LITHUANIAN ENERGY INSTITUTE

Barriers and drivers for 5GDHC implementation

Workshop “5th generation district heating and cooling in the Baltic states”

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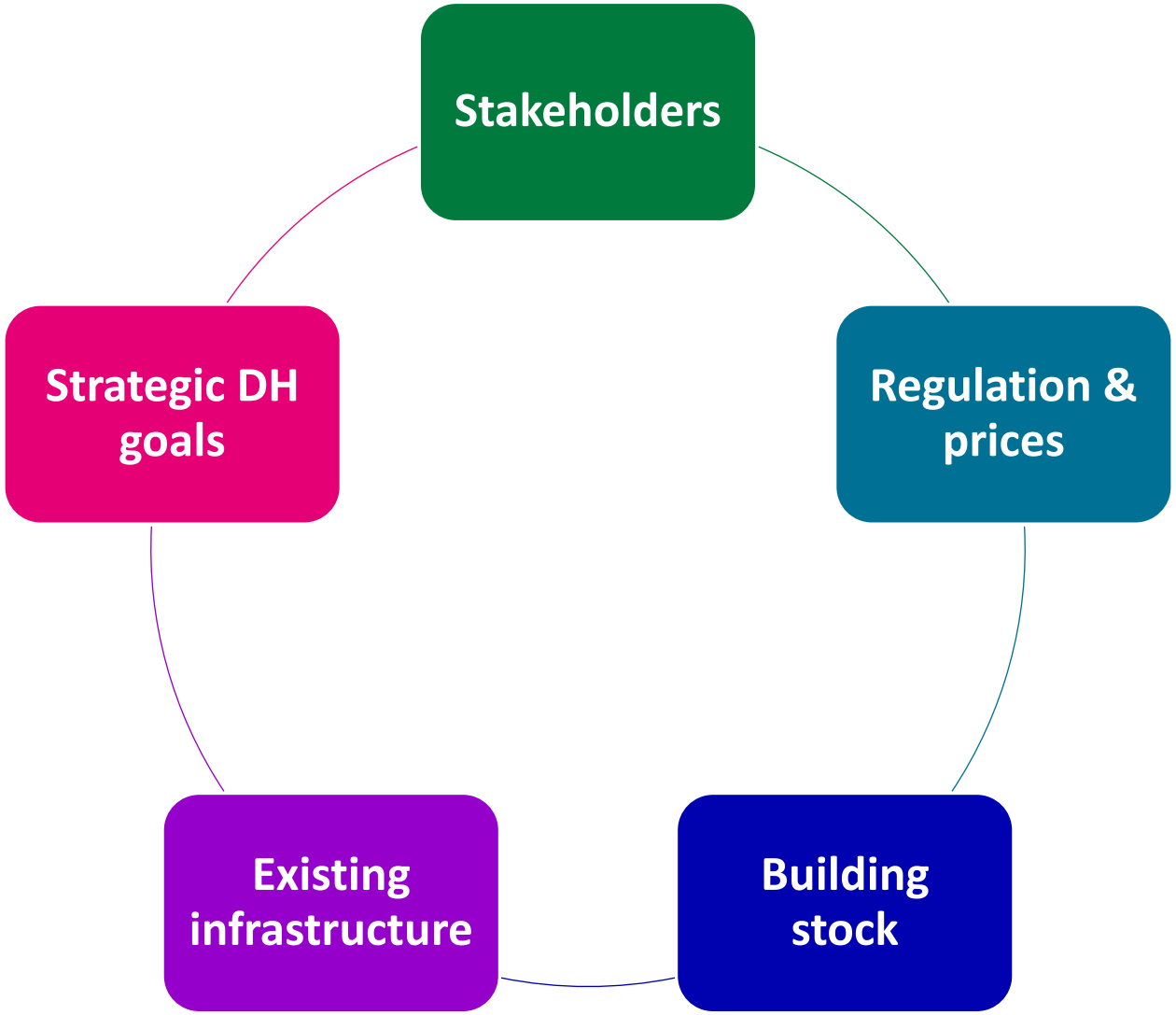
District heating in the Baltic states



Stakeholders

Estonia

- DH operators are mainly private companies.
- Private entities as DH owners may be more interested in investing in improvements due to the profit orientation. On the other hand, private companies are more profit-oriented and are not interested in less feasible DH networks.

Latvia

- DH systems are mainly owned by local municipalities and, in some cases, private owners.
- If the municipalities own DH, it is possible to implement complex heat supply renovation projects, including the improvement of heat supply and public buildings.
- For example, the municipality of Gulbene implemented the first small-scale low-temperature DH system in Latvia since it owned both the heat source and the buildings to which the heat was supplied.

Lithuania

- DH operators include both private and public operators.
- 49 licensed DH companies in all 60 municipalities.
- Moreover, 43 independent heat suppliers (24 regulated and 19 non-regulated by National Energy Regulatory Council).

Regulatory mechanisms and DH prices

Estonia

- The DH network is regulated by the District Heating Act.
- The DH price limit in Estonia must be justified, cost-effective and enable the company to fulfil its legal obligations. Only justified sales volumes and profitability expenses may be taken into account when approving the heat energy price for the period of regulation.
- The maximum area price is set by the Competition Authority in accordance with technical indicators.

Latvia

- Latvia has no specific laws for the DH sector. However, the DH sector is regulated by the Energy Law.
- Heating tariffs in Latvia depend on many factors, including the size of the system, the fuel used, the technical condition of the system, and even political considerations.
- Heat production, transmission and distribution are public services that are regulated by the Public Utilities Commission in Latvia.

Lithuania

- DH sector is regulated by the Law on the Heat Sector.
- The only country from the Baltic states that uses competition between heat producers. Each month, different DH suppliers compete in price level auctions.
- Moreover, Lithuanian DH companies participate in the biomass market (biomass exchange and heat trading system BALTPOOL).

Existing infrastructure

Estonia

- Oil shale is the main source of electricity energy and the main fuel in Estonia's energy mix.
- Biomass accounted for 46.8% of the Estonian DH energy mix and natural gas for 25.6%.
- Oil shale (9.2%), municipal waste (6%), shale oil gas (6%), fuel oil (3%) and peat (2.8%) make up a small part of the DH energy mix in Estonia.
- District cooling is implemented only in Estonia (Tallinn, Tartu and Pärnu).

Latvia

- Natural gas has been the dominant fuel in electricity and DH in Latvia.
- Biomass-based heat production increased from 19% in 2014 to 29% in 2019 at cogeneration plants and from 50% to 66% at heat-only boiler houses.
- A small low-temperature DH was also introduced in Latvia, in a parish of the Gulbene Municipality, which is more focused on the optimisation of the existing heating network in the village.

Lithuania

- About 70% of electricity is imported after the shutdown of the Ignalina Nuclear Power Plant in 2009.
- Almost 70% of the heat is produced using RES (mainly biomass) and municipal waste in the Lithuanian DH sector. The share of heat from natural gas in the fuel mix is less than 30%.
- The reduction of the DH supply temperature is implemented in the Lithuanian capital Vilnius (pilot).

Building stock

Estonia

- 23,600 apartment buildings in Estonia.
- The annual energy consumption of residential buildings remains relatively stable at 10 to 12 TWh.
- Heating accounts for about 85% of consumption (~9 TWh) and electricity accounts for ~15% (~2 TWh).
- Around 50% of non-residential building consumption is for heat (~3 TWh) and the remaining 50% is for electricity (~3 TWh).

Latvia

- 39,000 apartment buildings in Latvia.
- The total consumption for space heating is about 10 TWh.
- The average energy consumption for space heating among all types of buildings is 138-139 kWh/m2 per year.

Lithuania

- 41,000 apartment buildings in Lithuania.
- The annual consumption of thermal energy by the building stock is about 20 TWh for heating and 8.5 TWh for hot water supply.
- Residential buildings consume 17.5 TWh of thermal energy and only 1.7 TWh of electricity.

Strategic DH goals

Estonia

- According to the National Development Plan of the Energy Sector until 2030, 11 TWh of the total heat demand will be met by biomass in 2030, and 80% of DH in Estonia will be provided using renewable sources.

Latvia

- According to the Latvian NECP 2021-2030, the share of RES in DH will increase by around 0.8-1.0 percentage points each year from 2020 to 2030, reaching 57.6% in 2030.

Lithuania

- According to the National Energy Independence Strategy (2018), Lithuania has set a goal to increase RES share in the DH supply to 90% by 2030 and reach 100% by 2050, which is the most ambitious goal among the Baltic states.

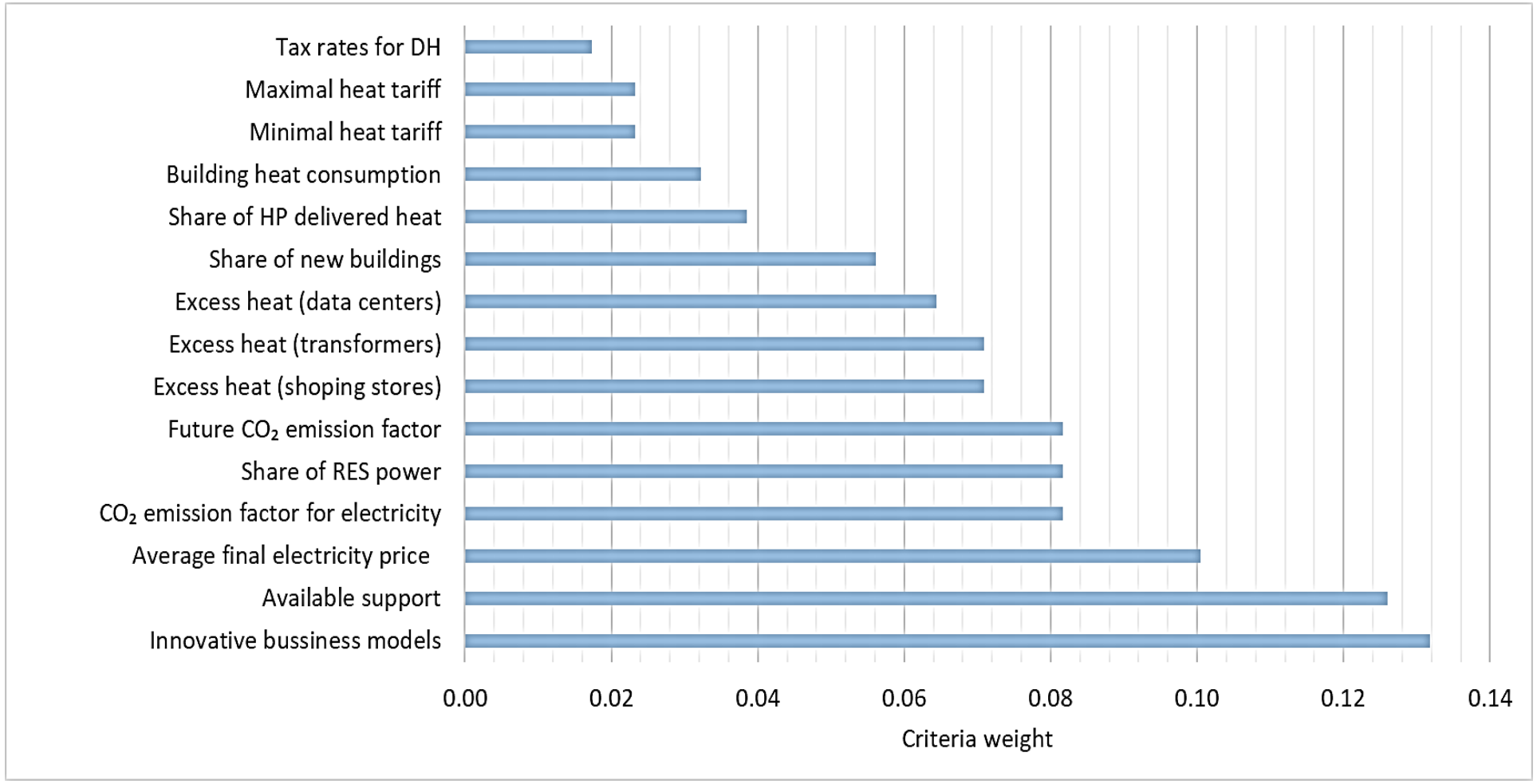
Barriers and drivers

BARRIERS	DRIVERS
Dependence on the electricity system	Climate change targets (low GHG emissions): e.g. stop using natural gas
High initial costs	Geopolitical implications of using imported natural gas
Specific new infrastructure is required	Ambitious energy transition targets of the country
Increase in the price of electricity	Reduced price volatility
Financial sources (lack of adequate funding and financing products)	Increased access to affordable, reliable, and sustainable energy for heating and cooling
Awareness (lack of skilled personnel)	Strengthening energy security
Institutional and administrative barriers	Creating local economic value and jobs
Market barriers	Positive effect on health
Lack of public acceptance	Ability to reuse waste heat
Regulatory and policy barriers	
Separate pipes are needed to provide both heating and cooling	
Centralised energy production, limiting network expansion area	
Dwelling spatial impact and dwelling noise	
High resident risk	
Existing biomass based district heating systems	

Criteria for the 5GDHC potential implementation in the Baltic States

Criteria	Unit
Average final price of electricity	EUR/MWh
Share of RES energy in electricity production	%
Share of heat supplied via HPs	unit per 1000 households
CO_2 emission factor for electricity	t CO_2/MWh
Future CO_2 emission factor for electricity	t CO_2/MWh
Maximum heat tariff	EUR/MWh
Minimum heat tariff	EUR/MWh
DH tax rates	%
Available support measures for possible 5GDHC implementation	Evaluation scale
Possibility to implement innovative business models	Evaluation scale
Specific building heat consumption	kWh/m^2
Share of new buildings	%
Excess heat source potential from shopping malls	MWh
Excess heat source potential from transformers	MWh
Excess heat source potential from data centres	MWh

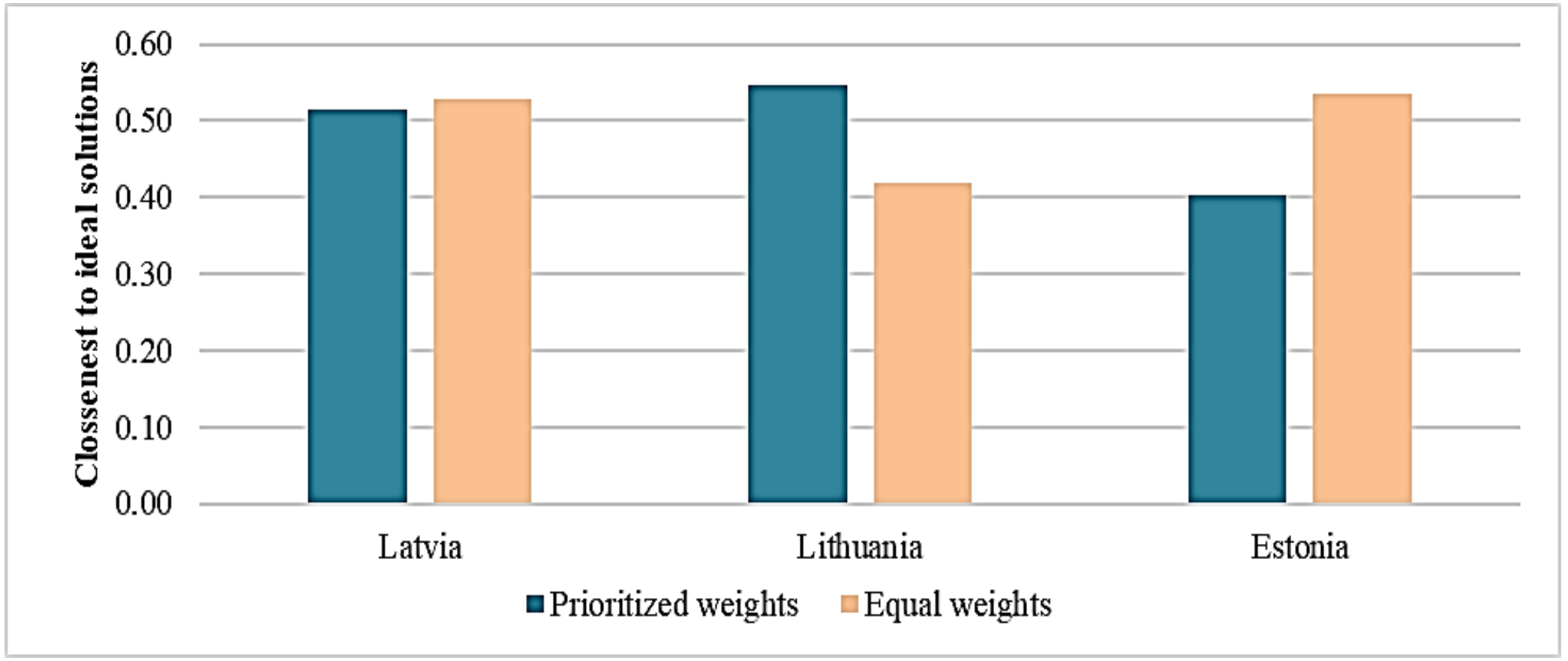
The defined weight of each criterion



Summary of criteria results for the Baltic states

Description	Latvia	Lithuania	Estonia
Average final electricity price, EUR/kWh	0.14	0.14	0.12
Share of RES energy in electricity production, %	53.42	18.79	22.00
Number of individual HPs, unit/1000 households	1.00	9.00	29.30
CO_2 emission factor for electricity, t_{CO2}/MWh	0.12	0.02	0.89
Future CO_2 emission factor for electricity, t_{CO2}/MWh	0.08	0.06	0.22
Maximum heat tariff, EUR/MWh	69.98	79.63	86.96
Minimum heat tariff, EUR/MWh	35.45	32.57	35.33
DH tax rates, %	21	9	20
Available support measures for possible 5GDHC implementation	2.00	2.00	1.00
Possibility to implement innovative business models	1.00	2.00	1.00
Specific building heat consumption, kWh/m^2	159.7	131.3	142.8
Share of new buildings, %	5	6	2
Excess heat source potential from shopping malls, %	10%	16%	13%
Excess heat source potential from transformers, %	3%	1%	1%
Excess heat source potential from data centres, %	1%	0%	2%

Results of multi-criteria assessment



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Thank you for your attention

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