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District heating – the role of EU investments

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This publication is the result of cooperation between the organisation Green Liberty and the international network organization CEE Bankwatch Network to analyse whether and to what extent European Union (EU) investments have brought Latvia closer to achieving EU and national energy and climate policy goals.

The full study in Latvian can be accessed here: https://www.zalabriviba.lv/wp-content/uploads/Centralizeta_siltumapgade_ES_investiciju_nozime.pdf



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The organisation Green Liberty aims to promote effective public participation in the decision-making, development and adoption of national and international legislation. Green Liberty has been educating and informing Latvian society for almost 25 years and represents the interests of society in various issues related to the environment, climate and energy. Green Liberty is part of international cooperation networks of environmental public organisations such as CEE Bankwatch Network, Climate Action Network Europe and the European Environmental Bureau.



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The main task of **CEE Bankwatch Network** is to prevent the ecologically and socially harmful effects of the finances of international development and to promote alternative solutions and public involvement. CEE Bankwatch Network brings together environmental non-governmental organisations from central and eastern Europe with the aim of redistributing European funds for the benefit of people and nature. In Latvia, CEE Bankwatch is represented by the organisation Green Liberty, which joins forces with other member organisations to promote the transition to a sustainable and fair energy sector.

To find out how you can get involved in promoting the transition to sustainable energy, follow us on social media and visit our websites: www.zalabriviba.lv and www.bankwatch.org.

If you are interested in cooperating and joining forces to participate in the working group of energy experts, contact us by writing to info@zalabriviba.lv.

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INTRODUCTION

When thinking about energy, the first thing that usually comes to mind is electricity; however, more than half (58%) of Latvia's primary energy consumption is used for heating. Heating is a basic need in Latvia, where the average heating season lasts 200 days. Not only are the type of system and boiler efficiency important for effective heat supply, but the energy source or fuel is also crucial. A country's heating system can play an important role in the well-being of its people and the health of its economy.

Yet heating can also have a significant impact on the environment. Heat generation makes a significant contribution to greenhouse gas emissions. Around one-fourth of total emissions in the world comes from the energy sector (including heat and electricity generation). Energy-related direct greenhouse gases are carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O), and the indirect greenhouse gasses are carbon monoxide (CO) and sulphur dioxide. These gases are mainly formed during the incineration process, but their leaks can cause additional damage.ⁱⁱ

Thus, it is important for countries like Latvia to find heating solutions that not only maximise the benefit for people, but which also have the smallest negative impact on the environment. Compared to increasingly popular individual gas boilers,

Latvia's district heating system (DHS), especially if it were renovated and capable of using local and renewable energy sources, could provide residents with the lowest-cost form of heat that would also benefit local economies and the environment.

Latvia's DHS benefits from centralisation, which guarantees a more efficient burning process that can help save money. DHS is able to provide the lowest production cost thanks to the maximum use of heat generating equipment and efficient use of resources; therefore, consumers may benefit from low tariffs. Several supervisory institutions monitor operations, emissions and consumption via smart meters. DHS is also the safest option for consumers, since it poses no direct risk of fire or explosion to their properties. An effective district heating system can control and reduce the environmental impact and raise the level of comfort of consumers.

However, the current system relies on combined heat and power (CHP) plants and modern boiler houses.¹ Although these have the

highest fuel efficiency, they rely on imported and environmentally harmful fuel sources: in 2018, 77.2% of the electricity and 58.5% of the heat generated by CHP plants were produced from firing natural gas.ⁱⁱⁱ Wood is Latvia's other main source of heat energy, and it is used even more now because of new biomass systems constructed through EU funds support programmes.

Natural gas is a problem not only from the perspective of the climate, but also because it leads to economic dependence.

The security of the heat supply could be improved by diversifying the types of fuel used to reduce dependency on one particular fuel.

One way to do this is by using local and renewable energy sources for generating heat, which would instead favour the local economy and reduce import dependency. Further updates to the DHS, such as modern incineration technologies, flue gas treatment units, recuperators, and flues of sufficient height to guarantee even dispersion and low concentration of harmful emissions could make this the most environment-friendly and cheapest option. In addition, individual metering would allow consumers to select the consumption level that suits their own needs. On the other hand, some of the drawbacks of DHS are heat distribution losses and distribution network maintenance costs. It is impossible to completely avoid these losses and costs, and they are included in the final price for consumers.^{iv}

Gas boilers for individual heating, which have recently become popular in Latvia, may seem like a rather low-cost and convenient option; however, the boiler service cost is often not taken into account, so the actual costs together with the boiler price are comparatively high. Boilers need regular service, and their efficiency can be impaired by poor use. In addition, gas is a fossil resource and produces methane emissions, which cause significant harm to the climate.

In 2018, district and local heat supply systems together produced 8,247 GWh of heat, 46.7% of which was generated from renewable energy sources, fully dominated by solid biomass or wood (93.5%). Since 2012, the proportion of renewable energy sources in district and local heat supply systems has grown almost three times, but the consumption of wood for individual heat supply (by households) reached almost 80% in 2018.^v However, the

¹ According to statistics, the proportion of heat generated by boiler houses and CHP plants in Latvia has changed considerably over the last 10 years. While in 2007, only 56% of the total heat generated was produced by CHP plants and 44% by boiler houses, by 2017 CHP plants accounted for 75.7%. Such changes can be explained by the introduction of the mandatory procurement component, which has resulted in bigger number of CHP plants producing energy. Accessed at <https://www.em.gov.lv/lv/siltumenergijas-razosana>

sustainability of biomass needs to be reconsidered in Latvia. So far, there are no clearly defined criteria for the sustainability of biomass. Recently there were discussions about the alleged radioactivity of woodchips coming from Belarus, but there is a lot more to consider, such as the distance the woodchips are transported.

Latvia's National Energy and Climate Plan (NECP) 2030² describes the country's energy- and climate-related targets³, including modern district heating systems which would make increasing **use of renewable energy sources**. It plans to make DHS more attractive by building new connections to district and local systems, installing new boilers, raising overall efficiency, putting low tariffs on heat and switching to renewable energy sources. The NECP also expects the introduction of district and individual cooling systems.

Latvia has also agreed to promote the use of renewable energy sources and improve energy efficiency in local and individual heat supply systems by replacing the old equipment, not only with wood-fired systems, but also with technology that generates low or zero emissions, like heat pumps, solar collectors and wind turbines. In addition, Latvia has prohibited the installation of new equipment that uses solid or liquid fossil fuels alone. The NECP also provides for actions that would allow for more efficient heating systems and use of technology and improvements to the heat market.

² Considering the European Green Deal and amendments to the EU Energy Efficiency Directive 2012/27/EU and the Renewable Energy Directive 2009/28/EC, changes will be made in 2021, including a proposal to raise the current targets in energy efficiency and increase the renewable energy sources proportion by 2030.

³ Latvia's target for the proportion of renewable energy sources in the total energy consumption is 45% – higher than the EU target, which aims for 32%. The target in the heating sector is 0.55% of total heat supply.

ANALYSIS OF DISTRICT HEATING PROGRAMMES IMPLEMENTED IN LATVIA WITH EU SUPPORT

Over the last 20 years, Latvia has managed to move from a very inefficient district heating system with big losses in distribution networks and inefficient burning of fuel to a comparatively qualitative and efficient system which uses increasingly less fossil fuel-based energy.

EU funds' investments have helped finance the reconstruction of heating networks and the replacement and upgrading of boilers, which have considerably reduced the use of using fossil fuels in the DHS.

Just 20 years ago, the DHS relied on coal and fuel oil and was characterised by enormous heat distribution losses and inefficient boilers. Investments in boiler houses to increase efficiency and encourage a shift to renewable energy sources started even before Latvia joined the EU. In 2003, the United Nations Development Programme introduced a joint financing scheme for boiler house reconstruction aimed at replacing coal and fuel oil with biomass in municipal boiler houses.^{vi} In addition, investments in projects aimed at promoting the transition from fossil to renewable energy sources and improving energy efficiency grew even more after 2010, when Latvia joined the flexible mechanisms of the Kyoto Protocol and introduced the Climate Change Financial Instrument. In general, investments have furthered the move towards a more sustainable energy sector, replacing coal and fuel oil with natural gas or biomass. EU funds have promoted the increasing use of biomass in the heat supply, resulting in the declining popularity of natural gas.

Thanks to the support of EU funds (2007–2020) and investments totalling EUR 198.63 million, including EUR 85.4 million in co-financing from the Structural Fund, a total of 238 kilometres of district heating system networks have been either built or reconstructed.

Programming period 2007–2013:

- total project costs: EUR 218.2 million;
- total eligible costs: EUR 162.8 million;
- total Cohesion Fund support: EUR 71.2 million;
- total length of reconstructed heating networks: 175.76 km;
- total capacity of boiler houses: 331.00 MW.

Programming period 2014–2020:

- modernisation and increasing of capacity: **226 MW**;
- additional capacity secured by renewable energy sources: **9.3 MW**;
- reconstructed heating networks: **60 km**;
- reduction of heat loss from reconstructed heating networks: **46,582 MWh/annually**;
- calculated CO₂ savings: **162,574 tCO₂/annually**.

Programming period 2021–2027:

- financing projected for improving heating supply systems: **EUR 65 million**.

MAIN CONCERNS

Energy efficiency of outdated DHS

Although Latvia ranks third in Europe (following Iceland and Lithuania) according to the number of people receiving heat from DHS, and centralised heating in Latvia is remarkably prevalent in densely populated places, a great share of these district heating systems are outdated.

Inefficient heat supply results in higher fuel consumption and emission levels, increasing the cost of heating for both individuals' wallets and the environment.

Analysis of EU Structural Fund projects indicates that boiler efficiency decreases after seven years, as boilers that have been used from 7 to 24 years are often replaced. During the last two EU programming periods, several investments have attempted to raise the efficiency of the DHS in Latvia. Unfortunately, EU funds alone are not enough to secure a more rapid implementation of energy efficiency improvement measures. Some of the reasons inefficient equipment is still used in DHS in Latvia are municipalities' limited opportunities to receive loans and slow capital turnover.

The renewal of the entire heat supply system, from generation to distribution to consumption, can significantly reduce consumption and thus also greenhouse gas emissions. Latvia should assess the most efficient type of each particular heat supply system to establish if it is possible to install zero emission technologies or high-efficiency, biomass-fired equipment for heat generation (under the condition that biomass is able to be sustainably sourced). Solutions for municipality rights to limit the number of energy supply systems that can be connected to an object in parallel should be developed by linking this restriction to the total area and to heat, electricity and gas supply.^{vii}

Connecting new users to DHS

Although the number of people using DHS is rather high in Latvia,

the increasing decentralisation of the population and construction of private houses has made individual heating systems increasingly popular.

Thus, improvements to the efficiency of district heating can attract new consumers with lower tariffs and an uninterrupted, reliable heat supply. It is still possible to connect new consumers to the DHS in Latvia, especially in densely populated places; even in

Riga, many new areas could be connected.^{viii} One of the options for attracting new consumers as mentioned in the NECP is the liberalisation of the heat supply market, for which a detailed evaluation should be performed.^{ix}

The NECP offers an additional solution: the state must offer economic incentives for end consumers so that the cost of heat via the DHS does not exceed the costs of an alternative individual heating system. Such incentives include measures aimed at decreasing the DHS heat tariff, including by attracting additional financial support from the EU to establish new regional DHS, and for the reconstruction of the existing heating system networks in municipalities where the current or planned capacity of the heating network is more than 2 MWh/m. In addition, the operational and maintenance processes undertaken by DHS operators and their related costs should be reviewed and optimised.

Proportion of renewable energy sources in DHS

Although investments made during the last EU programming periods have in general improved the proportion of renewable energy sources in heat supply, there is still a high dependency on imported natural gas. Currently, heating and cooling is dominated by solid biomass or woody biomass, which Latvia considers 'renewable'. Over time, the proportion of heat generated using renewable energy sources has increased from 40.7% in 2010 to 54.6% in 2017, while the number of boiler houses fired with woody biomass from 241 in 2010 to 306 in 2018 and the installed capacity from 597.6 MW to 994.2 MW.^x

Unfortunately, zero emission technologies in heat supply are used very rarely, and solar collectors or heat pumps are only used in a few cases.

Additionally, using electricity for heating is not a widespread practice – just 0.1% of heat generated in Latvia in 2018 was produced using electricity.

It is important that investments continue to improve the energy efficiency of heat supply systems and to ensure that less resources are consumed; moreover, investments should also facilitate the transfer to renewable energy sources and especially zero emission technologies in heat supply. The NECP also bans the installation of new equipment fired with just solid or liquid fossil fuels, and such activities will not be possible under EU investments in the future due to the constraints of the EU Taxonomy for sustainable activities.

Combined heat and power

To implement the requirements of Article 14 of the Directive 2012/27/EU, Latvia has carried out a comprehensive assessment and a cost-benefit analysis of the potential for the application of high-efficiency cogeneration and efficient district heating and cooling.^{xi} The assessment concluded that **the proportion of CHP in heating in Latvia is high** (72.6%). In 2017, some of the regional DHS in Latvia ensured a close-to-maximum CHP proportion in heat production and a large share of renewable energy sources in their fuel structure (for example, 97% of heat produced in Jelgava came from CHP plants and 85% of this heat was generated using renewable energy sources).

Analysis of the potential shows that there is no option to raise the national proportion of renewable energy sources in heating, while high-efficiency CHP plants in DHS should be introduced in several cities (Daugavpils, Liepāja and Jūrmala). Such developments should be planned by analysing the financial return and impact of investment on the heat and electricity market prices in each particular case.

CONCLUSIONS AND PROPOSALS

EU funds account for the largest portion (around 70%) of all publicly available financing in Latvia and contribute to reaching national and EU policy targets. This analysis of previous EU programming periods shows that via these funds, Latvia has managed to move from a highly inefficient district heating system with large distribution losses and poor burning of fuel to a comparatively qualitative and efficient system that does not use fossil fuels. Such investments have significantly changed the fuel habits in the DHS and cut the total amount of CO₂ emissions. Reconstructed heating networks and the replacement and upgrading of boilers have not only brought Latvia closer to reaching national and EU energy and climate policy goals, but they have also contributed to the economy in general and had a positive impact on the heat tariff for consumers.

Latvia plans to continue to finance the measures aimed at reaching the national energy and climate goals through EU funds and by fully implementing the 'polluter pays' principle, which means raising the tax on fossil fuels and providing tax reliefs if certain energy efficiency requirements are met. However, to ensure that future investments in the DHS maximise their potential, Latvia needs to take specific actions.

First, Latvia needs to ensure the sources of energy for heating are sustainable. Latvia needs to find ways to deal with the challenges of increasing electrification of heating systems, which can be sustainable provided that electricity is generated in an environmentally-friendly manner and from a renewable energy source.

In addition, Latvia needs to ensure that biomass is used in a sustainable way. The proportion of biomass (primarily wood waste, which Latvia is rich in) in heat supply is significantly growing and replacing gas, thanks to projects financed by the EU funds. The NECP does not plan for this increase, and it does not specify how biomass can be used sustainably. For example, recently there were rumours in Riga about radioactive wood chips imported from Belarus^{xii}; such situations should be avoided by implementing strict, unambiguous guidelines that stipulate biomass sustainability criteria. Such criteria could include an obligation to use wood chips from logging residues, that biomass is not transported farther than 50 kilometres, and certain technological requirements to ensure that hazardous compounds or ash are not emitted.

In the future, it is also important to facilitate the development of new technologies and to use emission-free resources. One project financed from the EU budget during the period from 2014 to 2020 – **Salaspils Siltums' solar collector system** – is considered a best practice example in the Latvian heating sector. The system **uses**

both a solar collector and a solar accumulator in combination with biomass. This system could be even further improved by installing a heat pump. This project has shown that heating companies can be transformed into energy hubs that use their accumulation potential to ensure the heating network stability.

Second, Latvia needs to continue to invest in the efficiency of its energy system. The 'energy efficiency first' principle must be a horizontal priority in all energy and infrastructure investment programmes. Latvia should promote the transition to fourth and fifth generation district heating and strive to establish a smart energy system. The country's 175 CHP plants and 633 boiler houses must be well-maintained, and their energy efficiency must be improved to reduce consumption and waste of energy. Improving the energy literacy of the general population can also help to reduce overall energy consumption.

Third, Latvia needs to carefully plan financing for future heating investments. A new criterion, a cost-benefit analysis that compares the boiler capacity with the invested amount, should be introduced when designing heating projects for EU financing to avoid unnecessary cost increased in the procurement phase. As pointed out by Dainis Ozols, a representative of the Central Finance and Contracting Agency who is in charge of supervising such projects, some boilers have been bought for almost twice as much as is paid by the private sector when buying similar ones.^{xiii} When planning the budget for heating in the next programming period, it is important that investments facilitating market distortion are not supported, including in relation to buildings that can be connected to district heating system. Finally, because EU funds might not be available for future upgrade and maintenance of heating equipment, several options for the development of district heating systems should be considered. The impact of the EU funds on the ability to maintain low heat tariffs should also be evaluated by comparing EU investments with similar investments in infrastructure without EU funds.

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CEE Bankwatch Network is today the largest network of grassroots environmental groups in countries of central and eastern Europe and a leading force in preventing dubious public investments that harm the planet and people’s well-being in this region and beyond.

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