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Establishment of an energy-efficient technology cluster

Roadmap for sustainable spatial development for the City of Kostomuksha

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Report for WP3: Road map for sustainable spatial development

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1. Roadmap preparation technique

The Roadmap for sustainable spatial development of the project pilot areas was designed using the ABCD (ITOG (outcome) in Russian) strategic planning method.

The Roadmap preparation was based on backcasting, involving vision statement, assessment of the current situation, and development of actions to achieve the vision through interim goals. The planning horizon is quite extensive (until year 2050), which is a rare occasion in Russia. The method comprises the following consecutive steps:

1. A – awareness and visioning;
2. B – baseline mapping (current situation in pilot areas);
3. C – creative solutions;
4. D – deciding on priorities (choosing actions).

2. Roadmap objective and tasks

The objective is to identify the directivity and prepare the list of potential actions to achieve sustainable spatial development in pilot areas, and to establish the energy-efficient technology cluster.

Tasks:

1. Shape the long-term vision of the pilot areas;
2. Briefly describe the factors behind the current situation in the pilot areas;
3. Determine the directions for the local administration to move in to achieve the vision, and specify the priority actions;
4. To harmonize within one concept the environmental wellbeing, economic development and social justice in terms of spatial development.

3. Vision

A model of balanced spatial development based on harmonious interactions of man and nature, efficient utilization of local resources, high productivity and competitiveness of the economy, conservation and utilization of the cultural heritage, and social wellbeing of the local community has been realized in the pilot areas (City of Kostomuksha and Kalevalsky Municipal District) through implementation of the Roadmap.

Economy: The pilot areas effectively use the competitive advantages of their location at the border to develop and diversify local economy. Strong industrial and trade contacts with foreign partners stimulate SME development. Local products are in

demand in the domestic and foreign markets. These factors helped reduce the dependency of Kostomuksha on its economic mainstay – OAO Karelsky Okatysh. The enterprise itself operates using the most advanced resource-saving and environment-friendly technologies, best practices in corporate social responsibility. Investment projects relying on the potential available in the Kalevalsky District are implemented through cooperation between the municipalities.

The energy-efficient technology cluster comprising the developers, manufacturers and vendors of energy-saving technologies has been formed in Kostomuksha. The cluster is developing also through the cross-border partnership network.

Nature-based and rural tourism are developing in the City of Kostomuksha and Kalevalsky Municipal District; relevant infrastructure has been built.

Infrastructure: The energy and communal infrastructure in the pilot areas is a complex of advanced technologies making the economy and operation of social facilities more efficient. The energy infrastructure is a combination of the centralized and off-grid systems. A new boiler house working on biofuel was built in Kostomuksha to act as the main one. The boiler house of OAO Karelsky Okatysh is used at peak loads.

The private housing sector uses individual heating systems: modular boiler houses working on biofuel and heat pumps. Thus, the dependency on district heating is reduced and the spatial development of the municipality is promoted.

Modular boiler houses are used in villages of the Kalevalsky District. Cutting-edge energy-saving technologies are employed at social facilities in the pilot areas.

Settlement system: The spatial development of the pilot areas proceeds through expanded settlement within the City of Kostomuksha and in villages of the Kalevalsky District. New land allotments for construction of cottage estates and private houses are used to this end. These projects have been made possible by resolution of the institutional problems in land use, and application of stand-alone essential utility systems. Eco-communities have been built in former ethnic villages. The eco-communities are model areas for the introduction of latest resource-saving technologies, and act as recreational destinations for local people and tourists.

Environment and resource consumption: The negative human impact has been minimized by the application of advanced technologies. Actions directed at resource saving help more efficiently utilize local resources. The environmental situation in the area is good. Protected areas (Kostomukshsky Strict Nature Reserve and

Kalevalsky National Park) secure conservation of the ecosystem, facilitate development of eco-tourism, and promote the nature stewardship ethics.

Quality of life: The high quality of life in the local community is due to a comfortable living environment, good environmental situation, efficient utilization of the spatial potential of the pilot areas. Establishment of the energy-efficient technology cluster has driven business development, created high-performance jobs, boosting local incomes. Private housing construction based on 'smart home' technologies significantly improves the quality of life.

The sustainable spatial development concept can generally be represented as an interaction of three components: environment, economy, and social justice (Fig. 1). The spatial aspect is related to wise land use and balanced development of the settlement system.

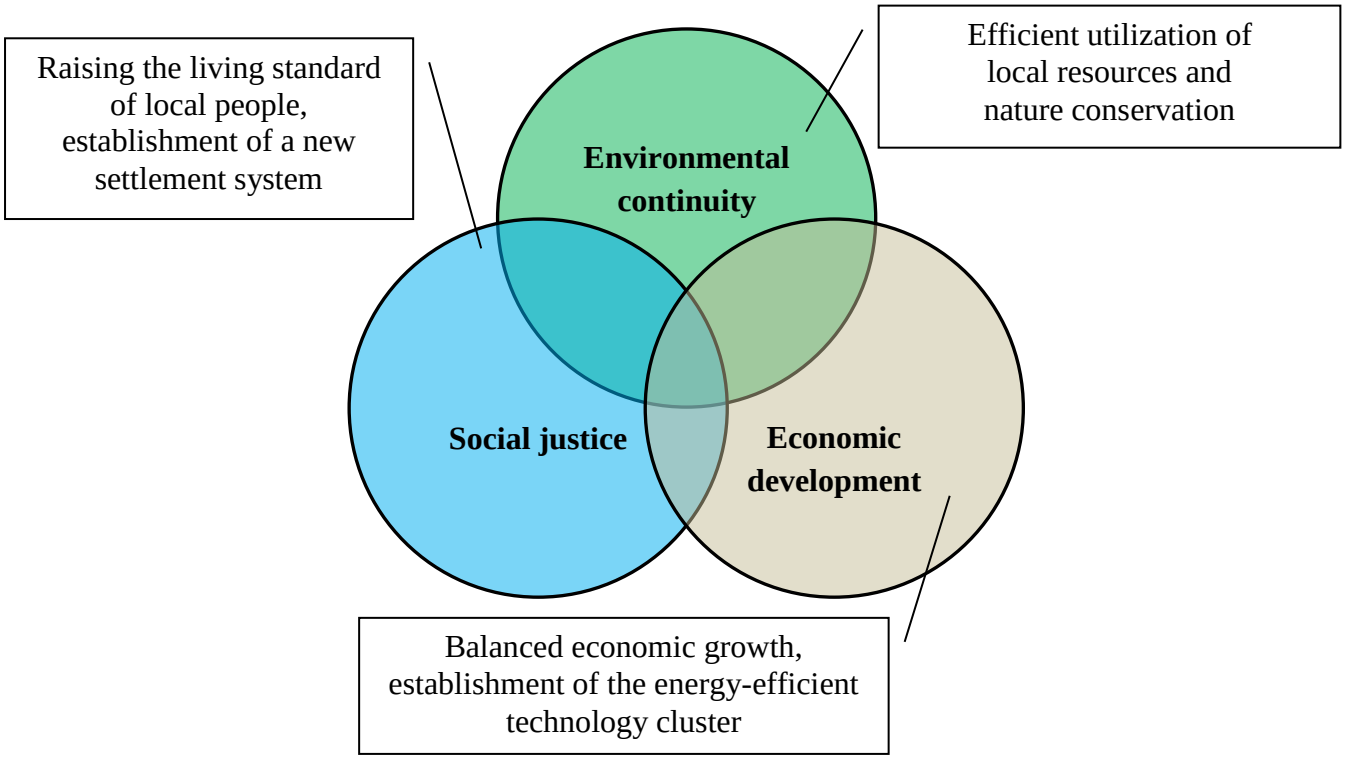

Fig. 1. Sustainable spatial development concept

The current situation in Kostomuksha, the limitations and opportunities for actualizing its spatial development potential are summarized in Table 1 in the form of the factors previously identified by experts from the Karelian Research Centre.

Tab. 1. Factors for spatial development of the City of Kostomuksha

Factors	Factor sign
Economy strictly specialized on resource use and a single industry (mining)	–
Peripheral, 'northern' location	–
Development historically connected with the border (in certain time periods much of the territory was out of economic use)	– / +
Distant from large economic centres	–
Distinctly industrial type of land use (distribution of the infrastructure, industrial facilities, public and housing facilities)	+ / –
Location at the border resulting in restrictions on economic use	–
Compact territory	+
Concentration of the tourism infrastructure within a limited area (City of Kostomuksha)	+ / –
Crucial role of the Kostomuksha mining company in the economy and the district	+
Quite high concentration and fairly high quality of manpower	+
High taxation potential	+
Strictly specialized economy with extremely slow diversification	–
Over ¾ of the district is protected areas (Kostomukshsky strict nature reserve) and state forest land, with corresponding substantial limitations on economic use	+ / –
High level of the energy and engineering infrastructure meant to serve the principal enterprise and auxiliary sector	+

Sustainable development scenarios for Kostomuksha and Kalevalsky District were prepared at the workshop at the University of Oulu on August 22nd, 2013. The provisional list of actions targeting at sustainable development of the pilot areas was discussed in Kostomuksha on December 10th, 2013.

Since the sustainable spatial development concept for the pilot areas builds upon the idea of establishing the energy-efficient technology cluster in Kostomuksha, let us consider the key elements of this cluster and the actions it takes to establish it (Fig. 2).

The first step is to substantiate the cluster approach to the promotion of energy-efficient technologies, and specify the premises for the establishment of such cluster in Kostomuksha.

Cluster is a geographic concentration of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions

(e.g. universities, standards agencies, trade associations) in a particular field that compete but also cooperate (M. Porter).

We believe it is the cluster approach that can generate the supply of energy-efficient technologies to the local market on the one hand, and ensure that these technologies are applied not only in the energy infrastructure and public utilities, but also in other sectors of the economy on the other.

In this sense, Kostomuksha can act as a model area for the Republic of Karelia and other northern regions of Russia. Once the mechanisms for establishing the energy-efficiency technology cluster have been elaborated and tried out there, one can apply them to other parts of the republic.

The **premises for the emergence of the energy-efficiency technology cluster** in Kostomuksha today are:

1. *Location at the border and actively developing international cooperation.* Location at the border will facilitate further establishment of the cross-border cluster with partners from foreign (primarily Finnish) research centres and providers of advanced technologies.
2. *Business development.* The city of Kostomuksha is currently a leader among Karelian municipalities as regards entrepreneurial activity. The development of enterprise and private initiative is a pre-requisite for establishment of the cluster.
3. *Modification of the settlement system.* Active development of the private housing sector creates demand for new technologies making the house as independent of centralized utilities as possible. This fact can stimulate the local market of such technologies.
4. *Growing prices of energy resources and public utility services.* The growing costs of housing and public utilities are a long-term trend, which motivates people to save energy.

Kostomuksha has lately been a platform for many resource-saving initiatives implemented within international projects. The project “Energy plan for the City of Kostomuksha” is implemented in cooperation with the Västerbotten County, Sweden. The energy plan is devised to reduce the city’s energy losses through upgrade of heat networks, street lighting, and reuse of excessive heat energy at the ore-dressing mill. The losses today are several times higher than from similar facilities in Sweden.

Preparations are underway for implementation of NEFCO-funded projects in energy, wastewater treatment, use of sludge and peat as biofuels jointly with Avec Group and Sweco companies. Kostomuksha takes part in Karelia ENPI CBC projects, some of

which imply investments, such as the project "Green Cities and Settlements: sustainable spatial development in border areas".

We also believe the following projects are essential for sustainable spatial development and establishment of the energy-efficient technology cluster:

1. "Improving the gravelroad Kostomuksha–Kalevala". The project is designed to improve the road quality by means of advanced dust-free technologies using geotextile and calcium chloride. The transport communication between the administrative centres of the pilot areas shall thus be enhanced.
2. "BIOKOS". The project implies installation of a biofuel-fed boiler house at the wastewater treatment plant.
3. "Ground heat". Within the project the school and Community Centre in the Village of Voknavolok will be transferred to geothermal heating.
4. "Development of cross-border biofuel infrastructure". The project aims to collect and analyse information about utilization of biofuel resources.
5. Some projects for eco-tourism development.

The growing demand for and supply of energy-efficient technologies is supposed to drive the emergence of the cluster. To this end, the potential for introduction of the technologies should be studied and their economic effect should be estimated. Measures should be taken to increase the number of entrepreneurs offering energy-efficient technologies. The areas of activity of the Kostomuksha City Administration towards establishment of the cluster are shown in Table 2.

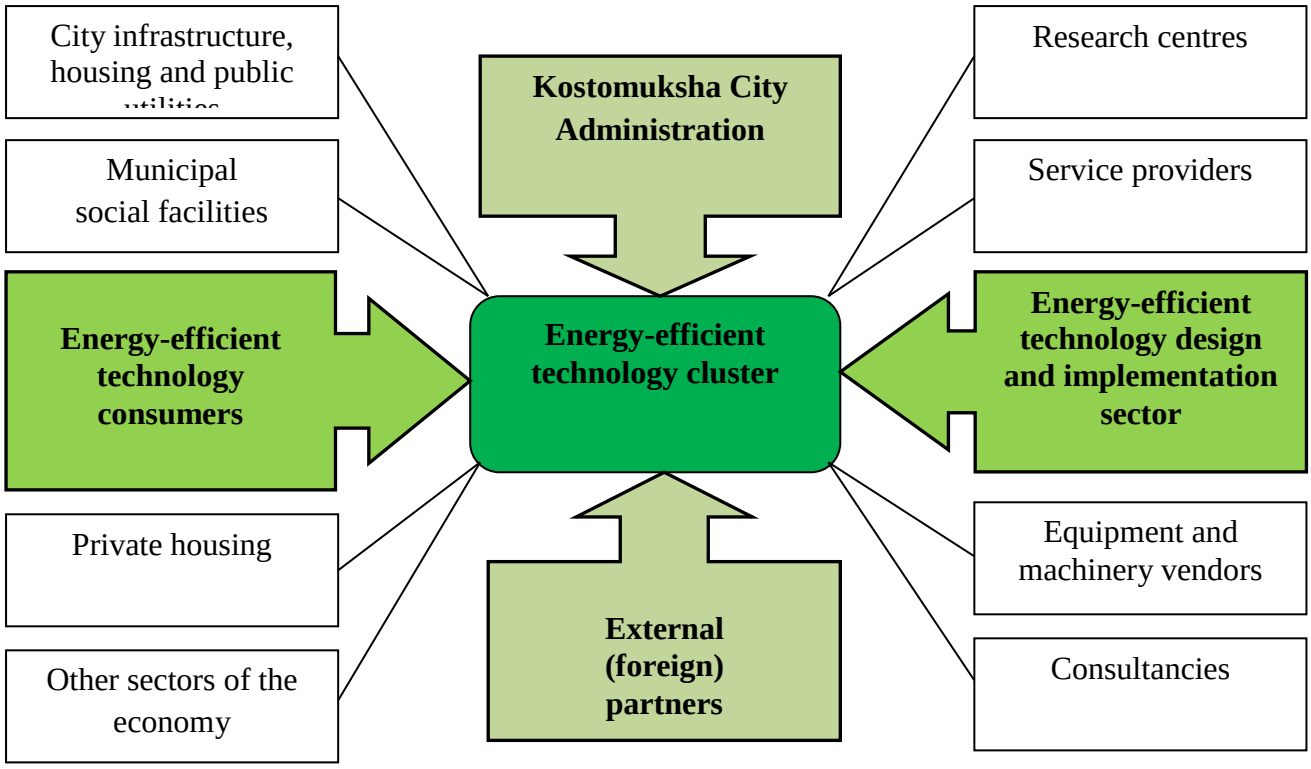

Fig. 2. Structure of the energy-efficient technology cluster

Table 2. Components of the city policy to establish the energy-efficient technology cluster in Kostomuksha

Component	Description
1. Investment policy	Drawing investments to the development of advanced energy infrastructure. Setting up the industrial park to host SMEs that design and implement energy-efficient technologies.
2. Urban planning policy	Generating favourable conditions for the development of private housing construction. Zoning of the territory. Introduction of latest know-how (smart technologies) in housing construction (‘smart home’ concept). Establishing demo construction sites for cutting-edge experience in energy-efficiency.
3. Business support	Including the “Energy-efficiency” nomination in the grant competition for business projects. Organizing seminars and workshops on energy-efficiency. Advisory services.
4. Education and training	Organizing training (incl. distant courses) in the energy industry, energy saving, application of modern energy-saving equipment.

5. Social policy	Energy audit of social facilities. Estimation of energy-saving capabilities. Enhancing the performance of social facilities through introduction of modern technologies (at least 30% of resources can be saved).
6. International cooperation	Cross-border networking for partners interested in implementing energy-efficient technologies. Participation in international programmes and projects on energy and sustainable development.
7. Strategic planning	Updating the Strategic Plan and municipal programmes to incorporate the cluster development considerations.
8. Place marketing	Positioning Kostomuksha externally as a contemporary energy-efficient community. Organizing the international conference and exhibition “Energy-efficient Town”. Participation in external events, and disseminating energy-efficiency success stories.