

Box 5: ENERGY EFFICIENCY CENTERS

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Energy prices in Russia are generally very low compared to those in most other industrialized nations. Russia's lower energy costs are in part due to being a major energy producer, but also because the price of energy is still heavily subsidized in some cases. Local governments, for example, subsidize the district heating prices that town residents pay. This puts a heavy burden on municipal budgets. In nuclear cities such as Snezhinsk, municipal budgets now subsidize approximately 70% of the total cost of providing energy to citizens and businesses. Reducing energy use will save the cities money – money that could be redirected to improving citizen's lives and encouraging economic growth. Municipalities thus have a large incentive to attract investments for energy efficiency.

In 1992, the Pacific Northwest National Laboratory (PNNL) helped create the Moscow Center for Energy Efficiency (CENEf) to provide analyses to help target these investments. CENEf has assisted many local governments to adopt new building codes. It has also helped develop proposals for hundreds of millions of dollars worth of investments in improvements of the efficiency of existing heating systems including leveraging money available from World Bank loans and matching local financing.* CENEf and the 50 or so regional energy efficiency centers and funds that have sprung up since 1992 have also helped develop a market for energy-efficient appliances, equipment and services. Russian-made refrigerators are now more than twice as efficient as they were in 1993, no small achievement in a country experiencing economic crisis. Companies producing controls, meters, turbines and boilers are all trying to improve their products, and there are now numerous companies that provide energy efficiency services ranging from energy audits to assistance with

* The major World Bank programs are the \$400 million Enterprise Housing Divestiture Project, which aims at making apartment ownership affordable, and the Energy Efficiency Project and the District Heating Project, which are under development.

developing, financing and implementing projects.

In the summer of 2000, CENEf carried out energy-efficiency analyses in the nuclear cities of Seversk and Zheleznogorsk in connection with the US-Russian project to either replace or convert the three plutonium-production reactors that still operate to provide heat to populations of these cities. Its analyses identified significant errors in previous estimates of residential energy demand and identified major opportunities to save energy at a lower cost than that of replacement energy supply.** CENEf did not have time to conduct an instrumented audit or to test other potentially cost-effective energy efficiency improvements, however CENEf's results are very much in line with the results of more detailed energy audits in other cities. The revised demand projections and proposed energy efficiency measures could save the cities and governments involved hundreds of millions of dollars in avoided capital costs.

Energy Efficiency and the Nuclear Cities

Researchers and municipal leaders in Russia's nuclear cities are increasingly coming to the decision that energy efficiency is not only desirable but also necessary for their survival. Energy efficiency can help address many of the problems facing nuclear cities, including the needs for quality jobs, reduced energy costs, alternatives to the energy generated at plutonium production reactors, and better environmental protection.

The nuclear cities in Russia need to target economic areas that are not only growing, but are likely to provide sustainable jobs over the long term as they shift their economic focus. Energy efficiency is an expanding business in Russia: cities, companies and individuals are increasing their investments in efficiency because of rising energy costs and environmental concerns. Energy efficiency provides quality jobs and is

** *Assessment of End-Use District Heat Efficiency for Seversk; Assessment of End-Use District Heat Efficiency for Zheleznogorsk* (CENEf Reports for the W. Alton Jones Foundation, 2000).

job-intensive, creating a long-term demand for skilled employees.

The needs of the energy sector mesh well with the skills and capabilities found in the nuclear cities. Nuclear scientists pursue the same curricula as energy engineers until relatively late in their education. Physics, mathematics, thermodynamics, materials research and advanced computation are skills critical to both fields. As the nuclear scientists look for new work and sources of income to supplement their dwindling nuclear research budgets, energy efficiency holds out the promise of long-term opportunity in a meaningful field.

While the opportunities are likely more diverse than this short list, there are four areas in particular that hold promise for creating jobs in the nuclear cities relating to energy efficiency:

District Heating. Energy losses in many district-heating systems are staggering. Energy is generally not produced very efficiently at centralized boiler houses. It is then transported through pipelines that waste up to half of the energy through losses, warming the environment rather than people's homes. Finally, the heat reaches end consumers, who usually have no way to control it other than opening the window. Russian's numerous pre-fabricated apartment houses are notoriously inefficient. Nuclear city scientists and residents could contribute to this energy efficiency work by conducting technical assessments of district heating systems, designing upgrades, implementing changes, and monitoring the system to ensure long-lasting results.

Design and modeling. Modeling energy use in buildings allows construction and architectural companies to create more efficient buildings. Likewise, many industrial companies need more comprehensive energy modeling to understand where to save energy and money. Energy and emission modeling capabilities are also needed to help Russia comply with international treaties, such as the Framework Convention on Climate Change. Some Russian nuclear scientists have years of expertise in designing and running complex models to develop nuclear weapons. This expertise could be adapted to designing better models of energy use.

Likewise, nuclear scientists could improve product designs to increase energy efficiency. Such work would also place the nuclear city in a

strong position for fabricating and testing equipment prototypes, and could eventually help pave the way for new manufacturing facilities for energy-efficient equipment in or near the nuclear city.

Fuel Cell Research. Many energy companies and experts believe that fuel cells will be a major new energy technology in the 21st century. The Soviet Union was one of the world's leaders in fuel cell technologies and much of this expertise was in the nuclear cities as fuel cells were first developed for rockets and space vehicles. Russia has many innovative fuel cell technologies, but most are far from commercial viability. That said, Russian researchers have technologies for fuel cell components that are potentially much more cost-effective than their Western counterparts, particularly for certain membrane technologies and auxiliary equipment. Western investors might be willing to partner with Russian fuel cell experts to develop Russian technology in this field. The W. Alton Jones Foundation is currently funding research on developing partnerships and understanding the market for Russian fuel cells, as a first step in reinvigorating this industry in Russia.

Energy Efficiency Centers. Energy efficiency centers could promote energy efficiency in the nuclear cities and surrounding region by helping the cities design policies and incentives to promote energy efficiency; providing outreach to scientists and the community on opportunities for work related to energy efficiency, including district heating improvements; and linking scientists to Russian firms seeking modeling, design, or energy assessment expertise.

There are many reasons to promote and invest in energy efficiency in the nuclear cities, and energy efficiency can and does pay for itself because of the energy savings. Thus, energy efficiency can become an element of a sustainable solution for economic development in the nuclear cities.

Both NCI and a new smaller European Community funded Nuclear Cities Initiative therefore are considering funding the establishment of energy-efficiency centers in the nuclear cities.