

Energy Efficiency and Social Organization in the Russian Part of the Barents Region

Research Plan — Proposal

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Introduction

The project is focussed on the efficiency of energy use in north-western Russia, specifically the Kola Peninsula. Comparisons will be made with other areas close by in the Barents Region. The focus of the study has been chosen on the basis of an on-going pilot study, implying that the issues presented below might be further elaborated before the project starts.

The decisive reason for the choice to study Russian energy use is the fact that this is an issue where the connection between the environment and the economy becomes especially pertinent. Energy use, which directly and indirectly causes severe environmental problems, is possible to affect through economic policy measures. Consequently, to identify and assess the effects of such measures is an urgent task.

Energy Use and Environmental Degradation in Russia

The Russian energy sector is notoriously inefficient. Energy waste is gigantic and the most powerfully contributing cause of Russia's in many respects catastrophic environmental situation (Sinyak, 1991). The inefficient use of energy is reflected in an internationally extremely high energy intensity in production. This is one of the main reasons for the serious air pollution. By the mid 1980s, the Soviet Union used approx. 2–3 times more energy per dollar GDP than e.g. Japan and the FRG (French, 1990). While waste of certain minerals (aluminium and copper) decreased compared with the OECD countries during the latter part of the 1980s, waste remained on a high level for lead, zinc, nickel and energy (Radetzki, 1994).

A contributing cause of this energy waste might be the fact that the USSR/Russia has huge energy reserves. Under central planning, therefore, it was never any question of the efficiency of energy use. According to estimates published by the

CIA, at the beginning of the 1990s the Soviet Union had 38 per cent of world reserves of natural gas, the country produced more oil and gas than any other country in the world and it was the third biggest producer of coal in the world after the USA and China (Feshbach and Freindly, 1992).

Many studies show that the savings potential in Russian energy demand is huge. Some scientists estimate that as much as 50 per cent of current energy demand (or a third of the “hypothetical” energy demand in 2010) might be conserved partly by “technological transfer” from the west, partly by the abolition of the old planning mechanism and partly through the introduction of market relations into the Russian economy (Sinyak, 1991 and 1993).

The north-western parts of Russia is richly endowed with energy resources. Particularly, in the Komi republic there are huge coal, gas and oil deposits. The gigantic state monopolies responsible for the exploitation of these energy resources have now been privatised (Sagers, 1993). This constitutes an institutional change that might affect the efficiency of energy production in the long term. During the last few years the Russian coal, gas and oil production has decreased significantly due to a reduced demand caused by the economic crisis and due to the fact that the industry has not been able to make necessary investments. The huge gas reserves discovered in the Barents and the Kara Seas are of national interest for the future energy supply and for generating hard currency incomes from export. The most well-known reserve is the Shtokmanovskoe field, which may come to play an important role for regional energy supply in the nearest future (Castberg, 1992).

There are also substantial energy users on the Kola Peninsula (e.g. the nickel smelting plants in Monchegorsk and Nikel and the aluminium smelting plant in Kandalaksha) and tremendous environmental problems which are clearly related to industrial energy use. Also the waste from military and civilian nuclear power plants constitutes a serious environmental problem on the Kola Peninsula.

Considering the current wasteful energy use in the Russian economy we can conclude that the regional environmental situation would probably be considerably affected by a decreased energy demand.

Technological Relations and Political Directives in the Energy Sector

Without going into the specific details of the energy sector we find that this is an industry which is special in as much as it by converting various energy resources (water, wood, coal, oil, uranium, sun, wind) produces energy (electricity, gasoline, heat) that is used in the production (and often also in the consumption) of more or less all goods and services in the economy. Furthermore, every step in

the transformation process – the excavation of the natural resource, the energy conversion process and the final energy use – causes a stress on the environment. It should, however, be noted that this stress varies, both qualitatively and quantitatively, depending on which natural resource that is used in the production of the energy carrier, which conversion process that is used to produce the energy, and the way the goods and services, which are the end result of the production process, are consumed.

Already this short description of the interdependencies in the energy sector implies a big and complicated (strongly interdependent) system with many different inputs, many different intermediary processes and many different outputs, the greater part of which are substitutes. Every distribution of energy resources going into this system, every choice of intermediary process and every distribution of energy going out to different users might produce drastically different total effects on environmental hazards and economic efficiency (Wene, 1989). All distributions and choices in the system are, furthermore, possible to influence by human decisions. When you consider the fact that the choice of “energy carrier”, the very process of conversion as well as the end use of the energy entail different kinds of consequences both for the environment and the economy, consequences that are often hard or impossible to assess in an unambiguous way (Wene, 1989), you immediately realize that the energy system is a genuinely *complex system* which does not lend itself to analysis or control in any simple way. Most of the energy resources require substantial infrastructural investments both to enable conversion to energy carriers and to enable consumption. This has led to a situation everywhere in the world where the energy sector is subject to far-reaching state regulations. In this respect production prerequisites do not differ much between market economies and centrally planned systems.

The fundamental technological and social prerequisites for energy conversion are similar in a market economy and a centrally planned economy. This also makes it both possible, interesting and meaningful to compare and try to explain the differences that actually exist between the efficiency and environmental consequences of the energy sector in a Scandinavian type of market economy and in a centrally planned economy of the type represented by the Soviet Union. The point of departure is the fact that the energy sector in the market economy is so much more efficient than the corresponding sector in the centrally planned economy, despite that fact that the sector is under heavy state control in both systems.

A basic task in the project will be:

to identify and study the institutional arrangements that affect energy efficiency under the transition to a market economy. This will be done on the basis of the situation existing in north-west Russia – especially on the Kola Peninsula.

An Institutional Approach

In his book “Institutions, Institutional Change and Economic Performance” (1990) Douglass C. North discusses the significance of institutions for the function of the economy and for social development in general. North's hypothesis is that modern, successful, economically efficient societies are those where the institutions contribute to making transaction costs low. With “institutions” North means “constraints” on the behaviour of organisations and individuals. Such constraints are sets of rules (laws and regulations), authorities, educational systems etc. (“formal constraints” in North's terminology) as well as “habits and customs” in a wide sense (“informal constraints”). Organisations or individuals who want to exchange products in the market will meet “transaction costs”. These are costs that are connected to the very exchange, costs (in the form of time and money) that are required to make the parties to the exchange feel sure that the exchange can be made in a way – and with a result – that they expected. In societies with well developed institutions transaction costs are comparatively low.

North's hypothesis is that the “institutional set” of a society determines if there can be a positive development (economic growth). The set of institutions changes only gradually and slowly. (Not even revolutions will change the institutions of a society as drastically as is one might believe.) North also maintains that the development is often “locked” in a certain direction depending on the existing set of institutions (so-called “path dependent development”). Here North refers to the theory of non-cooperative games, where an important result is that there might exist multiple equilibria. Therefore, it is not evident that the institutions that are developed in a certain situation will be in some sense the most efficient.

The task that was stated above becomes interesting since Russia and other areas not long ago belonging to the Soviet Union are now being transformed into market economies. The problem is that they have “inherited” a social machinery and an economic structure that was formed during more than 70 years of Soviet economic planning and that such a system is not easy to transform. Inheriting the “old” system also meant inheriting its inefficiency (Såtre Åhlander, 1993). However, by penetrating the task set out above, it may be possible to indicate ways to make the Russian energy sector more efficient and, consequently, less harmful to the environment.

Specification of the Basic Task

The task stated above requires further elaboration to make it accessible to analysis. The approach is *systems comparative*, but the main effort must be devoted to explaining the existing situation in the (former) centrally planned economy, i.e. Russia.

In order to solve the main task concerning what institutional changes must be made in Russia in order to make energy use more efficient and less environmentally degrading, information/knowledge is required about a number of issues, such as:

- a) What are the goals of the Russian energy policy? By what means are these goals to be achieved?
- b) What does the Russian energy system look like? What is the size of the Russian energy reserves, what are the most important energy carriers, how is energy conversion achieved (the most important energy techniques and their efficiency)? What does energy demand look like in the national compared to the regional perspective, for different energy carriers and for different end uses?
- c) Why is the energy efficiency in the Russian economy so low? Why are conversion losses so great and energy intensity so high in many sectors of the Russian economy compared with the situation in the West? What is the size of this energy waste? How big is the energy savings potential in the Russian economy (under different conditions)?
- d) What would be the environmental consequences of various feasible energy conservation policies and how could such policies be implemented?

The study is focussed on energy use and its determining factors in the Russian part of the Barents Region. The situation on the Kola Peninsula is of special interest. The assumption that is going to be tested is whether, and to what extent, energy use is dependent upon, and can be affected by, different institutional conditions. Consequently, items c) and d) above are of central interest in the project.

The study relates to a recently published dissertation (1993) by Ann-Mari Sätre Åhlander at the University of Stockholm. Sätre Åhlander describes the environmental degradation in the Soviet Union and offers an explanation to the fact that different Soviet environmental programmes have been inefficient and why there is such a wide-spread misuse of natural resources. The author has also specifically looked at the environmental situation in the forestry sector. The conclusion is that it was the Soviet system of central planning with its specific institutional and incentive structures that made it impossible to efficiently cope with Soviet environmental problems.

The purpose of the current project is to analyse the situation in the “post Soviet” society — the emerging Russian market economy — in an environmentally important field (energy demand). It is essential to reach an understanding of the Russian development, since the on-going restructuring is extremely complicated, hazardous and unpredictable. Correct assessments of the development makes it

easier for us to adapt to actual changes and also to contribute to the implementation of measures leading to a positive economic and environmental development.

Project Organization and Time Plan

The project work is to be conducted within the framework of “The Barents Programme — The Umeå University Multidisciplinary Research Programme on the Barents Sea Region”. Project leader is Dr. Ulf Wiberg, head of the Centre for Regional Science (CERUM), where the work is going to be performed by Mr. Mats-Olov Olsson. Prof. Lars Hultkrantz at the Department of Economics and Prof. Jan Åke Dellenbrant at the Department of Political Science, Umeå University, are supervising the work. Dr. Torgny Mossing at the Department of Environment and Health, Umeå University, is the ecology consultant to the project.

Agreements about collaboration have been made with the Institute for Economic Problems (Prof. G.P. Luzin, Dr. N.G. Peshev) and with the Institute of Industrial Ecology Problems of the North (Prof. G.V. Kalabin), Kola Science Centre, the research centre of the Russian Academy of Sciences in the city of Apatity on the Kola Peninsula.

The project is planned to start on July 1, 1994 and proceed through 1995 and 1996. Funding is sought for a full time doctoral position (continued), for a part time research assistant at the Kola Science Centre and for various expenses.

The project will be continuously reported through the publication of articles in scientific journals and through a scientific dissertation.

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