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ENERGY EFFICIENCY IN THE RUSSIAN NORTH: Institutional challenges and sustainability

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Abstract

In this paper, we provide an overview of the recent trends and developments in the energy efficiency area in the building sector in the Russian northern territories. The increased building and construction activity in Russia is characterized as particularly energy-intensive, and the market for energy-efficiency technologies has great potential. We address energy efficiency as both an organizational activity and a component of a broader sustainability concept. In this context, we focus on institutional determinants influencing the energy efficiency technology market development. The emerging market faces even more complexities associated with uncertainties of the sustainable development idea. The paper seeks to make connections between key elements of the energy efficiency field and ideas of institutional and sustainability challenges. The paper should support and encourage business practitioners and investors in the High North building sector.

Keywords: *energy efficiency, building industry, Russia, sustainability, institutional challenges*

1 Introduction

Energy efficiency technologies are seen as a business opportunity by many countries nowadays. The importance of energy efficiency is directly linked to countries' energy resources potential and energy security. In a generic sense, energy efficiency is often defined as a ratio of the useful output of a process to the energy input of this process. This means maximizing energy capacity from existing resources, or using less energy to produce the same amount of services (Patterson, 1996). The later refers to the limiting energy consumption and is also labelled as energy sufficiency or conservation. Energy efficiency and conservation are considered to be key means of achieving countries' energy policy goals.

The use of energy in buildings accounts for a large share of the total end use of energy (IEA, 2008). Buildings are responsible for approximately 40% of the total world energy consumption. Therefore, energy efficient technologies has become a particular agenda for the building and construction sector. Buildings can be designed in such a way to reduce or optimize energy consumption.

Russia's economy is one of the most energy-intensive economies in the world (IEA, 2012). Its seven major areas of economic activity (agriculture, forestry, construction, manufacturing, transport and communication, retail and wholesale, hotel and catering and other activities) are ranked among the top 25 most energy intensive globally (World Bank Group, 2008).

Russian buildings are particularly energy intensive, due to their increasingly obsolete building stock, their inefficient design and the long heating season. A study of the International Energy Agency compares energy intensity in residential buildings across countries and concludes that the Russian residential buildings have about twice as high intensity compared to that of Norway and Sweden (World Bank Group, 2008). These findings are supported by the study of the Pacific Northwest National Laboratory which underlines that Russian residential buildings use twice as much energy to heat a square meter of space than Canada, a country with similar climatic conditions (Lychuk et al., 2012).

Russian North is a large area that represents almost 2/3 of the country and it includes Altai Republic, Republic of Buryatia, Karelia Republic, Komi Republic, Republic of Sakha (Yakutia), Tuva Republic, Zabaykalsky Krai, Kamchatsky Krai, Krasnoyarsky Krai, Permsky Krai, Primorsky Krai, Khabarovsk Krai, Amur region, Arkhangelsk region, Irkutsk region, Magadan region, Sakhalin region, Murmansk region, Tomsk region, Tyumen region, Chukotsky Autonomous okrug (The Federal Law of Russian Federation, 2004). The Northern areas are especially energy intensive. Cold climate in the North means cooler temperatures year-round and reduced daylight in winter and it inevitably increases energy consumption in buildings, in comparison to many other countries. Russian northern territories are often portrayed as less comfortable regions due to climate conditions, expensive life and lack of infrastructure. According to the Federal State Statistics Service (2014), however, the Russian North faces also an increase in the construction activity of residential buildings.

The increase in the building and construction activity is potentially promising for the involved businesses, including the suppliers of energy efficiency products, technologies and services. Nowadays the country's energy infrastructure is quite inefficient. Despite some new facilities, the major part is worn out. The Russian Government Program "Energy Savings and Energy Efficiency up to 2020" points out that more than 90 percent of the capacity of the active power stations, 83 percent of the residential buildings, 70 percent of the water boilers, 70 percent of the electric grid technologies and 66 percent of the district heating networks were constructed before 1990 (Government of the Russian Federation, 2010).

During recent years, Russia has experienced a significant legislative pressure to enhance energy efficient technologies. A similar trend is seen in other countries: the buildings' improved energy performance follows the introduction and strengthening of building codes (IEA 2008). Vaughan

and Turner (2013) also underline that enforced and strengthened building codes can stimulate savings for local economies and households, as well as reduce the need to build additional energy generation sources.

Achieving the same level of energy efficiency market development in Russian North still appears to be a challenge. This paper aims to explore recent developments in energy efficient technologies in the building and construction sector in Russia and key challenges that can influence the market development. Key determinants can bring more understanding of the conceptual approach of energy efficiency in this context and thus they can be helpful for business practitioners and investors in the High North building sector.

2 Theoretical framework and method

Companies operate in society, by adapting and developing their strategies in constant interaction with other actors and institutional environments. Research literature acknowledges the importance of contextual factors and institutional environment. An institutional perspective of organization theory postulates that companies operate within a social framework of norms and values. Energy efficiency can be addressed as an organizational activity within the market development. Institutional theory deals with the question of change through the process of interaction with its context and traditionally refers to Bergevarn et al. (1995) and DiMaggio and Powell (1983). From this perspective, new business activities appear as a result of interrelated processes at organizational level, between organizations and their context. This line of research allows the investigation of different institutional challenges, especially those coming from the context. The main elements of the contextual environment at these levels are institutional determinants for the market development. Formal legal pressures directly influence a market activity. Contextual environment might even have stronger influence than formal pressures. Local policy, cultural, information or language challenges may strongly contribute to the development of business activities.

Not only can institutional challenges influence the market development but the activity itself can also determine the development path. As IEA (2014) claims, it is evident now that energy efficiency has played, and continues to play, a large and valuable role in the sustainable development of the global economy. Energy efficiency can be addressed as a component of a broader concept of sustainability. Recently, an increasing interest in the 'sustainability' term in different kinds of literature has emerged. There are many interpretations of sustainability but the most often quoted definition of sustainability remains similar to the "sustainable development" concept given by the World Commission on Environment and Development (Brundtland et al., 1987). In their report "Our Common Future" the so-called Brundtland Commission defines: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland et al., 1987, p.43). In 1992 at the United Nations Conference on Environment and Development, the "Rio Declaration" presented the principles of sustainable development (UN, 1992). The emerged concept of sustainability focuses on achieving a balance between social, environmental and financial responsibilities and performance of organizations. This is

challenging because of the uncertainties brought by incorporating this idea into practice by organizations. Sustainability challenges should be integrated into rationality used for decision-making about energy efficient technologies activities.

This article is designed to follow these two conceptual lines. It aims to explore institutional determinants that influence energy efficient technologies market development in the Russian North. These are peculiarities of regulation and constraints of the context. The study analyzes institutional challenges in the context of Russian North and relies on secondary data analysis. The overview of the recent energy efficient technologies, products and services market in Russian North relies particularly on the results of the report "Energy Efficient Buildings in the Russian North: cross border trade facilitation" (Kazakov and Andreassen, 2014). This article proceeds then with a discussion on the challenges connected to the broader concept of sustainability. The knowledge of institutional and sustainability challenges can contribute to the success of business activities of this market.

3 The development of energy efficiency in Russian North

The period of Russian reforms during 1992-1998 and the financial crash in 1998 led to difficult economic times in Russia. The situation was caused by the budget deficit, growing state debts, inflation and increased poverty (Nekipelov, 1999). A slowdown in the economic growth and social wellbeing was experienced by all regions in Russia. The regions of the Russian North experienced a drastic change from the Soviet era system to market economy without having any economic capacity to cope with global markets (Rautio, 2013).

Starting from 2000 the Russian economy has been characterized as growing and stabilizing (Gavrilenkov et al., 2004), and from 2008 Russia has become again one of the largest economies in the world. However, this growth has not led to increased socio-economic well-being in the peripheral regions. As Rautio (2013) stresses, the regions of the Russian North are still struggling with numerous structural problems without solid regional policy measures provided by the state to cope with the challenges.

While 16 percent of the territory, with more than a half of the population, was characterized as ecologically dysfunctional, Russia had still the world's largest potential of natural ecosystems (8 million square kilometers) (The Decree of the President of Russian Federation №440, 01.04.1996). The growth of the Russian North was strongly linked to the potential of natural resources (Rautio, 2013). Northern territories were highly dependent on industrial capacity of mining, metallurgical, forestry and energy sectors.

Energy efficiency became a major economic area in order to secure the economic modernization of Russia. During President Medvedev's rule from 2008, the Russian economy aimed to create a diversified economy based on technology and innovation, decreasing the country's dependency on oil and gas revenues. Not surprisingly, energy efficiency was identified as one of the priorities for this modernization.

During that time, first discussions about improving energy efficiency were legalized, and the national policy on energy efficiency had begun its development on federal level. The Decree of

the President of Russian Federation (2008) intended to decrease the energy intensity of Russia's GDP by 40 percent by 2020. More specific provisions about energy efficiency of buildings and other structures have aimed at strengthening energy efficiency of the Russian economy through The Federal Law of Russian Federation (2009). The Russian Ministry of Energy has been given the responsibility for energy efficiency policy development in Russia, so the Ministry focuses on developing orders, decrees and other regulating documents, aiming at ensuring freer entrance to the electricity providers' network, the industry's modernization and increasing the attractiveness of the sector for investors. The Ministry works closely with other federal and regional bodies and influence the energy efficiency area.

At regional level, the field of energy efficiency is developed through regional laws and programs. All Northern Russian regions have developed advanced action plans to improve energy efficiency, taking under consideration the geographical and economic characteristics of the regions. The main objectives of such initiatives include creation of new energy sources in the regions, as well as reducing costs and improving the efficiency of energy consumption.

Apart from legal development, the market potential is supported by commercial pressures, such as the Fund for Capital Repairs of Apartment Buildings, stimulus for the Energy Service Companies concept development in Russia and opportunities for bidding via the Russian State Procurement System (Lychuk et al., 2012).

Federal and regional codes on energy efficiency in buildings has taken effect in Russia. The new generation of these codes was created to implement technical measures on design and operation of buildings with efficient use of energy (Matrosov, 2007).

4 Energy efficient technologies, products and services market in Russian North

As described by Matrosov (2007, p.124), "a fundamental transformation has taken place in the Russian building sector, toward the production, sale, and use of energy-efficient construction materials and products, and changes in building design methods". A market for energy services and products in Russia consists of hundreds of energy efficiency products and services, producers and suppliers, intermediaries, and millions of end users. Market conditions vary, reflecting different socio-economic conditions of regions. Besides, in the Russian North the key geographical factor is the cold climate and the long heating and lighting season. Eight energy efficient technologies, products and services segments are identified as they emerged in the northern territories of Russia (Kazakov and Andreassen, 2014):

1. Insulation of building envelope, which includes mineral wool, glass wool, expanded polystyrene foam extruded polystyrene. The insulation market is growing around 5-6% a year (Shavina, 2014; Kuzyakina, 2010).
2. Windows, that are divided into three segments: plastic (PVC), wooden and aluminum. The PVC windows account for more than 70 percent of the total market, aluminum framed windows accounted for 13% and wooden framed windows accounted for 11%. The number of glass factories has increased since 2013. This will increase production capacity and toughen the competition (Stroy-obozrenie, 2013).

3. Lighting products, which include incandescent lamps, compact and double-ended fluorescent lamps, halogen, LED lamps, and motion sensors. Energy efficiency lamps occupy about 40% of the market in Russia. The dominating segment is incandescent lamps, where Russian companies occupy almost 60 percent. The market for energy efficient lamps is growing and is more dependant on import (Lighting Business Consulting Agency, 2013).

4. Meters, that include power, gas and water counters. The main share of all types of meter production is held by Russian producers, while imports occupy 15-20% of gas and water meter production. The market is growing 20-30% per year (BusinesStat, 2012).

5. Renewable energy facilities that include bio fuel, hydro, geothermal, biomass, wind, tidal and solar energy sources. This segment is not well developed in Russia due to the low cost of traditional and locally available energy sources, inconsistent legal base, weak awareness of renewable energy questions and lack of state and private investment (Bächtold, 2012).

6. Energy Service Companies (ESCO). ESCO is an innovative concept in Russia which means performing a full range of work on implementation of energy-saving technologies. The Russian ESCO market has been developing slowly since The Federal Law of Russian Federation (2009) came into effect. The ESCO is attractive only when organizations or local governments have no budget allocated for implementation of energy efficiency measures (Semikashev and Kolpakov, 2014).

7. Energy efficiency houses (also called “Green Buildings”). This category describes modern buildings designed and constructed according to the BREEAM (Building Research Establishment Environmental Assessment Methodology) assessment and the LEED (Leadership in Energy & Environmental Design) rating system. It is not yet a strong market trend in Russia but the volume of green buildings is growing due to many large industrial projects, such as the 2014 Winter Olympic Games in Sochi, the Football World Cup etc. (JLL, 2014).

The first five segments are the key developments of the energy efficiency market in Russia. These segments have relatively low complex and costly manufacturing technology. They are widely produced and well tested by Russian users. Local producers and developers have gained experience in producing these technologies and products. The segments’ market is characterized by high competition and high entry barriers. Renewable energy, energy service companies and green buildings are the least developed segments in Russia. In the northern regions of Russia, they do not occupy any substantial share of the energy efficiency market.

The overall energy efficiency market in Russia and, particularly, in Russian North, is still under development. However, there are studies that believe that the commercial potential is high, especially for small and medium sized businesses (World Bank Group, 2008; Kazakov and Andreassen, 2014). The niches of renewable energy, energy service companies and green buildings are promising. Relevant up to date knowledge about institutional challenges can support and encourage the market development.

5 Institutional challenges in Russian North

Economic and structural problems of Russian North described in section 3 as well as other institutional challenges impede the improvement in the field of energy efficiency. The most crucial challenges can be grouped as follows.

5.1 Economic challenges

Russian reforms during 1992-1998 did not improve the economic situation. Instead it resulted into depletion of natural resources, criminalization of economy, speculation in the capital market, wage-cutting, increase in the population poverty rate (Koptug et al., 2000). Difficult economic times generated lack of transparency and high regulatory burden. This resulted into uneven implementation of commercial law, and weak interdepartmental coordination (Lychuk et al., 2012).

Economic challenges of Russia influenced chronically weak management and coordination of energy efficiency projects. In particular, partnerships between involved state bodies, between state and private actors and even among private entities are challenging (Gusev, 2013).

The historically available and affordable energy in a resource-based Russia economy contributed a lot to the stabilizing period. The constantly low prices result in a lack of incentives for businesses and users to implement energy saving measures (Gusev, 2013; Bächtold, 2012).

5.2 Structural challenges

While Russian economy is growing, the Russian North is not experiencing significant socio-economic well-being (Rautio, 2013). Even though the legislative basis for energy efficient technologies is developed at federal level, there is a lack of appropriate regional regulations and necessary technical requirements on energy-efficiency standards and labels in house building (Gusev, 2013; Evans et al., 2012; Matrosov, 2007).

5.3 Financial challenges

Northern regions in Russia are struggling with the lack of long-term funding. The limited availability of long-term loans and high interest rates creates difficulties for residential multi-apartment buildings' cooperatives to raise funds for modernization (Gusev, 2013)

Public buildings and other entities, financed by state budget, may have poor credit ratings and transparency, hence limited ability to attract new funds. (Evans et al., 2012)

5.4 Information challenges

Information problems are often raised in literature in the field of energy efficiency. Lack of information and asymmetric information are often given as reasons why consumers systematically underinvest in energy efficiency (i.g., Sanstad and Howarth, 1994). There is a lack of information dissemination, awareness and capacity-enhancement in relation to energy efficiency technologies and products in Russia (Bächtold, 2012; World Bank Group, 2008).

Information problems also influence the lack of modern technologies and slowdown the local development (Bächtold, 2012; World Bank Group, 2008). For instance, there is a lack of structured information especially about energy efficiency in the building sector, and much of the discovered data require verification and translation from the Russian language (Kazakov and Andreassen, 2014).

Lack of professionals makes the technological gap bigger. Besides, administration system in housing, communal and construction segments is inefficient and complicated, especially when it comes to procedures for monitoring the use of energy efficient materials and technologies. Relatively few energy auditors can assist in controlling and assessing benefits from implemented energy efficiency technologies (Gusev, 2013; Lychuk et al., 2012).

6 Sustainability challenges

The terminology for the concept of ‘sustainable development’ in Russia is generally considered to have first appeared after the 1992 Rio Declaration (Koptuyug et al., 2000). Sustainable development was described according to the principles defined by UN as a balanced development in all respects, which are: environmental performance, societal responsibility, and economic contribution. The importance of introducing the principles of sustainable development was recognized by the Russian government. In 1994 a Presidential Decree regarding state strategy on environmental protection and sustainable development was issued (The Decree of the President of Russian Federation №236, 04.02.1994). Later, in 1996 a Presidential Decree underlined the necessity of introducing the sustainable development concept (The Decree of the President of Russian Federation №440, 01.04.1996), although, at that time Russian economy was characterized as unsustainable. The reductions in state ownership led to the lack of governmental support in social programmes in education, research, health and culture (Kozlova et al., 1999). As Kuznetsov et al. (2009) conclude, the period generated a lack of mutual trust between people, businesses and authorities.

Another challenge comes from the sustainability idea framework. Implementing sustainability-related activity is fundamentally different from implementing other organizational activities. Epstein and Buhovac (2014) point out that sustainability goal differs from the traditional goal objective of maximizing economic growth. While achieving excellence in social, environmental, economic, and financial performance, the link to profit, even in the long term, is unclear. Typically, for an organization this means uncertainties in terms of short-term competition for resources and long-term benefits.

7 Discussion and conclusion

The appeared legislative and regulative basis serves as driver for the market of energy efficiency. Federal and regional laws as well as building codes can influence implementation costs, dissemination of information, basic technical infrastructure etc. Despite the development of the legislative framework many serious challenges in the Russian North influence the field of energy efficiency in building sector.

The procedure of implementation of laws in Russia goes from federal to regional level. That means that key terms of energy efficiency and energy savings are formulated in new federal laws, which also elaborate mandatory activities for achieving certain goals. After that, the governmental decisions are distributed to the regions with mandatory requirement to fulfill the goals. On this long way, the system encounters problems of technical regulation. To overcome these structural challenges it is important to develop solid regional measures to cope with federal requirements.

Considerably different levels of socio-economic development between northern Russian regions and the rest of the country calls for financial support from the government. In the current situation of local budgets deficit, resources competition is usually won by initiatives called to keep social and economic stability in the regions, rather than new industrial projects. Energy efficiency products and services have high production and installation costs. Local governments do not prioritize them because of economic and financial problems. Thus, in the Russian North the role of the government in forming and stimulating new initiatives, such as energy efficiency field development is crucial.

Public policies to promote energy efficiency must be constantly scrutinized for their continuing appropriateness in view of technological advances and the emergence of new market institutions (Golove and Eto, 1996). This seems to be still relevant for the market in the Russian North. Overcoming the information challenges can bring new investments and thus reduce financial problems.

The slow development of the energy efficiency term is, perhaps not surprisingly, similar to the slow dissemination of a broader sustainability idea in Russia. Sustainability questions have been coming up in the agenda of federal authorities in Russia in these difficult economic times. The underlined importance of a sustainable and socially responsible development in the country and governmental calls for implementing the concept of sustainable development to Russian companies. This however, did not lead to any changes in corporation policies (Andreassen, 2013). Energy efficiency was identified as one of the priorities for modernization under Dmitry Medvedev's presidency from 2008 to 2012. This vision was however often criticized by putting forward doubts about the potential of scientific innovation and about the possibility of making the policy real (Eke, 2009).

The introduction of energy efficient technologies and products has not experienced any big growth in the market. Energy efficiency technologies can be far too expensive to install and even to use and might be quickly labeled as being unsustainable. It seems that for energy efficiency, the goal of achieving excellent balance in social, environmental, economic, and financial performance is also relevant. The sustainability idea is challenging organizations to fit this kind of activities in traditional capital budgeting format, to allocate resources and make a choice between sustainability initiatives. Just as the sustainability idea, energy efficiency demands spending a lot in the short term without a guarantee for financial benefits even in the long term. This can be relevant both for users, construction companies and governments. On the other hand, non-financial benefits, like reputation, might be achieved.

To conclude, some difficulties experienced by the market of energy efficiency can be explained by institutional challenges connected to the context of the Russian North regions. However, they are also similar to the problems of incorporating sustainability idea by organizations. Just as for sustainability activities, one way to overcome these challenges can be to assess and integrate the risks and reputation-related impacts into decision-making.

8 Practical implication and recommendation

This article has discussed energy efficiency development in the building sector of the Russian North. Its market potential can be challenged by institutional determinants of the context and by problems similar to practicing of sustainability ideas. For business practitioners the knowledge about these challenges can contribute to successful market strategies oriented to overcome the problems.

It is also relevant to address the question of entering the Russian market. It is not expected to have any fundamental legal and regulative difficulties that may negatively influence the Russian market entry. Even more, Russian authorities (federal and regional) systematically announce preferences and create incentives for companies who register entities in Russia in order to work in Russia and contribute to the national economic development (Lychuk, 2012). However, the energy efficiency market, with advanced technologies, is a dynamically emerging market with structural and informational difficulties that are crucial especially for foreign newcomers. Thus, it is important to constantly evaluate and update the appropriate knowledge about energy efficient technologies and products while entering the market in the Russian North. One of the relevant advices to enter the Russian market given by Doornich (2014, p. 241) is to “...develop sustainable long-term trust - based relationships with few nodes in the market with which they can interact, exchange and receive information from regarding market conditions and opportunities”.

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