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The Cluster: A Mechanism for Developing the Centralized Heating System

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Abstract
"Science and technology cluster - a grouping of legal entities and natural persons established on the basis of a contract of association, concluded between accredited science and innovation organizations and/or accredited higher education institutions, other non-commercial organizations, on the one hand, and economic agents, local public administration authorities employers' associations or professional associations, natural persons, financial institutions, international organizations, domestic or foreign investors, on the other hand, for the purpose of carrying out scientific research, education and technological transfer of scientific results and innovations, their exploitation through economic activities'.

Keywords: Cluster, Heating System, ANRE

Introduction

The research solution is the formation of a cluster of specialists, connected to the district heating system of the Municipality of Bucharest, which can function as a cluster stintific. Thus, all the proposals regarding the district heating system of Bucharest (from decision makers, specialists, civil society, business environment) are inputs for the cluster, it analyzes and generates simulations on the economic, social and technical impact of all the proposed measures and generates measures for decision makers and for the operator of the district heating system.

The output of the cluster are the measures to be undertaken by the decision makers and the operator of the district heating system of the Municipality of Bucharest which are interconnected with other institutional mechanisms generating continuity and coherence throughout the life of the district heating system.

Thus, the way of organizing the district heating system at the level of the Municipality of Bucharest by granting a special mandate to the Thermoenergetic Intercommunal Development Association and setting up a regional operator to which the service delegation contract is directly assigned, obliges the Bucharest City Hall to set up an external mechanism for the energy transition from the current fragmented state of the system to an integrated approach with measures for outsourcing non-core activities and optimizing the networks.

The areas of approach of the cluster of specialists must encompass the entire complexity of the public service of heating of the population and generate actions for the following chapters of strategic interest:

1. Adequate local policy, oriented towards the development of the district heating system at the level of Bucharest Municipality and neighboring localities in collaboration with the regulatory environment (ANRE).

- Elaboration at the level of the Municipality of Bucharest of a methodology for financial support for the installation of energy sources through cogeneration, energy sources using renewable energy and for RDI (Research, Development, Innovation) in the field of population heating.
- Setting ambitious targets for the reduction of CO2 emissions in the Municipality of Bucharest and stimulating economic operators to achieve the objective
- Promotion at the level of the General Council of the Municipality of Bucharest of a coherent and stable political framework regarding the district heating system of the Municipality of Bucharest.

2. Focused and coherent local policy on urban planning including heat mapping.

- Long term integrated approach for urban planning and giving major importance to energy supply of new buildings as a factor for the development of the district heating system of the Municipality of Bucharest.

- Development of unitary and mixed zones on energy supply for heating of population. Studies on the relevance of mandatory connection to the district heating network for each new building in Bucharest Municipality.
- Alignment of interests / maturity of cooperation between decision makers, regional district heating operator and end users. Close to zero profit principle for the regional district heating operator in Bucharest Municipality, as it is owned by the municipality. The operator of the district heating system should be focused on the comfort of the citizens, not on profit generation.

3. Competitive prices for centralized district heating compared to alternative heating solutions.

- The centralized district heating system is not clean for Bucharest, it is only viable when it proves to be more cost-effective than the alternative heat supply option. Taxing the energy source (the Nordic countries variant) or the long term CBA approach (cost-benefit analysis) to assess the best heating option can generate a highly competitive district heating system.
- Increased taxes for dwellings heated with other sources, has been the key measure approved in other European capitals to promote energy efficiency and support the implementation of an environmentally friendly heating system for the population in congested areas.

4. "Empowering" the users of Bucharest's district heating system.

- The users must be at the heart of the business of the Municipal Company for centralized thermal energy supply. The company's main objective will be to increase the quality of the services provided and reduce prices, and Bucharest citizens must be directly or indirectly behind these decisions through price transparency, support in the decision-making process and acceptance of projects in the centralized district heating system. The need to develop at the level of Termoenergetica municipal commission a way of governance and social initiatives (citizens' empowerment, awareness raising on the benefits of efficient centralized district heating systems, etc).

5. City-level consumer surveys can also provide information on local perceptions, behaviors and potential barriers to the adoption of a home heating solution using district heating. Such surveys can help to improve understanding of heating behaviors and changes over time, as well as of the heating technologies used, and awareness levels of energy efficient heating practices. Surveys could also seek to assess the effectiveness of support schemes for the uptake of various heating and comfort solutions (if available), thereby supporting local authorities in the design and roll-out of subsidies, grants and other incentives.

Heating surveys are widely used by governments across Europe, including in the UK and Belgium, to inform wider heating policy development.

In Germany, a survey commissioned by the German Energy Agency (DENA) found that more than half of over 1000 people surveyed wanted to save energy on heating. The survey also collected information on citizens' heating behavior.

6. At the national level a clear definition of clean heat and what could be categorized as renewably generated heat should be generated, this would help policy makers allocate support and funding to the most efficient low emission technologies and provide more clarity to industry stakeholders and consumers to help their adoption. In addition, policymakers could further clarify how innovative solutions and equipment (e.g. heat pumps) contribute to renewable energy and the setting of electrification targets, including setting guidelines on how heating using fossil fuels and renewable energy sources is considered in relation to national energy and climate targets. The European Heat Pump Association (EHPA) is also aiming for heat pumps to be recognized as "sustainable" under the EU taxonomy, which would provide a signal to investors. The role of professional associations and experts in community utilities services (e.g. ANTEC) can promote standards and solutions for heating and cooling using clean energy and equipment that are recognized and can economically develop the labor market. Through the Heat Pump Ready Program (Heat Pump Ready Programme - GOV.UK (www.gov.uk)), the UK government has invested GBP 60 million (USD 76 million, CNY 546 million) to accelerate uptake and is also providing R&D tax breaks to support the development and demonstration of heat pumps at large scale. Such a model could be adapted and applied to industry to promote the development of more affordable and better-suited heat pump options.

7. Industrial waste heat recovery provides heat for district heating in HAMBURG. Waste heat recovery, e.g. from wastewater treatment systems, presents an opportunity to decarbonize thermal power plants. Heat pumps in this case have a key role and have been applied in the city of Hamburg, Germany, as part of the objectives to develop a fossil-free wastewater treatment system by 2025.

The project, a collaboration between Johnson Controls, Hamburg Water and Hamburg Energie, aims to avoid about 66,000 tons of CO2 per year by installing four 15 MW heat pumps. The heat pumps will extract heat from treated wastewater from Dradenau's sewage treatment plant, which processes around 450,000 m3 of wastewater every day, and feed it into the central district heating network. It is estimated that the project could help supply clean heat to around 39 000 homes.

HafenCity, a new district to be built in Hamburg by 2030, also aims to supply its district heating system with 100% waste heat from the nearby Aurubis copper smelter. The project is expected to supply 20 000 households with hot water and could save more than 20 000 tons of CO2 emissions annually.

8. Waste heat recycling in Bucharest Municipality

To facilitate increased recycling of waste heat in light industries and Bucharest's district heating it is necessary to identify and map potential waste heat recovery options that could be enhanced, such as by implementing demonstration projects and mapping available waste heat from industry, power plants,institutions, wastewater treatment, data. centers and other applications.

Identifying low quality waste heat can also highlight opportunities for utilization, such as through integration into district energy networks. Bucharest could introduce mandatory heat planning at the local level to capitalize on

opportunities for waste heat recovery in the future, as well as to prioritize waste heat in local district heating system supply planning. This could be supported by expanding financial support for waste heat recovery where heat pump recovery technology is applied and providing incentives for scaling up heat pump applications for waste heat recovery to further accelerate investment.

In 2020, the Korean government initiated a national heat map of all waste heat energy from power plants, incinerators, district heating, fuel cells and industrial sites to facilitate the utilization of waste heat and accelerate energy efficiency improvement and recycling of waste heat.

9. Equipment purchase versus Heat as a service

Market dynamics necessitate the encouragement of new business models for clean heating services to help customers, facilitate adoption of the concept, and reduce the long-term need for subsidy support.

New business models for home heating can help expand the district heating market with new offerings for consumers, such as property-linked financing. Thus, the centralized operator can contribute to the affordability of the dwelling to the environmentally friendly and clean district heating system. The innovative financing model includes heat as a service, where consumers pay for heat rather than for equipment and fuel, as well as for subscription models as opposed to purchasing heating equipment (central heating, etc.)

The government could investigate the viability of such approaches to support the development of a new market structure for clean heating services through the development of new operators of centralized systems. Schemes that aim to reduce upfront costs and provide a general package of services may be particularly useful in poorer rural areas, but also in residential areas where upfront costs may be a barrier. Such approaches could be particularly effective in addressing the affordability of higher cost technologies for district heating system development or individual technologies operated by the centralized service operator.

The operator of the centralized system needs to manage a flexible, cost-effective system capable of integrating thermal energy produced from renewable sources. Thus an integrated management approach is required, based on a diversified energy mix, consisting of cogeneration capacity, heat storage capacity and promotion of renewable energy sources.

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