilremstroi from building organizations; Komfort from the chemical plant, etc. (Representative of Department of Housing and Utility Services. Personal interview. Cherepovets. Fall 2005).

In practice, there was virtually no single city plan, as the main constructors were the city's enterprises, and the city administration had no voice in decisions on location, even if a formal general city plan existed. It was the tradition that each plant constructed their houses anywhere in the city, and their housing departments were forced to maintain housing stock in different parts of the city, spending a lot of time traveling across the city.

There are four main areas in Cherepovets: *Zasheksniskii, Industrialnyi, Severnyi and Zarechenskii raiony*. *Industrialnyi raion* (residents call it the plant's area or downtown informally) is the oldest part of the city. Residents have been located in this area since the foundation of the city in 1777. The first houses with centralized hot water and heating systems were built there by the steel plant after World War II, during the 1940-1950s, to accommodate the plant's engineers and workers. About 35.6% of the city's housing stock was located in this area. The other parts, Severnyi (informally, *Fanera,* 8.7% of city's housing stock), Zarechenskii (*Zarech'e,* 42.4% of the housing stock) and Zasheksniskii (*Prostokvashino,* 13.3% of the housing stock) *raiony,* were built in during 1960-1990s and were inhabited by houses of different local factories.

In the city, houses of different plants and correspondingly different housing maintenance companies could be located on one street:

> Their houses are located in all four areas of the city, in *Prostokvashino*, *Zarech'e*, *Fanere* and *Industrial'nom*. They built everywhere, in this part one house, in another part three houses and so on (Representative of housing maintenance company. Personal interview. Cherepovets. Spring 2005).

> Large plants were the main builders of the city. Until 1994, the city had only about 30% of all housing stock; 70% was the property of Azot, metallurgists, chemists…. If we look at the city's map, it looks like a zebra. Houses of different plants and housing companies could be easily located on one street (Representative of the local administration. Personal interview. Cherepovets. Spring 2005).

This problem was not solved during the enterprise housing stock divestiture project implementation in the 1990s, and, nowadays, municipal housing companies are struggling with the same dilemma. It was very hard to transfer buildings from one housing enterprise to another because of the discrepancy within housing stock that had different ages of construction and different technical conditions. Nobody was willing to take the old building in place of the newer one:

> It is very uncomfortable… Why didn't they exchange houses? Because the age of these houses is different, and tariffs are the same for all houses, whether they are old or new; that is why they keep them… It is tradition that was decided to be kept (Representative of the local administration. Personal interview. Cherepovets. Spring 2005).

This problem has been continuing since the city's development as a big industrial center. As for residents, it is still a real achievement to reach the appropriate housing management office in the other parts of the city:

> For example, one of my employees lives on street N. But his housing management office is in a different part of the city, about seven bus stops to get there. However, he may pass four houses and there is the housing management office, but of another housing maintenance company. We had one anecdotal case once. On street N., there are two housing management offices - one housing company in Building No.2 and another housing company in Building No.3. Let us imagine the situation when I have a heat or running water emergency, and my phone is also broken…. How can I reach my housing company? I cannot run over there… There is not so much bedlam in big cities. In Cherepovets, it was traditional that nobody wanted to break down (Representative of the local administration. Personal interview. Cherepovets. Spring 2005).

> Our housing support system is very inconvenient. There is a very simple solution for it: let us transfer all the buildings in one part of the city to one housing maintenance company and do that for all parts. However, we decided to keep the old system. Say, there are four neighboring buildings, one of which belongs to *Comfort*, another to *Metallurg*, and the last two – somebody else's. Say, they have only one trash dumpster area to share… of course, there are constant conflicts over who is responsible for its cleaning, trash pick-up, etc. (Local journalist. Personal interview. Cherepovets. Spring 2005).

Another problem inherent in the property organization in Soviet times was the uncertain boundaries between areas served by different housing companies. The state owned all land indivisibly with no right of alienation and, as result, did not maintain the ordinary mechanisms to distinguish one plot of land and property from another (like land registries). Because all productive assets were in principle "common" and belonged "to the people," the law did not define the ordinary physical and legal boundaries of land and property located at this land. There was often no record of the line dividing land between two buildings (Heller 1998). The state also created a complex hierarchy of divided rights in the land instead of assigning an owner to each plot. Ownership was divided between different state agencies, often linking upward from a state enterprise, to a group of similar enterprises to the local and then central offices of a ministry responsible for that branch of industry. After transition, such indistinct boundaries and overlapping ownership led to a great problem: formal owners of the land and buildings and public officials often could not answer the question of who controlled the land on which they stood and who was responsible for maintenance of the buildings located at this plot:

> I can provide anecdotal evidence.., it was 1995. There were the area between residential buildings and a large pool between them. A car was sinking in this pool. Its owner, of course, jumped out of the car, but the car was damaged completely. He went to court. However, this area happened to be a border… here, one company and nearly, another company… nobody agreed to consider this pool as their concern and nobody wanted to pay for the damaged car (Representative of the local administration. Personal interview. Cherepovets. Spring 2005).

Human actors in utility sector: Like housing stock, utility services were usually provided by municipally owned companies. However, in many places local enterprises had their own utility facilities and provided services directly to their housing stock. In Cherepovets, most boiler-houses were built by the local industrial enterprises that projected and financed their construction only for the needs of their housing stock rather than thinking about the city as a whole organism. As one of the respondents notes, "it was economy of many petty monarchs. Boiler-houses were located here and there without any planning" (Representative of the local administration. Personal interview. Cherepovets. Spring 2005). The metallurgic plant was the owner of four boiler-houses in the city, heating station #1 and #2 in Zarechenskii raion, heating station #3 in Industrial raion, and heating station #4 in Zasheksninskii raion. Another boiler-house, Northern (*Severnaya)* heating station, was built for the needs of the local chemical plant, *Azot*. Azot financed the construction of this boiler house and then transferred the operational responsibilities to the city's heating company. This company, *Teploenergiya,* was created in October 1966 and from that time until the middle of the 1990s, was responsible for the heating supply to the buildings not covered by the plants' network, that is, about 30% of all residential buildings.

Residents: Until recently, the steel plant was the main actant in the organization and maintenance of water and heat supply networks in the city. Residents were not (and are not today) considered possible actors or noteworthy consumers. As one representative of the local administration vividly describes current perceptions about residents,

> If there will be no hot or cold water in one house, is it the big problem?! Residents can live without water supply for one week – it is not a big deal! Well, it would be bad and inconvenient. You will need to go to the shop and buy the bottled water. But if there is no water supply in the factory or plant even for one day…What does it mean to leave Severstal without water? There is the big plant that will stop without water (Representative of the local administration. Personal interview. Cherepovets. Spring 2005).

Overall, residents had little capacity to act in this administrative system. They were not owners of their apartments and did not share the burden of financing the sector, paying quite little charges for utility services. The rent control system had not changed since 1928. As I mentioned in Chapter 4, 13.2 kopecks per sq. meter of living area per month were charged, with only some minor adjustments for building quality and for floor space above the norm (Betrand 1992; United Nations 2004). As a result, utilities were considered "free stuff" by most Soviet residents.

Non-human actors in the sector: In the Soviet Union, heating services were universal for most residents in many urban and some rural areas. When in the 1950s-1970s centralized urban networks were developed almost everywhere, running hot water and heat became an everyday practice for many Soviet households. In ANT language, the final purpose of a central heating system can be best understood through the concept of "delegation": It relieves human beings of the trouble and effort that were needed to warm their houses by delegating the process to pieces of machinery: boilers, pipes, radiators, and thermostats, whose behaviors are more predictable and stable (Verbeek 2005, 117).

In general, two types of heating systems were developed in the USSR, local and centralized systems (Gromov 1974; Safonov 1974; Sokolov 1975). Local systems, primarily built in rural areas, serve one or several buildings, while the centralized model, constructed in most urban districts, serves the whole residential or industrial area. Centralized, or district, heating had developed as the primary method for household heating during Soviet times. Such a model allowed a reduction of the volume of required fuels, administrative expenses (due to introduction of automatic control over equipment), and emissions but did not include considerations of individual preferences (Gochenour 2001). Today in Russia, approximately 80% of the population lives in apartments that are equipped with hot water radiator heating systems where the heat is supplied from an external source. In Cherepovets, for instance, 57.8% of residential buildings had central heating in 1959, 89% in 1970, 95% in 1980, and 99.2% of buildings in 1990 (Cherepovets local archives). Like in other places, the city's heating system had the program 'to heat everybody equally' and was not concerned about the individual preferences of the end-user.

A typical heat supply system includes a heat generation source and an extensive heat distribution network.

A heat generation source: There are several types of heating devices around the country: combined heat and power stations, centralized boiler-houses that produce only heat, and recycling plants. The most common heat transfer fluid used in buildings is water, either in the form of liquid or of vapor (Sokolov 1975).

In Cherepovets, like in many mid-sized towns, the main heat generation sources are boiler-houses. A boiler is a device, consisting of closed containers together with heat sources, which heats water to generate steam. Although the water does not literally boil in hot water 'boilers', they are called boilers, nevertheless. The main responsibility of boilers in the network is to transfer heat, produced by burning a fuel, to a fluid. There are 13 boiler-houses in the city which produce about 2 billion Gcal of heat per year. Two of them are the property of Severstal, and the heating company buys heat produced by the plant for the needs of residents in some parts of the city (mostly located near the factory). The other eleven boiler-houses are integrated into five large heat stations and are the property of the city.

100% of the fuel input for the city's boiler-houses is covered by natural gas. In Soviet times, almost every generation facility had a back-up fuel source, fuel oil, as the security of the supply was (and is) essential in the cold climate. Today, only two of the city's boiler-houses have reservoirs of fuel oil, for it is rarely used in Cherepovets because of the complexity of running the system using this source:

> It is only a back-up source. It was bought many years ago, I did not know even in which place exactly…. Today, we heat fuel oil; it circulates in our system. So, if there is any catastrophic event in the city, we can shut off gas pipes, open valves and can operate using fuel oil. It is not so quick; of course, it takes time… (Representative of the local heating company. Personal interview. Cherepovets. Fall 2005).

Normative temperature limits for the city's boilers is +50-55°C. They are supposed to generate heating up to 20°C in most apartments and up to 22°C in apartments in the corner of the building (*Rech* November 17, 2004). However, as representatives of the heating utility state, in Soviet times many boiler-houses were not able to keep water temperature below +70°C; therefore, in apartments in many buildings, the temperature was usually about +25-27°C during the winter season (Representative of the local heating company. Personal interview. Cherepovets. Fall 2005).

A heat distribution network: The next element of the heat supply system is the pipeline network that delivers heat produced by the heating sources to the buildings. Figure 6 presents the typical model of a heating network in any Soviet city.

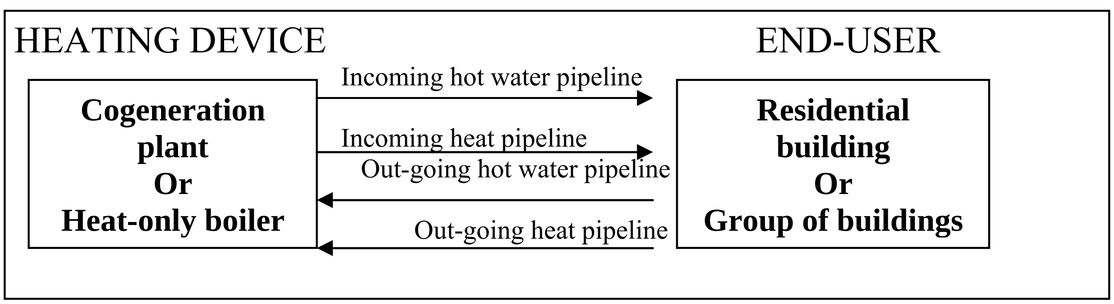

Figure 6. Typical district heating system.

The distance to which heat can be supplied is about 15-20 kilometers. In this sense, heating networks are more constrained than gas or electric networks are. There are certain limitations in distance, after which there is no sense in continuing the heating networks because of the rapid increase in the volume of required fuels and the corresponding increase in operating costs. In the country, two main types of pipeline systems were used to transfer water inside the network, one- and two-pipelines. A one-pipeline system is used in cases when the transfer fluid is used by consumers in full and is not circulated inside the network. In Cherepovets, this is employed only in one area, Zasheksninskii raion. In a two-pipeline system, transfer fluid is circulated partially or completely inside the network: it comes back to the heating device where it is heated again. This two-pipeline model was the primary system in most Soviet townships (Sokolov 1975). In Cherepovets, it is employed in three areas: downtown, Zarech'e and Fanera.

Overall, as some analysts argue, this network was designed in a way that inscribed the main principles of the administrative model in the sector where the city was considered one organism and where housing and utility companies were the main actors while residents were a mostly ignored agent (Collier 2001; Hill and Gaddy 2003). In the heating sector, while formally the main consumers were buildings, residents have had no influence over when and how much heat was produced. The heating systems are two-pipe, constant open flow, direct distribution systems that are often operated above ground. Heat distributed from the plants through several substations serves a building or group of buildings. The substation usually has four pipes, two (incoming and outgoing) providing hot water and two (again, incoming and outgoing) providing heat directly connecting the system to the building taps or heating pipes without by-pass connections to individual units. In some cases of so-called standard construction (*tipovaya zastroika*), there are not even by-pass connections to the individual constructions (see Figure 7). That is, residential buildings and adjacent schools, shops, and kindergartens are connected to the central heating network by a single pipeline that goes through all of them without the technical possibility of disconnecting a single unit.

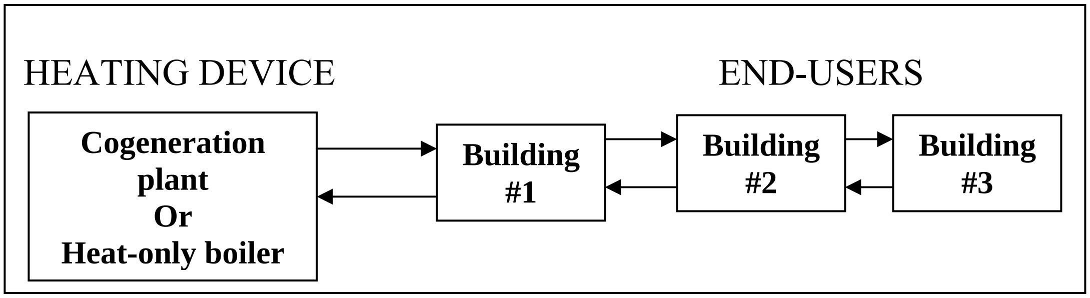

Figure 7. Typical transitional heating network in Soviet buildings.

Under such a system, there were no shut-off valves to control room temperature or heat flow and no meters to calculate the consumption in individual units either at the level of apartments or the group of buildings. Heat temperature could be regulated by the central boiler house, which sets the temperature according to the average outside temperature – the colder the day, the more heat is produced. Such centralized control often results in overheating in some locations and underheating in others due to time delays in the system responding to weather changes and variation in temperature inside the network due to losses. In this system, the end users can regulate the temperature in an apartment only by opening the windows to vent excess heat or by plugging in individual space heater to warm their units. In their turn, heat providers have no tools to measure or modify heat consumption to adapt to consumers' demand (Hill and Gaddy 2003; Kazakevicius et al. 1998).

In Soviet times, paying quite small charges for these services, the residents, however, did not object to such technological practices. They were sure that hot water would be provided throughout the whole year, and heat would be provided during heating season. They could also predict that it would be relatively warm in their apartments - at least 20° C in each room.

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As the above review demonstrates, the Soviet model of urban networks had two main characteristics:

- The administrative system was constructed in such way that a) in most places, enterprises' administrations were the most powerful actors in the sector; b) local administrations had a limited capacity for coordinating activities in the sector; c) in everyday operations, representatives of the utility and housing companies were the most powerful agents, and d) residents were not included in any sector's activities - either in financial or administrative terms.
- These principles were the script for technology. Soviet urban networks were designed in such a way that they imposed certain norms of behavior and patterns of everyday interactions on people. In the heating and water sectors, universalism and collectivistic norms were inscribed in the design of the pipes in buildings that prescribed limitations on disconnecting individual apartments and, in case of the heating sector, on controlling the temperature level in every household's unit. Overall, the system was built only for the needs of industrial enterprises without residential consumers in mind. While the resident was (and is) the end-user of the utility networks, she was prescribed less agency and ability to act than the other groups were. For the resident, utilities were always "free stuff" that did not require their concern.

5.3. Post-Soviet changes and urban networks: market-oriented technologies in Cherepovets.

As Chapter 4 discussed, in the post-Soviet period, there were drastic changes in the administrative model in the housing and utility sector. Blaming the Soviet central planning for its lack of cost recovery mechanisms in the sector, the Russian government proposed a program to remove the largest distortions that currently existed in the sector, like low cost recovery tariffs, absence of ownership over apartments, and a monopolized production system. The main goal of this program was to introduce market in the sector, i.e., to transfer the sector from state administration to a self-regulating market (Freinkman 1998; World Bank 2003). It was supposed that federal, regional, and local authorities would regulate such a market (rather than directly control the sector's activities) and represent the interests of the residents in the new administrative model.

As many studies demonstrate, in many places around the country, some of these measures have not yet been realized, while others being implemented have not reached the proposed policy goals (Kara-Murza and Telegin 2004; United Nations 2004). For instance, the changes in ownership structure of housing stock have not led to an increasing participation of residents in maintenance and effective management of their houses. Privatization itself does not make clear what to do with partly privatized multi-family buildings where no responsibilities have been assigned for the common, thus "ownerless," parts of the building:

> The privatization of individual units did not equate to private responsibility for buildings. Privatization of existing housing simply grants title to a specific apartment and a share of the common areas of the buildings as well as the right to sell or rent. New owners are responsible for payment of energy bills, including heating of common areas as well as general maintenance of the building. Responsibility for the building as whole is still an unresolved matter, causing serious concerns related to retrofit of the building stock (Kazakevicius et al. 1998, 837).

In practice, residents still consider utilities as "free stuff" and rely on the local governments for repairs of the whole buildings, and the municipality is still considered the owner of most of the city's buildings. Municipal enterprises continue to provide maintenance, repairs, and rehabilitation for all the residential buildings in most Russian cities. A huge variety of subsidies are still in power, and full charges for utility services that would create adequate financial resources for the sector have not been implemented in most places. Neither have energy programs that would allow savings both for utility companies and residents. And so on. As we explain, employing Cherepovets's case in the above chapter, several factors are responsible for the local failure or success of implementing the prescribed market reforming measures. These factors include financial and human resources, and certain socioeconomic and physical characteristics.

The more interesting and often neglected problem in other studies was one with changes in the technological model of the sector and resistance of old Soviet infrastructure in accepting these changes. As we mentioned above, the second step in promoting market relations in the sector was the introduction of new, market-oriented technologies that were supposed to change the behavior of both the consumers and producers of utility services. As the end of Chapter 4 indicated, in the case of Cherepovets, the delivery outcome of this program was twofold. Some market technologies installed in the city (like new pipes or thermal insulation) were successful, while others (like heat meters or heat exchangers) failed to achieve their purposes. The answer to the question of what can explain such variation is largely left outside of research attention in most current studies on Russian housing and utility reforms.

In order to clarify why such difference exists, several cases of technological innovations in the city will be analyzed. Such a review will be based on the ANT-institutional model predictions that the main explanatory variables of the effect of new technology are its physical nature (scripts) and its fit with the existent context. I will briefly describe the successful cases in Cherepovets, since they have been already discussed in the previous chapter, and focus mainly on the failed cases of new market technologies.

5.3.1. Thermal insulation and new pipes.

As we discussed in Chapter 4, while the housing stock in the country as well as in the city are relatively young (in Cherepovets, most buildings were constructed between 1960 and 1985), it is of a very low quality. The energy efficiency of individual apartments and the building in general is generally poor and does not meet Western standards. Some buildings have moisture and mould problems due to poor thermal insulation, while others suffer from dry air due to poor ventilation (United Nations 2004). Most pipelines in the city were in the same poor condition. While they were supposed to operate only 20-25 years, in practice they were in use for 30-50 years and usually without major repairs. In addition, the material from which most pipes were constructed, the cast, was very poor quality with a short lifetime and great percentage of leakages due to corrosion. As a result, "until recently, twice as much energy was used for heating a square meter of space in the Baltic countries, Russia, and Poland as was used in the Nordic countries, without occupants enjoying similar comforts" (Kazakevicius et al. 1998, 832).

In order to solve the problems of poor insulation and leaking pipes, Cherepovets decided to install new thermal insulation inside selected municipal-owned residential buildings and to replace cast pipes in the city. Using the World Bank's loan, the local administration initiated basement reconstruction works (in 679 buildings), insulated domestic hot water heat exchangers (in 678 buildings) and space heating controls (in 339 buildings), and replaced old windows and entrance doors to the staircases in multi-unit building and roofs (in 749 buildings). Using its own revenues, the city also replaced 200 km (out of total 333 km in the city) of the old cast pipelines and installed new pipes with a longer lifetime and lesser percentage of damages:

> We are changing all pipes now… We do not use cast pipes at all because we are thinking about the future. Moreover, we are trying to replace all the pipes with plastic materials, not like in other cities where they install part of the pipe from cast and another part from plastic (Representative of housing maintenance company. Personal interview. Cherepovets. Fall 2005).

> We are changing all water pipes in the city. I am personally a strong advocate of plastic pipes. Why? They are more convenient, long-running and nature friendly… There is no corrosion on plastic pipes; steel pipes can operate only 20 years and plastic about 50 years. Then, because of no corrosion, we have better and cleaner water. These pipes are also very easily installed… and much faster than steel pipes. And you know, they are much cheaper than old pipes – about 20% cheaper (Representative of the local water company. Personal interview. Cherepovets. Fall 2005).

As it was expected, such measures would result in the reduction of heat transportation losses by 2-3 times. And such expectations were not wrong. According to local officials' evaluations, the new insulation of both buildings and pipelines indeed resulted in high energy savings. In retrofitted buildings, the savings was estimated to be 17% on the heat and hot water supply system and 4.6% on space heating (World Bank 2005). New pipes reduced leaks in the supply network from 25% to 10%. As some respondents report,

> You cannot see running hot water in the city – maybe, in one or two places but it is very rare. We cannot afford to heat the ground; our heat is too expensive and that is why we are concerned about the installation of new pipes (Representative of the local administration. Personal interview. Cherepovets. Spring 2005).

What can explain the positive effect of these technologies? As our ANT model argues, among market-oriented technologies installed in the city, we should expect three types of new technology to be successful, i.e., technologies with strong script (whether they have fit with old context or not) and technologies with weak script, though only if they have only a small degree of misfit with the old context. In the first case, we should observe the artifact that will work in a prescribed way. In the last case, there is a little chance that the artifact will be used differently from the prescribed ways. While there is a physical possibility of damaging the equipment, there are no apparent incentives to do that.

New pipes can be the example of the first case, technology with strong prescriptions for which the fit with the old context does not make any difference. New pipes were placed underground, that is out of direct access for end-users. Moreover, installation of a new leakage detection system with electronically controlled indicators on these pipes allows the city to reduce the direct access to technology even for professionals from the heating company. Most leakages are determined now automatically without digging out the ground and revealing the pipelines system. Thermal insulation, in its turn, can serve as the example of the second case, technical innovation with weak prescriptions but fit with the old physical context in the Russian housing and utility sector. While physically, users can replace this insulation in the building (e.g. remove new plastic windows in the apartment), there are no meaningful reasons to do that. By merely replacing old windows, door and roofs, new insulation does not also change anything in patterns of human-nonhuman interactions in the sector.

5.3.2. Automatic heat exchangers.

The more interesting examples of new market technology installed in the city are automatic heat exchangers. A heat exchanger is the device built for efficient heat transfer from one fluid to another, whether the fluids are separated by a solid wall so that they never mix, or the fluids are in direct contact. This device is usually installed at the level of multi-unit buildings in Russia. In theory, the automatic exchanger reduces energy waste by controlling temperature inside the system. In addition to improving energy efficiency (i.e., 20-30% reduction in losses from overheating units in the winter; during the fall and spring period, reduction is estimated to be 50-70%), this equipment was also supposed to introduce a new model of interactions between residents and representatives of the housing companies in the Russian housing and utility sector. While in Soviet Union, the manual exchanger forced users to interact with repairpersons and pay bribes for the heat in their units, the automatic exchanger was expected to eliminate such relations. As our model predicts, the heat exchanger can be placed in cell #3 (see Table 66) – technology with a weak script (i.e., users can in some way change its operation) and small degree of fit with the old context (i.e., it tries to introduce new patterns of interactions between people) that will fail in most cases. Let us evaluate whether this prediction will work in our case.

The heat exchanger has lived through drastic changes in Cherepovets. In Soviet times, there were no effectively operated automatic heat exchangers at the building's level. Water was supplied from the boiler-house to the non-automatic in-house heat exchanger that was served by the housing company.

For this type of heat exchanger, most of the responsibilities and control were delegated to the special repairperson from the housing-maintenance company, *slesar' iz ZhEKa*. This person usually was not usually able to very quickly adjust the temperature of supplied hot water inside the building, an inability which resulted in overheating in some parts of the house and under-heating in other parts. The residents had no competency over controlling the temperature of their radiators, which did not even have shut-off valves, and were forced to adapt to such a temperature level as was set up by this repairperson. Technologically, the agency of the residents was restricted.

They were dependent on the repairpersons to adjust temperature in the apartment since in order to set up the right temperature regime, this person had to come to their house's basement and manually adjusted the heat exchanger.

The ANT notion of script is relevant to conceptualizing that situation. Madeline Akrich (1992) introduces this concept to visualize the way in which innovators' representations of users shape technological development. As she argues, in the design phase, actors construct many different images of users and objectify these representations in technological choices. The very act of identifying specific individuals or groups as users may facilitate or constrain the actual role that specific groups of users are allowed to play in shaping the development and use of technologies. The inscription of representations of users and use in artifacts results in technologies that contain a script: they attribute and delegate specific competencies, actions and responsibilities to users and technological artifacts. In our case, the Soviet type of heat exchanger incorporated a clear script that delegated responsibilities, agency and control to specific users (housing companies and their repairpersons) and created dependencies between different groups of users. According to the old exchanger's script, residents were dependent on repairpersons that sometimes refused to serve residents and waited for additional bribes to do their work, i.e., to supply heat to individual units in the building.

Of course, residents tried to overcome this technological script in everyday life, or in ANT language, create "anti-programs." Anecdotal evidence suggests that Soviet households had a wide variety of such anti-programs to heat their apartments. In-house heating systems were vertical, i.e., steam-heat pipelines passed vertically through all apartments in the staircase of the multi-unit building. When there was such a system in an ordinary nine-floor house, the apartment at the first floor usually received too much heat while the units at the higher floors were under-heated. In order to control an apartment's temperature, residents of the first-floor apartments opened windows (even in the winter), while their neighbors in apartments last connected to the heating system had cold radiators and were forced to huddle in the kitchen with the stove-top and oven turned on, wear winter clothing indoors, or sleep under a multitude of blankets. They also bought electric room heaters and were forced to spend even more on electricity to heat their apartments (Filipov 2001; Lampietti and Meyer 2003). Residents also tried to enhance the operation of the heating system in their apartments on their own, to install additional sections of radiators to get a larger volume of heat than their neighbors with the standard number of radiators.

There was also another way to fix this technical problem. Residents from under-heated units could call the repairperson from the housing maintenance company who would redesign the pipe system in the building's basement, for a certain amount of unofficial payment, so that the freezing apartments could get more heat.[50] Then, previously overheated and now under-heated apartments on the lower floors would in turn call the same repairperson who had only one solution – to redesign the pipes back again, for another bribe from residents. Such manipulations could be endless.

While some of the strategies were irrelevant to the heating system as a whole,[51] some of them were clearly troubling practices that disturbed the operation of system. Opening windows, for example, led to over-consumption of energy. As many representatives of the heating company report, with the opened windows in apartments, "we just heat the streets during winter." Additional radiators installed in some apartments and constant pipe re-modeling by repairpersons disturbed heat balance inside the building and made worse the situation for all residents. After some time, the in-house heating system was so unbalanced that some apartments were overheated and others were under-heated permanently:

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[50] Such method was in conflict with the existent technical instructions that heat supply should go first to the ground, the most coldest floor, then to the highest floor and finally to other levels. However, repairpersons often violated the rule and over-designed the pipelines in order to help residents and to receive additional income.

[51] They can have, however, relevance for other city's utility networks. Individual electric room heaters, for instance, create serious problems with electricity disconnections around the country. Because existing building wiring cannot support large numbers of small heaters and because regional electric system cannot withstand sudden demand in electricity when outside temperature drop and residents plug in their devices, there were many problems with overall voltage in Russian cities.

> Let's imagine that you live on the first floor and you live on the last floor of the same building. Your apartments are identical, but you decide to install more sections on your radiators… How can heat balance be controlled in such case? Even the first-grader knows that it is simply impossible to adjust the temperature inside such building (Representative of the local administration. Personal interview. Cherepovets. Spring 2005).

> I have moved into my apartment. Everything seems so bad to me; the radiator is damaged, and there are other reasons. And I decided to install additional 10 sections of radiators instead of two. Of course, my heating equipment would have a different heat emission in comparison with radiators in other units. And I have damaged the neighbor's heating system a little bit. Therefore, there is unbalance in the whole building (Representative of housing maintenance company. Personal interview. Cherepovets. Fall 2005).

At the end of the 1990s, the script of heat exchangers was adjusted in order to solve the problem of overheating and under-heating. Now, the automatic heat exchanger is responsible for temperature control inside buildings. As Chapter 4 mentions, in-house automatic heat exchangers were introduced to the city during the implementation of the World Bank project in 1996-2003. Heat exchangers (total number of 1,137) were installed in 678 houses (about 55% of all municipal buildings in the city) using World Bank money and in the rest of the houses using Teploenergiya's own funds.

The installation of heat exchangers was an obvious advance in the development of heating sector in the city. Heat exchangers allowed for the heating of water on demand as it passed through it (*Rech* November 16, 2004; *Rech* February 3, 2005). Such a type of equipment is also very well suited to relatively uniform loads, which are the case for most of the multi-family buildings in the country where the consumption of hot water is usually increased during evenings. In addition, in theory the heat exchanger aids in the avoidance energy waste and high maintenance and operational costs. While its installation requires more expensive heating elements, overall it has a lower cost of operation because of the reduction in energy waste in the building (around 70% according to some estimation) (Makarova 2001). Today, water in the city buildings is heated only up to +55°C instead of +70-100°C as it was before (*Rech* October 1, 2004).

Stated in the ANT language, it is a vivid case of delegation when responsibilities from untruthful humans who require bribes for their services are transferred to predictable, non-bribable nonhumans. Competencies and control are also changed in the new exchanger: in the second model of heat exchanger, automatic indicators installed outside register temperature and adjust the overall temperature inside the building to the most comfortable level. As a result, the residents no longer need to call the repairperson in order to adjust the heat. Now the temperature is regulated by an automatic exchanger, without the intervention of the repairperson. The script of this second product is very different from the first model: responsibilities and control are not delegated to humans but to nonhuman technology. In short, the installation of this energy-efficient device should also result in a small revolution in interactions between housing companies and residents by changing personal contacts to impersonal interactions between repairpersons and consumers.

However, such expectations for the new technology were in conflict with the old technological surroundings in which the new device was installed in the city. As residents do not have control equipment on their radiators and, thus, are still not able to manage the climate inside their own units, the script of the automatic heat exchanger still shows very restricted agency for the residents and imposes non-symmetrical communication between humans and things. Now, the thing determines human comfort. As a result, some weeks after the exchangers' installation, it turned out residents, especially from apartments overheated under operation of the manual exchanger, did not like this technology. Before they possessed the power to control the apartment's climate – when it was too hot, they opened windows. Now technology has taken that power and imposes its own temperature limits. It keeps temperature up to +20°C during the days and drops it considerably during nights:

> A heat exchanger was installed in our house. It is already the second winter when we have had it. Our radiators are very cold during the night. Why should be pay the same bills for the heat if in some houses it is +30°C and in our house it is only +20°C?! (*Rech* November 17, 2004).

> Our radiators behave very strangely now. They are not very hot during the day and terribly cold during the night. When I reported to my housing company about that, they said: "What do you want? We don't have control over temperature now; it is all the effect of the installed automatic heat exchanger (*Rech* November 20, 2003).

> Interviewer: Do residents like the new equipment?
> Respondent: Residents used to have it +25-28°C in their apartments and had to open windows. Now, they have +20°C and of course, they complain.
> I: Is this the only reason?
> R: Yes. We checked many times, measured many times in different units. The temperature is at the required level. Of course, it is colder than residents used to have. However, this temperature level is prescribed by federal regulations. Now, automatic equipment controls this level instead of us (Representative of housing maintenance company. Personal interview. Cherepovets. Fall 2005).

As we have seen, the various models of heat exchangers contain quite different scripts in terms of distributing agency, control, and responsibility among people and things and among the different user groups involved. The two models of heat exchanger acted quite differently with respect to the way they distributed agency between residents and housing companies and between users and the artifact itself. Whereas the first model delegated all responsibilities and control to the repairpersons, the second model delegated all responsibilities to the technology, although in both models the agency of the residents is very limited. This conclusion – that is, that the end-users are assigned no agency in new technology - is in conflict with the existing image of automatic heat exchanger as a 'consumer-oriented' tool. Theoretically, installation of this equipment – and proposed delegation of temperature power from human to non-human actors - was supposed to provide the right set of incentives for consumers (like frugality, calculability and rationality) and empower them in their heat consumption. However, given that consumers are living in apartments without shut-off valves, automatic heat exchangers still support the residential consumers' weak position inherited from Soviet times.

The next interesting point in the history of the exchanger's adaptation in the city is the anti-programs against the new device created by representatives of the housing maintenance companies. Like residents, they also complained about the installation of new technology:

> It is easier for us to maintain old heat exchangers…. Why? Because we need special personnel, engineers, to operate new technology. Therefore, we need to pay them high salaries, so we need to include these salaries in the tariff… But how can we increase this tariff if it is not our authority to do that? (Representative of the housing maintenance company. Personal interview. Cherepovets. Fall 2005).

Their main complaints concern maintenance, monitoring costs of automatic heat exchangers and increasing operational costs:

> Well, our maintenance costs are increasing… We should monitor this equipment each year, to clean it, for instance… We need special fluid for that…. special spares. There is, for instance, one special pump; it costs 46,000 rubles. We bought such a pump last year…. Nevertheless, we need more than just one pump. The fluid for the exchangers' cleaning is special and can be bought only abroad. If we use our Russian fluid, we will break the heat exchanger (Representative of housing maintenance company. Personal interview. Cherepovets. Fall 2005).

> We need to monitor this equipment every year or every three years, I do not remember. Well… we checked everything last year… it cost 8,000 rubles. We checked only 16 exchangers. What will we do next year when we should check 200 exchangers…. I do not know… Then, ablution should be done each year… maybe even 2-3 times per year. Who knows how this exchanger likes our water? Nobody cared about that while installing this equipment… Then, testing of different parts of the equipment, like the meters, should be done each year… We used very simple fluid to clean our old exchangers, now we are required to buy a very expensive special fluid. What for? (Representative of the housing maintenance company. Personal interview. Cherepovets. Fall 2005).

> These exchangers have special lining parts. If it tears a little bit, we need to replace it. It is very expensive (Representative of the housing maintenance company. Personal interview. Cherepovets. Fall 2005).

Unlike residents, these people are responsible for the everyday operation of heat exchangers at the level of the building and are able to physically correct scripts in technology. As representatives of housing companies report in interviews, they connect buildings with new, more complex technologies to the city's heating network in two steps. First, they connect old manual heat exchangers, start heating for all buildings and only then, re-connect the system to the automatic equipment:

> In the beginning of the heating season, we start with the old exchangers. Then we turn our attention to the automatic devices because they require constant debugging. It takes some time, and residents have already frozen; it is too cold for them, and heat is in need now and at once. Therefore, we use the old system firstly, and then we gradually turn every building to the automatic system. But this new system has always disconnected just after the beginning of its operations, because our networks cannot tolerate its requirements (Representative of the housing maintenance company. Personal interview. Cherepovets. Fall 2005).

> In practice, we serve two sets of equipment at the same time. We have the old exchanger to use it in the case of emergency breakdowns. We also prepare it for operation and always made it ready for the winter… We did not remove old equipment while installing new automatic technology… Just in case (Representative of the housing maintenance company. Personal interview. Cherepovets. Fall 2005).

Thus, representative of the housing companies have to bear additional costs. They keep operating old and new equipment during the heating season, are forced to buy spares for both of them, and pay additional salaries for technical staffs that support the operation of manual as well as automatic heat exchangers. In short, heating costs are increasing twice.

To sum up the review of the case of heat exchanger, while this device does change the pattern of interactions between residents and repairpersons, it fails to force its main programs “to reduce average heat consumption in the building” and “to bring down operational costs.” In many cases, residents are still able to modify technological prescriptions by installing more than the prescribed equipment in their units and, thus, disrupting the operation of the system. In its turn, the practice of running two systems employed by the housing companies in the city also violates the exchanger’s script and increases the costs of operations in the heating sector. As our model argues, such failure can be explained by the fact that this technology has a weak script and is incongruent with the old context. The residents had direct access to elements of the system that the exchanger was supposed to regulate (i.e., radiators in units) and could physically intervene in technological scripts. In addition, the exchanger was placed under direct control of actors whose incentives and patterns of behavior the device was supposed to change, representatives of housing companies.

5.3.3. Heat meters at the level of multi-unit building.

Another case of the technology in cell #3 is heat meter at the level of buildings. As our model predicts, due to weak script (a meter’s operation can be blocked by any representative of the housing company) and a huge degree of misfit with existent context (meter is totally new equipment for the Soviet utility networks), this device should also fail to achieve its goals.

In the Soviet Union, only electricity was metered and typically read monthly. For other services, like water and heat, metering of residential consumption was almost non-existent. As a result, heat and hot water use were calculated at the basis of norms established by heating companies. According to prescriptions of the market reform program, such practices were required to be changed quickly. As many studies argue, "expanded metering is critical for appropriate pricing of utility services and creating incentives for energy efficiency" (Freinkman 1998, 35). Russian Law on heat (articles 11 and 19), for instance, claims that installation of meters will allow the calculation of consumption at the basis of real consumption rather than at normative indicators ("normative billing" is based on average heat provision to the city divided by the sq. meter of the individual unit) and change behavior of both residents and utility companies (World Bank 2003, 7). As it was believed, installation of this equipment was the first step in the creation of incentives for energy savings programs, the introduction of full cost-recovery prices on utility services and in the end, the emergence of "market" in the sector.

At the end of the 1990s, heat meters were installed in many multi-family buildings around the country as well as in Cherepovets. Using the World Bank loan and its own funds, the city installed meters in 735 buildings. It was assumed that such technology would suggest an adequate set of incentives for consumers who would calculate their heat consumption and introduce various energy saving measures.[52] In economic terms, it was also expected that meters would boost energy efficiency by 20% and reduce heat consumption by 30% (World Bank 2003).

The outcome of the addition of meters to the overall network can be analyzed in a twofold way: on the one hand, as the previous chapter demonstrated, it is a clear indicator of progress in utility reforms in the city, for they do not only technologically update the system but also introduce market-based model of services provision. The main implicit goal of the meters is the redistribution (in terms of ANT model

[52] This argument was developed in most World Bank's reports about Russian housing and utility reforms. For example, see Freinkman (1998) that argues, "in the medium term it will give way to new incentives and behavior that will bring savings for all parties" (35).

delegation) of power from the heating utility (which had previously enforced its prices and norms of consumption on end-users) to consumers themselves who can now calculate their own heat consumption and control expenses on heat. As many analysts argue, the heat meter at the level of the building makes the residents of the building responsible both for the heating network and for the house itself. Realizing that old inside-house pipelines are too old, street pipes are constantly leaking, and the building's windows and roofs are not energy-efficient and thus, their house consumes too much heat, residents will cooperate, collect funds to repair the outdated equipment and fix the problem (Nachional'nyi Doklad 2003; World Bank 2003):

> Heat meters stimulate frugality with heat consumption for they create an owner of each resident by allowing him to change the sum of the heating bill. They force owners to change broken windows in the staircase, insulate doors, and modernize the heating system. They also force them to worry about the annual cleaning of the heating system in the building (Ulitin 2003).
>
> Heat meters will oblige residents to consume less heat and introduce energy-savings programs, meaning residents will use their own money to buy control equipment and to maintain it. They will also insulate windows and will not open them as before to ventilate the excessive heat (Nikanin 2001).
>
> Once a building is metered, tenants have some incentive to cut back on heat by reducing flow into the building but this should be done through a collective decision (Kazakevicius et al. 1998, 852).

On the other hand, such an optimistic picture of meters contradicts the everyday usage of this technology in the city. At least three major problems appeared after the meters' installation in Cherepovets: The first and most important problem was caused by the neglect of this market-oriented device installed in a field already filled with old Soviet-type technologies. As it was mentioned in Chapter 4, because of the technical specifications of Russian housing stock (i.e., in-house single pipe system), the meters were installed at the level of the building rather than that of the individual apartment in Cherepovets. The heat consumption of the household, as a result, is calculated based on the volume of heat consumed by the building or sometimes, a group of buildings in the same area, and then is divided on the floor area of individual units in the building(s).

Under such conditions, instead of the imposition of calculation and frugal behavior on the individual consumer, a building-level meter in the house with no shut-off valves on individual radiators cannot do more than continue the Soviet pattern of free-riding and the same high volume of heat consumption. A single household in such a house still does not have the incentives or physical capacity of restricting its heat consumption. Even if it wanted to (and could) do that, what is the reason for the household to cut off its consumption, given that the bill for heating will be shared by all residents of this multi-family building (in many cases, by 500-1,500 people)?

Moreover, there is no apparent reason for any family to pay the heat bills at all, for due to technical specifics of the system, the non-paying unit cannot be simply disconnected from the heating network and will be supplied with heat and hot water regardless of the family's huge debt to the utility company:

> [For disconnections of the heat supply] first, there is no technical possibility because it is impossible to remove physically or disconnect the common vertical pipes in an individual unit. Second, the disconnection of a single unit in a multi-family building is not allowed by the construction rules and norms, because it can damage the whole construction of the building. That is why the heating cannot be switched off in the single apartment. By the way, the Housing Code prescribes the resident to be responsible not only for his own unit, but also for the whole building. Therefore, the owner of the apartment cannot just turn off the heat and is responsible for paying heating bills whether he uses services or not (*Rech* March 22, 2005).

> In municipally owned houses, every unit has an individual contract with the utility companies that provide gas, water, and heat. The payer knows: if his family has no debts to Teploenergiya, their apartment will not be cut off from the hot water and heat supply. He also knows that his neighbor, even if his family pays no bills at all, also cannot be disconnected from the system, due to the technical arrangements of our houses (*Rech* October 20, 2004).

The next problem with the new technology is the resistance of the heating and housing maintenance companies to use or maintain meters. In Cherepovets, many respondents as well as newspapers' publications indicate that while heat meters were installed on the city's residential buildings, the local heating utility refused to read their measures and based their billing on normative indicators (i.e., total volume of heat consumed by the city):

> The contract with the World Bank stipulates that the loan should have the same outcome for all buildings, whether meters or other equipment were installed or not. Therefore, all residents pay for utilities based on the same scheme rather than on the measures of their meter. Only if they create condominiums and thus, not municipal house anymore, do they have the right to pay based on a meter's readings (*Rech* May 5, 2003).

> Teploenergiya has no incentives to use meters. When we created our condominiums, we talked about the installation of meters. But the heating company told us that of course, we had rights to install any number of meters, but they were still going to charge us their own tariffs rather than read our equipment (*Rech* July 4, 2004).

While such resistance of the heating utilities was predictable and in fact mentioned in many previous studies on the Russian housing and utility sector, the behavior of another powerful actor in the heating sector, housing companies and their representatives, was largely neglected. For housing companies also, there was no apparent reason to introduce new technology:

> We are not interested in meters at all. So to speak, we and those who like to see metering are on the different sides of a barricade. And while there is no incentive for our company, the situation will not change. It does not matter how much I want to have them or how much they criticize and persuade me (Representative of the housing maintenance company. Personal interview. Cherepovets. Fall 2005).

As many representatives of housing companies argue, the main reason explaining their lack of interest in metering devices is the absence of material stimulus. Collecting a fixed amount of charges for the maintenance of in-house engineering infrastructure on the basis of floor area rather than real consumption, housing companies do not receive additional profits whether residents would measure heat or not:

> At the current stage when we do not collect payments for heat from residents, and we do not pay Teploenergiya, we do not see any effect of the meter… Basically, I think that our company should be interested in the installation of this device which promises energy savings. If I pay a certain amount of rubles for heat for the building, I should be interested in the meter's readings. Moreover, I will carry out some modernization and install new equipment in order to reduce heat consumption in the buildings. I will look at the meter's reading and recognize: "Ah ha, it is necessary to put additional insulation here and seal additional air holes there, so the measures will be lower." However, there isn't that incentive now. Why should I care whether the resident will pay more or less for the heat if my company is not responsible for collection? (Representative of the housing maintenance company. Personal interview. Cherepovets. Fall 2005).

Consequently, while formally required to promote the new technology, in practice housing companies create many barriers to its successful installation:

> Ok, we have a city program to install meters. You – I mean staff who will install device – sign the contract to install, say, 30 or 40 meters and are given several months to do that. You, full of optimism, go to inspect the buildings and see small basements with no lights, windows, or doors. Of course, you go next to the housing company and require then to provide electricity, and install doors to protect your meters from residents. Well, housing companies are required to do that formally. But do they care? However, without their help you cannot begin your installations for there will no cables and meters tomorrow if there is no basement door and any resident can come there and take anything. Then, another problem is the absence of electricity in this basement. There can be doors, and you can install your meters, but how will they work without an electrical supply? (Anisimov 2003).

In many cases, the meter's estimations, if applied, are read by representatives of the housing companies only once a year due to the high costs of measuring and a lack of specially training professionals at the companies responsible for billing. Then, this data is used for the next year regardless of the increased or decreased heat consumption in the building.

As the ANT-institutional model argues, given that new technology was in conflict with the values of the old Soviet technological system that prescribed a universalism of utility services and their collective consumption, we should not expect that heat meters would work in the proposed way in the city. Residents in units with no control devices on their radiators have no incentives to follow the meter's script "to reduce heat consumption in the buildings." Given the level of discretion among this group of consumers, they have power to revise the meter's prescriptions (or in ANT language, create the own anti-programs); by installing additional sections on their radiators (the strategy mentioned in the previous section), they can increase their own heat consumption but distribute the costs for all residents in the building. Representatives of heating and housing maintenance companies had an even larger degree of discretion in the usage of this technology, by rejecting to read its measures or by physically blocking such readings.

5.3.4. Heat meters at the level of apartment in the multi-unit building.

The last example of market-oriented technological innovation will be illustrative for the effect of technology with a strong script and small degree of fit with the old context (cell #4 from Table 66) cannot be evaluated empirically due to the lack of evidence in the case of Cherepovets. Individual heat and hot water meters have not yet been installed in the city. Therefore, to describe this case, I will use available evidence from other cities. The ANT-institutional model predicts that, by and large, such a device should be successful. While it is totally new equipment for the Soviet technological system that is trying to introduce new, market-oriented and individualistic values for the users, its strong script reduces the creation of anti-programs. The heat meter is very complicated equipment requiring special training to operate it. Therefore, only a few users will be able to change its prescription.

As I have already mentioned, due to technological and economic reasons, heat meters were installed only at the level of the whole house rather than of the apartment in most old, Soviet-style buildings. However, units in houses constructed since the beginning of the 2000s (mostly, in so-called “elite houses” made with fewer floors and higher levels of amenities, and thermal insulation than the existing housing stock) have been equipped with this device in many locations around the country. As the restricted experience of elite houses indicates, people purchasing new apartments in such buildings are more aware of efficient heating, and being wealthier than average residents, can afford conservation practices. Such practices, including installation of an apartment-level meter and thermostatic valves on radiators, provide additional thermal comfort and allow residents of elite houses to regulate heat consumption and consequently, reduce heating bills (Nikanin 2001).

The financial difference between the normative bill based on the collective sharing of a meter’s reading and an individual bill is hard to calculate. However, some sources note that there is about a 2-5 times reduction in charges for units with an apartment-level meter. As one report concludes, “there seems to be no question that metering individual households leads to greater reductions in energy use than just metering buildings” (Kazakevicius et al. 1998, 853). The single-unit meter eliminates the free-rider problem inevitable in the case of the multi-family building device and is more successful in the imposition of its prescription “to be aware about your own heat consumption.”

Trying to overcome technical constraints of the Soviet-time housing stock, many analysts also argue that the example of elite houses can be extended to old buildings. As they propose, the cheap evaporation heat meters (that indicate how much heat has passed through a radiator but do not actually measure heat consumption) can be installed on apartment radiators even in houses constructed before the 2000s. Their measures (while inaccurate) can be used to figure the household’s heating bill and remind residents that they should pay for some of their consumption (Kazakevicius et al. 1998; Nikanin 2001). Such meters which collect information about nominal heat consumption in a single unit can be installed in every apartment. Once per year, measures of both the building and unit-level meters will be collected and form the basis for calculation of the individual heating bill.

While this market-oriented technology looks very promising if installed on Russian housing stock, as our model predicts, there is still a slight possibility of its misuse. Given the high number of engineering-training specialists in Russia, there is a chance that some users will be still able to disturb the operation of the new equipment there. As some engineering reports indicate, residents in many Russian localities indeed create the ways to overcome the meter’s prescriptions:

> There is a specific attitude toward energy efficiency programs among Russian consumers. After installation of a metering device, any resident should reflect about how to reduce her expenses on heat and water. In theory, the answer is simple: you should be frugal with your consumption. In practice, residents solve the problem in their own way. They create ways to manipulate the indicators of the metering device. As the heat meter is more complicated equipment than, say, the electricity meter, there are many more ways to change its measures. There is also virtually no way for utility companies to identify such changes (Kargapol’chev 2002).

According to Kargapol’chev (2002), while requiring special knowledge in physics and electrical engineering, several strategies to misuse the hot water and heat meter can be still employed by some residents:

1) The first strategy employed with the tachometer-type of hot water meter is the mechanical alteration of the meter's operation. Any water meter consists of four parts – valve, special filter, metering device itself, and another valve. All but the filter parts are sealed. So, the resident can manipulate this filter by attaching a small additional wire that will slow down the rotation of the meter. The meter, in its turn, will underestimate the volume of real water consumption.

2) The second strategy is employed with the electromagnetic meter, which consists of two parts, a turbine with one or two magnets that rotate in the water and a meter that calculates these rotations. The resident can install an external magnet that slows down the turbine's rotation and reduce the meter's measures. Given that such disturbing magnets can be removed anytime, when the representative of the heating company decides to inspect the operation of the meter in the apartment, there is no way to identify a user's intervention.

3) The next strategy is the installation of a special resistor on pipes near another important part of the heat meter, the thermal converter that measures the temperature of water. Such a resistor can reduce water temperature significantly and consequently, understate the meter's measures.

Of course, such evidence is only anecdotal. In order to realize how many users employ such strategies in practice and whether they really disturb the operation of the network, we need to compare the numbers of heat and hot water consumption before and after meters' installation for each building. However, such data is very hard to collect in any Russian locality. As some reports argue,

> Of course, residents will try to manipulate and to cheat the meters. Of course, some of them will be successful. History knows the cases of intervention in systems of the most reliable banks of the world. However, the cases of massive interventions will be rare. All devices are sealed. All inspectors are responsible for checking the validity of measures. If such an inspector suspects any external intervention, she can refuse to read the meter's measures. Residents have a choice – do not to break rules and live in peace, or to risk it and lose everything (Nikanin 2001).

5.4. Conclusion.

This chapter tries to answer the question that was left open by the implementation model, - why do certain market-oriented technological changes affect the operation of heating network in some ways, while other strategies fail to do that? It describes several cases of technological innovations in the city of Cherepovets that are summarized graphically in Table 70. As the table demonstrates, the positive or negative effect of the new technology, whether it will impose its script on users and implement its program of action, depends on interactions of two factors: the physical nature of the tool and its degree of fit with the old context. Technologies with a strong script that cannot be easily changed by any user have higher chances of imposing their rules regardless of the degree of misfit with the existent context. While the device from cell #4, with a strong script and a large degree of misfit, may be misused by some users, such practice will unlikely disturb the function of the technology. Technologies with weak scripts have two fates. The one fitting with the old context (or old values inscribed in the network) will probably succeed in its operation, for it is not supposed to change anything in the old context and thus, does not create any apparent incentives for its misuse. Technology that is incongruent with the old context (i.e., a tool that tries to change the existent expectations about human-nonhuman interactions) will fail in many cases. Having a weak physical nature (i.e., it allows direct intervention and manipulation), its attempt to introduce new social values and new patterns of interactions between different groups of users will likely be unsuccessful. Consumers will change its prescriptions and will use the device in ways not proposed by designers or policy makers.

To sum up the major theoretical finding of the chapter, the main contribution of ANT is that it allows us to consider the role of technologies while studying market transition in the Russian housing and utility sector. As it demonstrates, technology can empower some social groups and weaken others and directly affect the outcomes of policy delivery. Though it looks like an obvious statement, however, many current reports that suggest recommendations for Russian municipalities often forget about the technological aspects of reform by believing in their predictable "behavior" and thus placing things outside of the analysis. As this discussion demonstrates, restrictions that are imposed by technologies should be mentioned in any analysis of the current heating policies across Russia.

	Fitting with old context (or expectations about human-nonhuman interactions inscribed in the network)	**Incongruence with old context**
Weak script in techn.	**Successful case:** Buildings' thermal insulation (plastic windows, new entrance doors, new roofs) *Fit with old context*: does not change anything in Soviet heating or housing; just replaces old equipment *Physical nature*: physically, can be replaced by users, but no incentives to do that.	**Two failed cases:** I. Automatic heat exchanger: *Fit with old context:* introduces new model of interactions between residents and representatives of the housing companies. *Physical nature*: Scripts in the equipment can be overcome by any resident II. Heat meter at the level of building: *Fit with old context*: totally new equipment for the Soviet-style network *Physical nature*: scripts can be overcome by users.
Strong script in techn.	**Successful case** Plastic pipes: *Fit with old context:* do not introduce any new social or economic rules; just replace old elements of technological network – cast pipes *Physical nature*: are placed underground and out of the direct access of end-users	**Successful case** THE EFFECT CAN ONLY BE PREDICTED BUT NOT EVALUATED EMPIRICALLY Heat meters at the level of the apartment: *Fit with old context:* new equipment for the Soviet technological system; introduce new, market-oriented values for the users. *Physical nature*: very complicated equipment required special training to operate it. Therefore, only few users will change its prescription. However, there is a chance that some users will be still able to disturb the operation of new equipment there.

Table 70. Cases of technological innovations in the city.

CHAPTER 6

CONCLUSION

In the previous chapters, I tried to bring two conceptual languages together with the aim of comparing their positions and conclusions while analyzing such issues as market-oriented reforms in the Russian housing and utility sector. The instrumentalism-implementation and the combined ANT-institutional approaches were applied to answer the main research question: how can we describe current changes in the heating sector in Russia? While answering this question, the study pursued two goals. It provided alternative explanations and descriptions of heating accidents in the country and assessed the explanatory power of two conceptual models for the Russian case. This chapter will briefly summarize the main research arguments and discuss policy implications and ideas for future research.

Review of main arguments

In general, the argument developed in the body of the study can be summarized in three propositions:

1. *Most analysts of Russian local politics explain and predict the outcome of local technological policies in terms of one general conceptual model that was entitled as the instrumentalism model in this study. This model considers implementation as the influence of certain static variables on policy outcomes.*

In confronting the puzzle posed by the absence of heating problems in one Russian locality while all other localities are struggling with heating breakdowns, the instrumentalism-model analyst frames the question: What did this locality do to implement the program of "heating residential buildings"? What are the main factors for the successful policy implementation? Then, she fixes the unit of analysis, local government action and implementation context of technological policy. The analysis starts by observing how a program operates in this locality and what is required for it to produce its effects. Next, she creates a list of certain factors that can help her to predict successful or failed implementation outcome, such as financial and human resources of the city, local socioeconomic and physical characteristics, goals and objectives of officials at different levels of authority responsible for the policy, and the political will of the local mayor.

The degree of influence of these variables on policy implementation is checked throughout statistical analysis. Based on the results of this analysis, the implementation scholar invokes certain patterns of inference: if the government successfully implemented the market policy, it must be the consequences of favorable conditions, like the availability of resources or the unique attributes of the local government. The analyst has explained the outcome of heating policy and the absence of heating disaster when she could show how local government was able to get required resources and to overcome barriers in order to keep urban heating networks in a fair condition. Recommendations about what other local governments should do are generated by summing up the strategies of a successful case to manipulate implementation factors in a certain situation, given specified objectives, such as, to develop a stable heating system in the city and escape serious heating damages.

Applying such a research pattern to the case of Cherepovets, this study suggests answers to the first research question: why do some Russian localities succeed in market policy implementation in the sector while others fail? The main variables of the implementation model that explain variation in reform outcomes across localities are the behavior of implementation actors and peculiarities of the implementation context. As this model argues, there is a certain combination of several factors that allows the city of Cherepovets to implement reforms in the housing and heating sector and, unlike other places, escape the fate of heating disaster. These factors include rich budget and high human resource capacities, favorable physical conditions, the political will of the mayor, and pragmatic relations with the region.

What is missing in this picture of reforms, however, is the lack of explanation of what happened with the implementation of the technological component of the market program. Did new market-oriented technologies operate successfully after their installation and what can explain the variation in their performance? This model also reduces the implementation to the list of static variables and overlooks the complexity of interactions between humans and new equipment.

2. *An alternative conceptual model, the combined ANT-institutional model, introduces the notion of complexity in social interactions and suggests possible solutions for the implementation model deficiency. It provides a base for improved descriptions of the cases like changes in the Russian heating sector.*

Unlike the implementation model, which suggests a list of static variables and co-variation as the main measure of the reality, the combined ANT-institutional approach introduces the notion of interdependencies. Faced with the problem of a current heating disaster, the combined-model analyst frames the puzzle: what are the specifics of the relationships between technologies and humans that enable or disable the effects of policy actions in the heating sector? She then fixes the unit of analysis, technology, the social values in the technology, and humans who interacts with the equipment in everyday life. Next, she focuses attention on certain concepts: the main elements of technology and settings in which it was installed, the prescribed functions of the technology and everyday practices of usage among its users.

Contrary to the first model, this conceptual lens rejects treating technological artifact as neutral tool to realize policy goals. It states that the idea of “pure,” “neutral” and “apolitical” technology that offers benefits for all is not helpful: “Technology is just as neutral as a toxic gas that can kill insects, but also people… because it serves *everyone* it is *not* neutral” (Beck 1997, 170). Technologies mirror the societies in which they were built and thus, maintain, reproduce, and sometimes impose the complex interplay of social relations and power mechanisms. They mediate human actions and perceptions of the world and change human existence and experiences. In order to analyze such an effect of artifacts, the analyst explores what influence past values in technology have on current policy and describes how technologies can empower some social groups and weaken others.

Such a model has, at least, one merit. In comparison with the implementation approach with its list of fixed variables, it opens up a new productive line of inquiry by introducing the idea of the uncertainty of social interactions in the policy analysis. This model can enrich conventional implementation approaches by contributing to a broader understanding of the context for technological reforms and by explaining institutional, political, and technical interdependencies.

ANT suggests to replace the conventional faith in the neutrality and stability of the technology, whose side effects and advantages can be carefully calculated with the belief in the uncertainty of interactions between humans and nonhumans in a society: “Technology resemble nothing so much as children. Children, too, on the one hand, require parental care and guidance, but on the other hand are always prone to surprising their parents and deviating form the regimen that they have been instructed to follow. Technologies, like children, once introduced into the world must be responsible reared, without depriving them of the opportunity of surprising us, if they are to becomes morally and politically effective fellow citizens” (Smits 2001, 167). In contrast to the implementation view that technology is a neutral means to realize our goals, the combined perspective offers a rich picture of technology, which does justice to its role in politics. Because of inscribed values, technology can codetermine the effect of human politics for empowering some social groups and weakening others.

The accompanying Table 71 provides the list of the most important ANT concepts and their comparison with the implementation language.

	Implementation	The combined ANT-institutional model
View of the policy process	Co-variation between fixed variables	Uncertainty and constant interactions between factors in flux
View of technology in policy process	Technology as means to realize human goals	Technology imposes the values of its creators and therefore is an active participant of policy making
Research focus	How humans implement their goals in technological policy	How technology (or values of past decision-makers) affect human actions
Main theoretical concepts	Implementation actors and context	Scripts
Research logic	Create a list of fixed variables that can allow us to predict the outcome of technological innovations	Account for unpredictability of societal career of technology – technology can be transformed in social interactions with users
Policy recommendations	Mainly need to change human habits and preferences	Need to consider both changes in the existing scripts and human habits

Table 71. Comparison of the implementation and combined models.

3. *Conventional policy recommendations "to focus on a list of fixed variables while analyzing policy-making processes" can be enriched by the conclusions of the combined ANT-institutional model, that is, "to give voice to interdependencies between factors." These models are complementary in their analysis of any technological reform implementation.*

Each framework provides a unique way to explore the market reform process in the heating sector across the Russian localities. As this study tried to demonstrate, because of such uniqueness, only concurrent application of both approaches to the same case can suggest a more complete account of current events in the Russian housing and heating sector and lead us to a fuller understanding of the interactions between technology and policy decisions.

The instrumentalist approach suggests an excellent way to analyze the implementation of financial and institutional reforms in the sector. It proposes reducing the implementation analysis to explore the effect of certain static variables on policy outcomes. At the same time, it has become clear that the traditional approach to policy analysis is one-sided. It misses all the complexity of interactions in a modern society, especially the peculiarities of relationships between humans and technological innovations and the influence of such interactions on policy-making. "People expect to find politics in the arenas prescribed for it, and they expect it to be performed by the duly authorized agents: parliament, political parties, trade unions and so on. If the clocks of politics stop there, then it seems that politics as a whole has stopped ticking" (Beck 1997, 98-99).

Technology is reduced to the role of tools in the human hand and excluded from analysis of the implementation process. As a result, the implementation model overlooks struggles for power beyond the narrowly defined discourses of politics and policy-making: "Objects, the practical things that politics is about, aren't really supposed to play any significant role in democracy. As someone once cried out during an intellectual get together, "Everyone knows that democracy is all about subjects!" Of course, it is true that democracy in many respects is first and foremost about people. It is about their will, their opinions and preferences, their rights, and other such attributes of human beings… To even raise the question of the role of objects in democracy may be considered an absurdity" (Marres 2005, 208).

As ANT tries to argue, the presence of a concrete and material world is visible in a modern society (Latour 2005). Things can profoundly influence social interactions. They can reduce particular interpretations and practices but also strengthen others and create new values and patterns of interactions between humans. Such an effect can be intended (e.g. when the designer builds in specific patterns in the new equipment that, in its turn, impose them on humans) and unintended (e.g. when users modify the designer's assumptions inscribed into the tool). In addition, ANT allows us to consider the effect of the time variable in human-nonhuman interactions. Technologies have much longer periods of operation in comparison with the life span of their designers. They persistently impose values of past policymakers (e.g. the collectivism values of designers of the Soviet heating system) and compete against values of new decision makers (e.g. market values of reformers of Russian heating networks).

For the specific case of reforms in the Russian heating sector, policy recommendations derived from the instrumentalist model will have little impact if they neglect such past values inscribed into the equipment and the constantly changing context of interactions between different variables. Using the conventional model, we fail to recognize how much the use of a technology can be displaced, translated, and modified in comparison with the initial intentions of its inventors. Given the unpredictable "social career" of new, market-oriented technologies, the instrumentalist model should be enriched by frames of reference that focus on of what happened with urban networks (pipes, cables, boiler-houses, etc.) in the implementation process. The combined ANT-institutional model is one way of approaching such questions and considering, through the symmetric analysis of human and nonhuman actants, who the decisions-makers are, why particular actors became decision-makers, and how they are given the power to make particular decisions.

Policy implications

The applied implementation and the combined ANT-institutionalism models present the following picture of technological reforms in the selected city. First, the implementation model identifies the list of static factors, which can possibly influence the policy outcome. It demonstrates the impact of specific features, like financial, human resource, and socioeconomic and physical characteristics, on implementation outcome in the housing and heating sector.

Second, the ANT-institutional model introduces the notion of interdependencies between factors and points out the impact of scripts, or past policy values in technology, on current policy implementation outcomes. As it argues, material entities are part of the institutional context, for technologies also contribute to the creation of meanings and impose certain sets of interpretations for different things or situations. For example, the Soviet centralized heating system, technically constructed in such a way that repairs to a certain segment of pipeline caused the disconnection of many buildings in the neighborhood, created certain practices among Soviet citizens. When due to repairs, hot water was switched off for a month or more in any Soviet city, this was taken as an essential inconvenience. Collectivist and "friendship" practices were organized so people living in the disconnected area went "to take baths" at the homes of relatives or friends' apartments in other parts of the city. When new technologies reducing the time for repairs were introduced in some areas in post-Soviet times, such innovations allowed the city to switch off the hot water supply only for two or three days. Now, this is the normal practice. When there is an emergency, and water is disconnected for a longer period, it is a sign to the residents that the city network (and the mayor himself) functions ineffectively. Thus, in many situations concerning city infrastructure, interpretative limits and systems of their description and appraisal are determined by the existent technological network.

This chapter applies the above argument for the case of Cherepovets's reforms and demonstrates the need for deeper research attention to the role of technology in market building in the Russian housing and utility sector. As claimed, any artifact has its own "societal career," the way in which it interacts with users in a particular setting. Such a career cannot be determined a priori. Technology may or may not function in the expected way, result or not result in the proposed changes in human behavior and succeed or fail in imposing the inscribed values.

As a result, scripts and scripts-in-use have great consequences for overall outcomes of market policy delivery in the sector. As the case of the heat exchanger demonstrates, instead of promoting the proposed set of impersonal interactions, technologies can contribute to further asymmetry in agency among users and, in the end, fail to impose the program of action prescribed by market program. As the example of the heat meter illustrates, instead of promoting individualistic values, the technology encouraged free-riding behavior, not predicted in the initial design. The model, which combines the ANT and institutional ideas about physical nature of a new artifact and the settings in which it was introduced, makes an attempt to explore the aspect of market reforms, often missing in conventional implementation studies – that is, to describe why certain market-oriented technologies work in the selected Russian locality while others fail.

Third, the correlated implication of the ANT model concerns the role of the consumer in technological reforms. This lens allows us to include the repressed voices that are excluded from the account of conventional policy studies about heating reforms in Russia. In the traditional view of implementation studies, the user – either a representatives of housing companies or, especially, an ordinary resident - is treated as passive and insignificant for the overall performance of technology and evaluation of market policy implementation outcomes. Introducing the concept of anti-programs, ANT opens way to the possibility of individual initiatives on the part of the consumer. It suggests focusing on everyday usage of the technology and considering how end-users interact with it, whether they use it or not in ways contrary to what it was initially intended.

Last, in addition to the analysis of implementation outcomes of the technological sub-program and the predictions about the behavior of new technologies in the city, the ANT model also demonstrates that technology can be a powerful actor in local politics. As one ANT study argues, "with regard to technology, politics is not only displaced… but also qualitatively changed from free deliberation about the good life, based on normative principles, to the making and unmaking of actual worlds" (Popkema and Harbers 2005, 253). In making such worlds, technology can reduce particular interpretations and distribution of power among different human actants by empowering certain human actors to act and to talk on behalf of others.

As this research illustrates, for instance, the centralized model of the heating network prescribed consumers the limited power. It does not grant the capacity to residents to control heat comfort in their own units and makes them the most powerless agents in the urban heating network around the country. The technical system transfers control and power to other field of political interactions (from the level of apartment to the level of City Hall) and to other social agents (from consumers to directors of heating utilities and the heads of local administrations). As a result, in current Russia, technology makes the mayor one of the most powerful agents in housing and heating sector, the actor who can literally control "weather" in the city, that is, to claim the date for the beginning of the heating season.

Like in other Russian localities, there are two operational periods for Cherepovets's boiler-houses, winter (or heating) and summer (non-heating) seasons. Winter season usually lasts eight months, from October to May; the summer period is four months, from June to September (*Rech* September 9, 2004). However, there is no exact date in the city (and around other Russian localities) when "winter" should begin. Usually, Cherepovets's mayor makes the decision about the beginning of this season based on the recommendation of the State Committee on Construction and Development (*Gosstroi*), which is, when outside temperature is below 8° Celsius for at least five days (*Rech* September 21, 2004). However, because this is a very sensitive issue for any city, the decision to begin winter is often made even when the outside temperature is higher than 8° Celsius (*Rech* September 20, 2005). The same is applied for the beginning of summer in the city; the mayor can claim its start depending on his own considerations.

Moreover, heating technology prescribes power to the representatives of the heating company, who can sometimes be more powerful agents than even the head of the city, the formal chief manager of all heating facilities. The centralized heating system is very complicated and designed in such a way that it requires a long period in which to start heat production. Representatives of heating and housing companies should spend a lot of time on preparing the city's networks, checking in-house networks (i.e., entering basements in every building) and then, connecting each house to the system. Thus, there is no flexibility in such a system, meaning it is impossible to turn on the system quickly during a cold summer or turn it off during a warm winter. As representative of Cherepovets's heating company suggest the following example:

> The centralized system has one great problem… You can especially feel it in September, April or May… In Cherepovets during Soviet times, I remember such a situation when it was very cold on July 7… One bureaucrat cried loudly: "Why did you turn off the heat? You should turn it on immediately! But how can you connect the whole city immediately?! So, while he was crying out, it became warmer… (Representative of the local heating company. Personal interview. Cherepovets. Fall 2005).

City officials, who look like very powerful agents in some situations, are powerless in many other cases. They cannot control the warmth of their citizens when they might want to do that for any populist reasons (like, to please electorate and enhance re-election chances).

Policy recommendations

Is it possible to change the system to make it easy for policymakers to impose new market-oriented values both on residents and representatives of utility companies? The simple answer to this question is "to build technology with strong scripts" that cannot be modified by the end-users. However, such strategy has possible risks. First, it can be ineffective in the specific context of its usage. In some cases, the reconstruction of the technology at once is not an effective way. As we can see from the example of the automatic heat exchanger, the partial modification of an old technological network often has the opposite outcome. The specifics of the Soviet collective urban technologies determine the lack of care about the houses among the city's residents. The Soviet practice of "everything belongs to everyone and nobody should be concerned about it" is still alive and the new equipment cannot change these values overnight. The only effect of this tool is the creation of anti-programs (or practices of resistance) among consumers.

Secondly, technology with strong scripts can be dangerous for the future democracy-building in the country. With such a type of equipment, the city administration will centralize maximum power in its hands and will exclude residents from any responsibility of caring about city's technological network. In such a situation, the possible recommendation of how to design more efficient technologies is to run tests for specific localities before installing new equipment and to consider the effect of both physical prescriptions in the new tool and the context of its usage (e.g. structure of population and its education and existing expectations about human-nonhuman interactions).

Future research

These were the main arguments of the presented study. They are not complete since the study was based on a single case study and a limited sample of data. It would be very interesting to see the results of a more thorough study on the heating policy in different Russian localities and former USSR republics. There are at least four areas for improvements for the future studies:

Synthesis: The current research does not suggest synthesis of two approaches employed in the research. Each model is considered separately and there is no clear connection between their findings. In the future, the project can be more concerned with the creation of a synthesis of these models. In such a project, the implementation approach will allow us to identify significant implementation factors and to evaluate their effect on policy outcomes. The combined ANT-institutional model will enrich the picture of the implementation process by adding considerations about complexity and interdependencies between implementation actors.

One case and one country: This study explores market reform implementation only in one city and in one country. As a result, it identifies possible reasons that might help us to predict the fate of the locality and the outcomes of interactions between new technology and context but does not suggest any valid generalizations about significant factors in market policy implementation in the housing and heating sector. In order to obtain more generalized conclusions, observations of this study can be used for the future research of technological innovations across several Russian localities. They can be also useful for further research of technological changes across other countries that experience the same technological problems, such as the former Soviet republics and Eastern European countries.

Case selection on the dependent variable. In order to solve the current shortcoming of selection on dependent variable – successful or failed market policy implementation in the heating sector, the findings of this study can be tested in a project that selects cases – whether inside the country or across different countries - on the basis of the explanatory variables without regard to the degree of progress in reform process in the housing and utility sector. In this case, it will be possible to generalize whether variations in our independent variables (e.g. motives of implementation actors, specifics of implementation context, scripts and anti-programs) are indeed connected with variation in the dependent variable, implementation outcome in the sector.

Employed research methods: Finally, applying only sociological methods, the study fails to assess the capabilities of other research strategies. Due to access constraints during field research, this study does not employ anthropological (e.g. direct observation) methods to explore everyday interaction between humans and technology. In future research, both sociological and anthropological methods should be applied in the study. Any such study would probably need to take the form of an interview survey of users in a sample of localities and countries, and an in-depth ethnographic study. This would, among other things, provide a database for our understanding of the general impact of material entities and values inscribed in them by past decision-makers on current policy-making.

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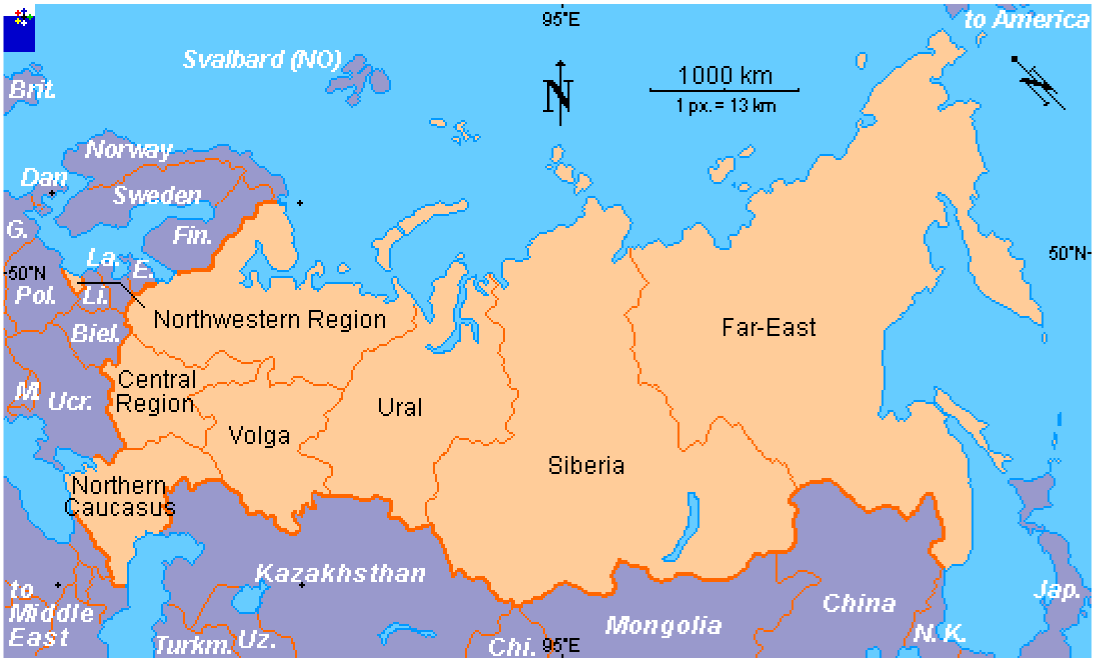
APPENDIX A

MAPS



Map 1. Federal Districts of Russian Federation.

The country is administratively divided into 49 oblasts, 21 republics, 10 autonomous okrugs, 6 krays, 2 federal cities (Moscow and St. Petersburg) and 1 autonomous oblast. Usually, these units are translated as regions in English. A few years ago, Russian President, Vladimir Putin created seven federal districts headed by presidential representatives, - Central region, Volga, Northwestern region, Northern Caucasus, Ural, Siberia and Far East Federal Districts. Cherepovets is located in Northwestern Federal District.

Map 2. Vologda region.

Vologda oblast is located in the southwest of the East European plain. It is an important rail junction with lines to Moscow, St. Petersburg, Arkhangelsk, and Kirov. Population is 1.26 million (2002). Density of population is about 9.2 persons per sq. km. The region is divided into 26 districts; 29 towns and 375 rural settlements are located here. Center of the region is the city of Vologda.

Vologda region is one of Russia's major iron and steel producing areas. It also has a significant chemical industry. The region's main exporting industries are steel (75% of total exports) and chemicals, such as sulfuric acid, mineral fertilizers, ammonia, and nitric fertilizers (18%) which are produced mostly in the city of Cherepovets. The production of Vologda region enterprises makes up 2.3% of the overall volume of Russian export.

APPENDIX B

DATA SOURCES

I. Author's interviews:
Cherepovets
Spring 2005, Spring 2006

Number of interviews, total – 20 interviews
Total recording time – 20 hours 22 min.

Interviews with representatives of the local administration and local legislative body - *Gorodskaya Duma*:

(**Short reference**: Like in other Russian localities, there are three main actors in Cherepovets's municipal governance – Council of Deputies, *Gorodskaya Duma* (representative function); the head of municipal administration, *Mayor* of the city (representative function, elected each four years) and municipal administration, *Mayor's office* or the local administration (executive function; responsible for administration of city's property). Department of Housing and Utility Services in Mayor's Office is the main agency responsible for implementation of local utility policy and coordination of activities in housing and utility sector. There are several sections inside this Department: Section of Financial Affairs, Engineering Networks, Housing Affairs, and Central Dispatching Office).

1. *March 16, 2005* - representative of the local administration, Business Sector. Time: 51 min. Topic: Local administration projects to reform water supply systems in the city.
2. *March 18, 2005* – deputy of Gorodskaya Duma. Time: 20 min. Topic: General context of utilities' reforms in the city.
3. *March 19, 2005* – representative of Local Administration, Business Sector. Time: 1 hour. Topic: History of utilities' reforms in the city, ideological program of reforms.
4. *March 21, 2005* – one of top managers of Department of Housing and Utility Services, Local Administration. Time: 30 min. Topic: City's administration vision of utilities' reforms in the city.
5. *March 31, 2005* **–** representative of the local administration, Business Sector. Time: 54 min. Topic: World Banks' loan to reconstruct utilities' systems and its realization in the city.
6. *April 5, 2005* – representative of one of departments of the local administration (also, former deputy director of Department of Housing and Utility Services, City's Administration). Time: 1 hour 56 min. Topic: Pluses and minuses of current policy of utilities' reforms in the city.
7. *April 12, 2005* – former director of one of city's housing-maintenance company and former deputy director of Department of Housing and Utility Services, Local Administration. Time: 1 hour 50 min. Topic: Enterprise housing divestiture in the city, interactions of utilities' companies and one of the city's ZhEU.
8. *April 15, 2005* – deputy of Gorodskaya Duma. Time: 45 min. Topic: The role of City's Duma in reforming housing and utility sector in the city.

Interviews with journalists:

1. *March 22, 2005* – a journalist of local newspaper. Time: 1 hour 6 min. Topic: Current changes in utilities' systems in the city.

2. *March 24, 2005* – a journalist of local newspaper. Time: 55 min. Topic: World Bank's loan to reconstruct utilities' systems and its realization in the city.
3. *April 6, 2005* – a journalist of local newspaper. Time: 58 min. Topic: Reforms of heating and water supply systems in the end of 1990s.
4. *April 13, 2005* – a journalist of local newspaper. Time: 28 min. Topic: Interactions of City's and Regional Administrations.
5. *April 18, 2005* – a journalist of local newspaper. Time: 20 min. Topic: City's Administration interactions with local journalists.

Interviews with representatives of local heating utility – Teploenergiya:
(**Short reference**: Like in other Russian localities, there is one main local heating provider in Cherepovets – municipal unitary enterprise, *Teploenergiya*. It is responsible for heat and hot water supply in the city and coordination of activities of five big heating stations. Department of Housing and Utility Services coordinates activities of Teploenergiya administration. In addition, each boiler-house has also its own director and management that are coordinated by Teploenergiya administration).

1. *April 6, 2005* – one of top managers of local heating utility - Teploenergiya. Time: 30 min. Topic: Reforms in heating supply sector in the city.
2. *April 6, 2005* – one of top managers of local heating utility - Teploenergiya. Time: 20 min. Topic: Technical innovations in heating supply sector in the city.
3. *April 8, 2005* – two top managers of local heating utility - Teploenergiya.. Time: 1 hour. Topic: Everyday life of the heating company in the city.
4. *April 11, 2005* – two top managers of local heating utility - Teploenergiya. Time: 40 min. Topic: Everyday life of the heating company.
5. *May 10, 2006* – the former top manager of local heating utility – Teploenergiya (worked in company during Soviet times). Time: 2 hours 30 min. Topic: Heating network in the city: operation during Soviet times, technological innovations.
6. *May 10, 2006* – top manager of local heating utility. Time: 35 min. Topic: Technical innovations in heating sector in the city.
7. *May 12, 2006* – two top managers of one of city's boiler-houses. Time: 1 hour 30 min. Topic: Operation of boiler-houses in the city; interactions between separate boiler-house and central administration of heating company.

II. Interviews from Academy of Finland's project: Cherepovets Fall 2005

Number of interviews, total – 9 interviews
Total recording time – 9 hours 15 min.

Interviews with representatives of the local administration:
1. *October 14, 2005* – representative of the local administration, Sector on Local Residents. Time: 20 min. Topic: Residents' complaints about housing and utility sector and Administration's responses.

2. *October 17, 2005* – representative of Department of Housing and Utility Services, Local Administration. Time: 1 hour 20 min. Topic: Reorganization of housing and utility sector in the beginning of 1990s.
3. *October 22, 2005* – representative of the local administration, Consumer Protection Sector. Time: 15 min. Topic: Residents' complaints about utility companies.

<u>Interviews with representatives of housing maintenance companies</u>:
(**Short reference**: There are five municipal housing-maintenance companies in the city - *Cherepovetszhilremstroi*, *Predpriyatie zhilizhnoe zhozyaistvo*, *Metallurg*, *Slyzhba zakazchika* and *Komfort*. These housing companies (called in Russian – *ZhEU* and *zhilizhniki*) are responsible for maintenance of residential buildings and their in-house engineering infrastructure. Department of Housing and Utility Services in the local administration coordinates activities of these five companies).

1. *October 18, 2005* – top manager of one of housing-maintenance company in the city. Time: 20 min. Topic: Activities of housing-maintenance companies, technical innovations, and interactions between housing and utility companies.
2. *October 21, 2005* - top manager of one of housing-maintenance company in the city. Time: 1 hour 15 min. Topic: Activities of housing-maintenance companies, technical innovations, and interactions between housing and utility companies.
3. *October 30, 2005* - top manager of one of housing-maintenance company in the city. Time: 50 min. Topic: Activities of housing-maintenance companies, technical innovations, and interactions between housing and utility companies.

<u>Interviews with representative of utility company</u>:
1. *October 12, 2005* – representative of local heating utility. Time: 55 min. Topic: Technical innovations in heating sector in the city.
2. *October 29, 2005* – representative of local heating utility. Time: 30 min. Topic: Technological policy in heating sector in the city.
3. *November 7, 2005* – former top manager of local heating utility (worked in Teploenergiya during Soviet times). Time: 2 hours. Topic: History of development of heating networks in the city; interactions with local administration during Soviet times and changes in post-Soviet times.

II. Publications in local newspaper, *Rech*.

(*Titles are in Russian*).

1999
January 8, 1999. ФАКТ: Беден? Докажи! (P.2)
January 11, 1999. ФАКТЫ: тепло уходит в землю (P. 1)
January 11, 1999. ФАКТ: У каждого своя правда (P. 2)
January 12, 1999. ФАКТЫ: Долги не греют (P. 1)
January 12, 1999. ФАКТ: Извилистыми тропами субсидий (P. 2)
January 13, 1999. Алексей Сальников. Вода пока молчит (P. 2)
January 15, 1999. ФАКТЫ: Деньги как вода (P. 2)
January 19, 1999. ФАКТЫ: Все течет (P. 2)

January 19, 1999. ФАКТЫ: Почти что хорошо? (P. 2)
January 19, 1999. Почем коммунальный платеж? (P. 2)
January 20, 1999. ФАКТ: Одиннадцать минус одиннадцать (P. 2)
January 21, 1999. ФАКТ: Не всюду авария, где разрыто (P. 1)
January 21, 1999. ФАКТ: Не так страшен долг как его накрутки (P. 2)
January 21, 1999. Сергей Косарев: Реформа ЖКХ будет продолжаться (P. 2)
January 22, 1999. ФАКТ: Водомеры шагают дальше (P. 2)
January 23, 1999. ФАКТ: Из Франции – к нашему водопроводу (P. 1)
January 23, 1999. ФАКТ: Остальные не спешат (P. 2)
January 23, 1999. ФАКТ: Вежливый отказ (P. 2)
January 26, 1999. Адрианов Валентин. 140 метров под землей.
January 27, 1999. Под мостом течет, но не река
May 25, 1999. ФАКТ: Отзимовали! (P. 1)
May 25, 1999. ФАКТ: Злостный недоимщик, жесткий кредитор (P. 2)
May 25, 1999. ФАКТ: Дешево, но «сердито» (P. 2)
May 26, 1999. Свет в конце тоннеля (P. 2)
May 27, 1999. ФАКТ: Земля и трубы (P. 1)
May 29, 1999. ФАКТ: Напор, вода и ржавые трубы (P. 2)
June 2, 1999. Холодно.. Теплее.. Горячо... (P. 1)
June 4, 1999. Когда же вода? (P. 1)
June 9, 1999. Ирина Рожина. «Острое обезвоживание». Почему это случилось? (P.1)
June 10, 1999. Очищающий напор (P. 1)
June 10, 1999. Ирина Рожина. Где искать горячую воду? (P. 2)

2004

July 1, 2004. Татьяна Ковачева. Зима нечаянно не нагрянет (P. 2)
July 1, 2004. Татьяна Ковачева. Жильцы просили за директора (P. 2)
July 1, 2004. Татьяна Ковачева. Вновь без горячей воды на сорок дней останется часть Индуструиального района (P. 1)
July 2, 2004. Оксана Емельянова. Тема №3: «Горячие» отключения (P. 3)
July 6, 2004. Татьяна Ковачева. Вологжанам не позавидуешь (P. 2)
July 8, 2004. Сергей Май. Подсудимые тарифы (P. 1)
July 13, 2004. Лидия Луссе. Вторая пенсия экс-директора «Теплоэнергии» оплачена за счет предприятия (P. 2)
July 19, 2004. Валентин Горобцов: Ощущение, что я попал в другую страну (P. 1-2)
July 26, 2004. Оксана Емельянова. Готовность к зиме – нулевая (P. 2)
August 4, 2004. Оксана Емельянова. Где будет тепло (P. 2)
August 5, 2004. Татьяна Оболенская. Подготовка к зиме и аварийность н адорогах стали одними из основных вопрос на традиционной пресс-конференции зам мэра Александра Афанасьева (P. 2)
August 6, 2004. Оксана Емельянова. Тема №3: «Горячая» пора (P. 3)

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August 31, 2004. ФАКТ: Один день без горячей воды (P. 1)
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September 9, 2004. Оксана Емельянова. Приближается теплый час (P. 1)
September 13, 2004. Оксана Емельянова. Проверка холодом и вандализмом (P. 2)
September 14, 2004. ФАКТ: Тепло порциями (P. 1)
September 15, 2004. Светлана Леонова. Нерентабельная экономия. Дешевле заплатить за 300 л воды, положенных по норме, чем за 100 реально потраченных (P. 2)
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September 22, 2004. Светлана Леонова. Владимир Дайтер: Водоканал неоправданно завышает цены (P. 2)
September 24, 2004. Тема №3: Тепловые проблемы (P. 3)
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October 1, 2004. Елена Жиборт. Деньги Мирового банка: Череповец потратил миллионы долларов. На что? (P.1, 20)
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October 6, 2004. Оксана Емельянова. Без тепла и горячей воды остались 209 жилых домов Индустриального района (P. 1)
October 7, 2004. Татьяна Тихонова. Маленькая трагедия: Забирайте последнее! – кричала должница судебному приставу (P. 1)
October 11, 2004. Ирина Ромина. По стаканчику стоков за здоровье череповчан осушили гости на церемонии (P. 1)
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October 12, 2004. ФАКТ: Сезон жалоб впереди (P. 1)
October 13, 2004. ФАКТ: Отключение за самоуправство (P. 1)
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October 15, 2004. Лидия Луссе. Прости меня, мама, заблудшего сына... (P. 4-5)
October 18, 2004. Светлана Леонова. За чистую воду за Шексной намерена бороться инициативная группа череповчан (P. 3)

October 19, 2004. Татьяна Кузмина. Череповчане пьют воду будущего. Так считают столичные светила (P. 2)
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October 26, 2004. Татьяна Ковачева. За чистую планету по протоколу (P. 2)
October 27, 2004. Елена Петрова. Больница без воды (P. 1)
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November 3, 2004. Татьяна Ковачева. Тарифы готовятся к росту. Депутаты гордумы решают, как этому воспрепятствовать (P. 2)
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November 25, 2004. Татьяна Ковачева. Ледниковый период. Почти четверть жителей Вологды мерзнут в своих домах (P. 2)
November 29, 2004. Елена Жиборт. Коммунальные услуги оплатят самым бедным (P. 1)
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November 30, 2004. Светлана Леонова. У воды – и не помыться. Жители Простоквашина не хотят пользоваться водой, пахнущей сероводородом (P. 2)

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January 17, 2005. Ольга Захарова, Оксана Емельянова, Светлана Леонова, Татьяна Ковачева, Татьяна Кузьмина, Сергей Комлев. Мост гнева. Что может и чего не может власть (P. 1-2)
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January 18, 2005. Татьяна Тихонова. Гнев народа вне закона. Участникам пятничного митинга предстоит беседа с правоохранительными органами (P. 1)
January 19, 2005. Сергей Комлев. Народ достучался до власти. Региональным льготникам оставляют льготу по ЖКХ, но снижают сумму компенсации (P. 1-2)
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January 20, 2005. Ольга Захарова. Низы хотят, верхи не могут (P. 1)
January 20, 2005. Татьяна Ковачева. Нас услышали. После встречи с губернатором лидеры ветеранских организаций вернулись в Череповец с легким сердцем (P. 1)
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January 21, 2005. Татьяна Ковачева: Комментарии (P. 3)
January 21, 2005. Татьяна Ковачева. Череповец бережет энергию (P. 4)
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January 25, 2005. Сергей Комлев. Ольга Захарова. Тройная ошибка Зурабова (P. 1)
January 25, 2005. Сергей Комлев. Беспорядков не будет – пообещала вчера мэру Михаилу Ставровскому лидер ОД «Пенсионер» Тамар Баулина (P. 1)
January 26, 2005. Оксана Емельянова. Испытание кипятком (P. 3)
January 26, 2005. Хотели как лучше, получилось как всегда (P. 4)
January 27, 2005. Татьяна Ковачева. Субсидиям вернут прежний порог. Принципальная договоренность об этом достигнута на уровне области (P. 1)
January 28, 2005. Оксана Захарова. Льготникам сделают перерасчет (P. 2)
February 1, 2005. Сергей Комлев. Вячеслав Позгалев: Ошибки были неизбежны. Но мы обязаны их исправить (P. 2)
February 3, 2005. Сергей Май. Засуха в Вологде: Почти половина областного центра осталась вчера без воды (P. 1)
February 3, 2005. Оксана Емельянова. Батареи просят тепла (P. 1)
February 3, 2005. Татьяна Ковачева. Коней на переправе не меняют. Промахи в льготной реформе, допущенные федеральным центром, исправляют власти города и области (P. 2)
February 4, 2005. Оксана Емельянова. Водные процедуры – через мэрию (P. 4)
February 7, 2005. Сергей Комлев. Нет ребята, все не так. Затевая льготную реформу, правительство не имело представления о реальном положении дел в стране (P. 2)
February 8, 2005. Светлана Леонова, Ольга Захарова. Плюс на минус: Транспортные, жилищные и другие предприятия подводят итог первому месяцу жизни без льгот, подсчитывая доходы и расходы (P. 2)
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February 9, 2005. Ольга Захарова. Резать не пришлось. Депутаты гордумы изыскали средства на послабление в оплате услуг ЖУХ, не сокращая финансирование по другим статьям (P. 1)

February 9, 2005. День Письма: Не дожидаться булыжников (P. 4)
February 10, 2005. Оксана Емельянова. Заплатите кто сколько может! – просят жилищные предприятия череповчан (P. 1)
February 11, 2005. Надежда Парамонова. События: Бюджет недели (P. 2)
February 15, 2005. Оксана Емельянова. Квартира, роддом... Эти и другие функции выполняют тепловые камеры, в которых зимой обитают бомжи (P. 2)
February 16, 2005. ФАКТ: Плата за услуги ЖКХ – не более 10% (P. 1)
February 16, 2005. Лидия Луссе. Труба – дело? Рейд по проверке правил эксплуатации внутридомовых систем теплоснабжения провели специалисты службы энергонадзора МУП «Теплоэнергия» (P. 2)
February 17, 2005. Ольга Захарова. Дружба «коммуналок». Познакомится с череповецкой сферой ЖКХ приехали вчера в город представители немецкой делегации (P. 1)
February 18, 2005. Оксана Захарова, Оксана Емельянова. Платить - не платить. Жители города с трудом решают сей «гамлетовский» вопрос (P. 3)
February 22, 2005. Ольга Захарова. Ключи от новых квартир в муниципальном общежитии за Шексной сегодня начнут получать специалисты бюджетных сфер (P.1)
February 24, 2005. Сергей Комлев. Льготы, тарифы и СМИ были в центре внимания депутатов на очередной сессии Законодательного Собрания (P. 2)
March 3, 2005. Елена Жиборт. 6 кв.м для неплательщика предусматривает Жилищный Кодекс (P. 1)
March 3, 2005.Андрей Ненастьев. Муниципальный хай-тех. Жизнь Череповца в электронном варианте (P. 2)
March 10, 2005. Вячеслав Позгалев: На череповецкий бюджет никто не посягает (P.2)
March 14, 2005. Ольга Захарова. Пикет в прозе и в стихах. Трехдневная акция протеста пенсионеров против реформы ЖКХ началась у стен мэрии в пятницу (P.1)
March 21, 2005. Лидия Луссе. Стоп-кран для должников (P. 2)
March 22, 2005. Лидия Луссе. Теплоэнергия в зеркале потребительских жалоб. Директору этого предприятия Вячеславу Степину горожане пишут, пожалуй, чаще, чем в газету (P. 2)
March 28, 2005. Оксана Емельянова. На дворы денег нет. Предприятия ЖКХ готовятся к летним ремонтам (P. 2)
March 31, 2005. Оксана Емельянова. Последняя инстанция в решении коммунальных проблем череповчан (P.1)
April 6, 2005. Татьяна Ковачева. Формировать тарифы ЖКХ должны специалисты под контролем депутатов гордумы (P. 2)
April 13, 2005. Оксана Емельянова. Общежитие или дом? (P. 2)
April 14, 2005. Оксана Емельянова. Вода без меры (P. 2)

III. Local laws and regulations in the housing and utility sector, Cherepovets

Main topic of regulation	Year	Regulation *(titles are in Russian)*
Budget of Vologda region and the city of Cherepovets (including detailed expense on housing and utility sector)	2001	04.04.2002 «Об исполнении городского бюджета за 2001 год» 30.10.2002 Поставновление Собрания Вологодской области №550 «Об исполнении закона Вологодской области «Об областном бюджете на 2001 год»
	2002	28.05.2002 Изменения в городской бюджет на 2002 год 15.10.2002 Обсуждение в Гордуме Постановления«О Положении о бюджетном процессе в г.Череповце 22.11.2002 Постановление «О Положении о бюджетном процессе в г.Череповце 17.12.2002 Постановление «О внесении изменений в городской бюджет на 2002 год» 25.06.2002 Постановление «О внесении изменений в городской бюджет на 2002 год»
	2003	25.03.2003 Постановление «О внесении изменений в городской бюджет на 2002 год» 27.05.2003 Постановление «Об исполнении городского бюджета за 2002 год» 24.12.2003 Постановление «О городском бюджете на 2003 год» 25.03.2003 Постановление «О внесении изменений в городской бюджет на 2003 год» 27.05.2003 Постановление «О внесении изменений в городской бюджет на 2003 год» 18.09.2003 Постановление «О внесении изменений в городской бюджет на 2003 год» 18.09.2003 Пояснительная записка по исполнению бюджета за 1-й квартал 2003 года 18.09.2003 Пояснительная записка по исполнению бюджета за 6 месяцев 2003 года

	2004	15.05.2003 Дополнительные меры к заседанию Рабочей группы по подготовке предложений по внесению изменений и дополнений в бюджетное и налоговое законодательство в связи с реформой федеративных отношений и местного самоуправления 01.01.2004 Постановление «О внесении изменений в Программу социально-экономического развития города на 2003 год 17.02.2004 Постановление «О внесении изменений в городской бюджет на 2003 год» 01.06.2004 Постановление «Об исполнении городского бюджета на 2003 год» 1.10.2004 Об областном бюджете на 2004 г. 13.11.2004 О городском бюджете на 2004 г. 24.02.2004 Постановление «О внесении изменений в городской бюджет на 2004 год» 29.04.2004 Постановление «О внесении изменений в городской бюджет на 2004 год» 28.09.2004 Постановление «О внесении изменений в городской бюджет на 2004 год» 07.12.2004 Постановление «О внесении изменений в городской бюджет на 2004 год» 17.12.2004 Пояснит записка по уточнению городского бюджета за 2004 г. 15.12.2004 О законе области «Об областном бюджете на 2005 год» 28.12.2004 Постановление «О городском бюджете на 2005 год»
Economic and social policies in the city (include data about the development of housing and utility sector)	2002	23.04.2002 Постановление «О внесении изменений в Программу социально-экономического развития города на 2001 год» 28.05.2002 Постановление «О выполнении Программы социально-экономического развития города за 1й квартал 2002 года» 27.08.2002 Постановление «О выполнении Программы социально-экономического развития города за первое полугодие 2002 года» 26.11.2002 Постановление «О

	2003 2004	выполнении Программы социально-экономического развития города за 9 месяцев 2002 года» 27.05.2003 Постановление «О внесении изменений в Программу социально-экономического развития города на 2002 год» 24.12.2003 Постановления «О Программе социально-экономического развития города на 2003 год» 25.03.2003 Постановление «О внесении изменений в Программу социально-экономического развития города на 2003 год» 27.05.2003 Постановление «О выполнении Программы социально-экономического развития города за 1й квартал 2003 года» 18.09.2003 Постановление «О внесении изменений в Программу социально-экономического развития города на 2003 год» 18.09.2003 Постановление «О выполнении Программы социально-экономического развития города за 9 месяцев 2003 года» 24.02.2004 Постановление «О внесении изменений в Программу социально-экономического развития города на 2003 год 28.12.2004 Постановления «О Программе социально-экономического развития города за 9 месяцев 2004 года» Постановления «О Программе социально-экономического развития города за 9 месяцев 2004 года» 28.12.2004 Постановления «О Программе социально-экономического развития города на 2005 год»
Local self-government, functions of local legislative body – ***Gorodskaya Duma***	2002 2004	01.08.2002 Информация о ходе выполнения наказов избирателей в период выборной компании 2002 01.06.2004 Положение о порядке утверждения городской Думой должностных лиц городского самоуправления 29.06.2004 Постановление «О плане мероприяний по реализации Федерального закона от 06.10.2003 «Об общих принципах организации

		местного самоуправления в РФ» Ноябрь 2004 Устав г Череповца
Activities of *Gorodskaya Duma*, statistical data about residents' requests regarding performance of housing and utility companies in the city	1995-2002/2003/2004	Справка о результатах рассмотрения предложений и обращений граждан, поступивших в Городскую Думу (1995-2002) Справка о тематике обращений граждан, поступивших к депутатам Городской Думы (1995-2002) Справка об обращениях граждан, поступивших к секретарю городской Думы Справка о тематике обращений граждан, поступивших к секретарю Городской Думы (1 полугодие 2000 – 2002, 1 полугодие 2000 – 2003, 1 полугодие 2003-2004) Таблица об обращениях граждан, поступивших к депутатам Городской Думы (1995-2002) Таблица о тематике обращений граждан, поступивших к депутатам Городской Думы (1995-2002) Сравнительные данные о социальном составе заявителей, обратившихся в городскую Думу (1995-2002) График динамики обращений гаждан, поступивших в городскую Думу (1995-2002) Сравнительные данные о % отношении по устным и письменным обращениям граждан в городской Думе (1995-2002) Справка о приеме граждан депутатами Городской Думы (апрель, май, июнь, ноябрь, декабрь 2002) Справка о количестве приемов граждан, проведенных депутатами Городской Думы (2 полугодие 2002, 2002 в целом) Справка о тематике обращений граждан, поступивших к депутатам Городской Думы (1 полугодие 2002) Входящая документация к депутатам Городской Думы (1 полугодие 2002) Справка о приеме граждан депутатами Городской Думы (январь, март, май, июль-август, сентябрь 2003) 25.03.2003 Отчет о работе контрольной палаты городской Думы за 2002 год Справка о количестве приемов

		граждан, проведенных депутатами Городской Думы (1 полугодие 2003) Таблица о тематике обращений граждан, поступивших к депутатам Городской Думы (1 полугодие 2003) Информация о количестве, характере обращений граждан на личном приеме населения депутатами Городской Думы (1 полугодие 2003-2004) Информация об обращениях граждан к депутатам Городской Думы по содержанию вопросов (1 полугодие 2003-2004) Сравнительные данные о социальном составе заявителей, обратившихся в городскую Думу (1 полугодие 2003-2004) Справка о приеме граждан депутатами Городской Думы (январь, февраль, март, июнь-август, сентябрь, декабрь 2004) Справка о количестве приемов граждан, проведенных депутатами Городской Думы (1 полугодие 2004) Справка о тематике обращений граждан, поступивших к депутатам Городской Думы (1 полугодие 2004) Информация об освещении работы депутатов городской Думы в СМ (1 полугодие 2004) Информация о работе Городской Думы за 1 полугодие 2004 г. Справка о приеме граждан депутатами Городской Думы (январь, февраль 2005)
Development of cold and hot water networks in the city	2002 2003	28.05.2002 Положение о муниципальном контроле в области охраны окружающей среды на территоррии города 24.12.2002 Постановление «О выполнении целевых комплексных программ по обеспечению санитарно-эпидемиолонического благополучия населения города в 2002 году» 24.12.2002 Городская целевая программа «Социально-гигиенический мониторинг на 2003-2005 годы» 01.07.2003 Пояснительная записка к отчету об исполнении основных направлений расходования средств городского эколонического фонда в 2003 году

	2004	17.12.2003 Постановление «Об утверждении городской целевой программе «Экологическое образование и воспитание населения г.Череповца на 2004-2010 годы» 27.01.2004 Городская целевая программа «Развитие системы муниципального экологического мониторинга на 2004-206 годы» 27.10.2004 «О санитарно-эпидемиологической обстановке в г.Череповце» Пояснительная записка к отчету о реализации целевой программы Использование, восставноление и охрана водных объектов города на 2001-2005 гг.
Urban planning	2002 2003 2004	25.06.2002 Постановление Гордумы г Череповца №72 Городская целевая программа «Разработка стратегического плана города и внедрение системы стратегического управления города» 25.03.2003 Правила землепользования и застройки г.Череповца 27.05.2003 Правила благоустройства и содержания территории г Череповца Основные положения стратегии развития г Череповца до 2012 года «Череповец – город лидеров» 27.01.2004 Постановление «О внесении изменений в городскую целевую программу «Разработка стратегического плана города и внедрение систем стратегического управления города» 27.01.2004 Городская целевая программа «Геодезическая сеть гоорда» 27.01.2004 Городская целевая программа «Кадастр инженерных сетей» на 2004-2006 годы 02.2004 Изменения к Правилам благоустройства и содержания территории г Череповца 18.11.2004 Постановление №248/04-21 «О внесении изменений и дополнений в городскую целевую программу «Разработка стратегического плана города и внедрение систем

	2005	стратегического управления города» 07.12.2004 Городская целевая программа «Социальный мониторинг» на 2002 – 2006 г.г. 16.03.2005 Правила землепользования и застройки г.Череповца
Housing and utility sector in the city – technological policy, financial issues	2002	Целевая программа «Развитие ЖКХ г. Череповца на 2002-2010 (Ш этап)» 10.06.2002 №21-21/44 Информация по займу Мирового банка для депутатов Думы 19.06.2002 Постановление мэрии г Череповца №2142 «О подготовке ЖКХ к работе в осенне-зимний период 2002/2003 года» 25.06.2002 Постановление Гордумы №78 «Об устранении недостатков по актам ревизии финансово-хозяйственной деятельности МУП «Теплоэнергия» 27.06.2002 О Порядке предоставления коммунальных услуг по водоснабжению и водоотведению населению в индивидуальном жилищном фонде Проект договора на отпуск воды и прием сточных вод для владельцев индивидуальных жилых домов

	            2003 2004	13.08.2002 №325/01-09 Информация о готовности ЖКХ города Череповца к работе в осенне-зимний период 2002/2003 8.10.2002 О ходе выполнения целевой программы по развитию водопроводно-канал хозяйства города на 2000-2003 18.11.2002 Отчет №02-23/199 О ревизии финансово-хозяйственной деятельности МУП «Жилищное хозяйство «Комфорт» 28.01.2003 Постановление об акте ревизии финансово-хозяйственной деятельности МУП «Жилищное хозяйство «Комфорт» 27.05.2003 Постановление «О положении об учете и ведении реестра мунициавльного имущества г.Череповца» 04.02.2004 О квартирных водомерах 29.06.04 Поставноление Гордумы г Череповца №90 Городская целевая программа «Переселение граждан из ветхого и аварийного жилищного фонда» на 2004-2010 годы
Tariff policy in housing and utility sector in the city	2002 2004	12.04.2002 Об изменении платы за водоснабжение и водоотведение 14.01.2004 Постановление «Об изменении платы за жилищно-коммунальные услуги» 10.12.2004 Постановление Региональной энергетической комиссии Вологодской области №160 «О тарифе на тепловую энергию» 28.12.2004 Постановление Гордумы г Череповца №184 «О порядке расходоания средств, собранных в виде платы за наем жилых помещений в муниципальном жилищном фонде»

IV. Statistical and archival data, Cherepovets

<u>Cherepovets Local Archives</u> (*titles are in Russian*):

1. Общая характеристика г. Череповца за 1947. Год – 1947 (Фонд 697 Отдел коммунального хозяйства, Архивная опись №2 за 1927-1930, 1933, 1936-1966 гг. Дело 31).

<u>Contents</u>*: Data about the number, ownership and construction type of residential buildings in 1947; number of buildings with running cold and cold water, central heating in 1947.*

2. Сведения о ЖКХ за 1955 в сравнении с 1940, 1950 гг. Годы – 1940-1955 (Фонд 697 Отдел коммунального хозяйства, Архивная опись №2 за 1927-1930, 1933, 1936-1966 гг. Дело 156).

<u>Contents</u>*: Data about the number, ownership and construction type of residential buildings (1940, 1950, 1955); number of buildings with running cold and cold water, central heating (1940, 1950, 1955).*

3. Переписка с государственной штатной комиссией. Характеристики коммунальных предприятий. Годы – 23.11.1946; 27.12.1947 (Фонд 697 Отдел коммунального хозяйства, Архивная опись №2 за 1927-1930, 1933, 1936-1966 гг. Дело 28).

<u>Contents</u>*: Description of specifics of water supply system in the city in 1946-47.*

4. Протоколы заседаний бюро экспертизы Министерства коммунального хозяйства, горисполкома, секции водопровода по вопросам водоснабжения г. Череповца. Годы – 29.08.1952, 13.11.1954 (Фонд 697 Отдел коммунального хозяйства, Архивная опись №2 за 1927-1930, 1933, 1936-1966 гг. Дело 95).

<u>Contents</u>*: Description of specifics of water supply system in the city in 1952-54.*

<u>Cherepovets Local Statistical Committee</u> (*titles are in Russian*):

1. Основные показатели развития хозяйства и культуры. Центральное статистическое управление РСФСР (handwritten).

<u>Contents</u>*: Data about the number and ownership of residential buildings (1965-1967, 1974); number of buildings with running cold and cold water, central heating (1959, 1961-1976). Construction of new residential buildings (1965-1975). Development of utility companies (1960-1975). Local budget data (1960-1976).*

2. Паспорт города Череповца, ноябрь 1977 (handwritten).

<u>Contents</u>*: Data about population in 1977.*

3. Социально-экономический паспорт города, 1970-1990 гг. Череповец. Центральное статистическое управление СССР (handwritten).

<u>Contents</u>*: Data about population (1970, 1975, 1977-1991); Data about the number and ownership of residential buildings (1970, 1975-1990); number of buildings with*

running cold and cold water, central heating (1970, 1975-1990). Construction of new residential buildings (1976-1991). Local budget data (1976-1990).

4. Паспорт города Череповца, 1990-2003 гг.

Contents: Data about population (1990-2004); Data about the number and ownership of residential buildings (1993- 2003); number of buildings with running cold and cold water, central heating (1993-2003). Construction of new residential buildings (1990-2003).

5. Паспорт социально-экономического развития г. Череповца за 2003 г. Федеральная служба государственной статистики. Москва, 2004.

Contents: Data about population (2002-2003); Data about the number and ownership of residential buildings (2003); number of buildings with running cold and cold water, central heating (2003). Construction of new residential buildings (2003). The volume of investments in housing and utility sector (2003).

6. Сведения о жилом фонде за 2004 г., ГП ВО «Череповецтехинветаризация», Федеральное государственное статистическое наблюдение. 21 февраля 2005.

Contents: Data about the number and ownership of residential buildings (2004); number of buildings with running cold and cold water, central heating (2004).

7. Муниципальные образования Вологодской области, 1991-2000. Официальный статистический сборник. Госкомстат России, Вологодский областной комитет государственной статистики. Вологда, сентябрь 2001.

Contents: Data about the number and ownership of residential buildings in Vologda region (1991-2000); number of buildings with running cold and cold water, central heating in Vologda region (1991-2000). Heating sector – the number of boiler-houses and volume of heat production in region (1995-2000).

8. Статистический ежегодник Вологодской области, 1995-2001. Госкомстат России, Вологодский областной комитет государственной статистики. Вологда, 2002.

Contents: Data about the number and ownership of residential buildings n Vologda region (1995-2001); number of buildings with running cold and cold water, central heating in Vologda region (1995-2001). Heating sector – the number of boiler-houses and volume of heat production in region (2001).

9. Муниципальные образования Вологодской области, Социально-экономические показатели, 1995-2002. Официальный статистический сборник, Т.2. Госкомстат России, Вологодский областной комитет государственной статистики. Вологда, 2003.

Contents: Data about the number and ownership of residential buildings n Vologda region (1995, 2002.1); number of buildings with running cold and cold water, central heating in Vologda region (1995-2002). Heating sector – the number of boiler-houses and volume of heat production in region (2002). Regional budget data (1995, 2002).

10. О положении в экономике и социальной сфере Вологодской области в январе-декабре 2003. Госкомстат России, Вологодский областной комитет государственной статистики. Вологда, 2004.

Contents: Data about population in Vologda region (2003).