7th International Conference on Smart Energy Systems
21-22 September 2021
#SESAAU2021

Smart Heat Tariffs in transition to free market

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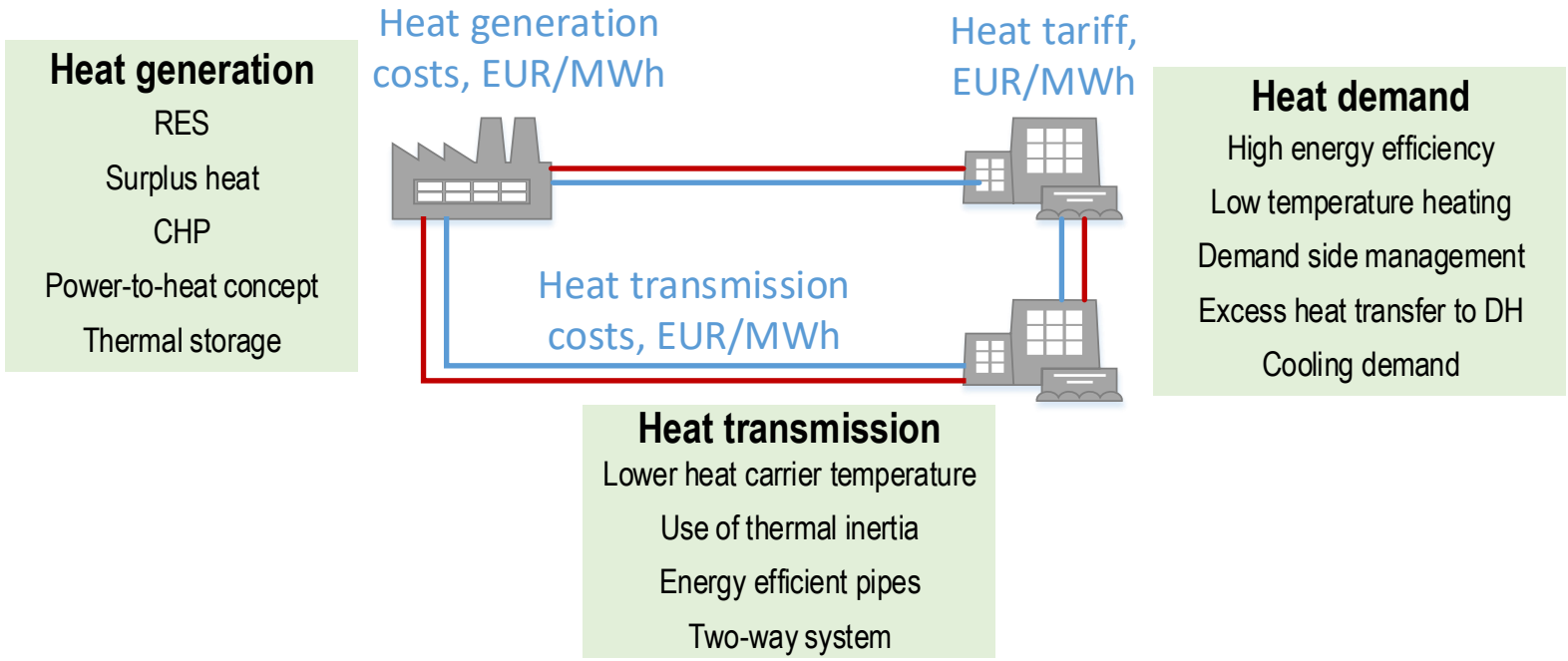
Funded by the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement no. 846463

Goal of the research

- The goal of the research is to compare different heat tariff determination methods and legislative frameworks to promote district heating transition towards sustainable development and carbon neutrality.



DH sector regulation mechanisms

Licensing — Example from Norway

- Three principles drive the licensing: **Quality of supply** (along with security of supply, operators must meet minimum standards of consumer service and protection); **Price of supply** (Less than electric heating); **Quality of heat** (Heat supply must meet conditions relating to carbon intensity)

Heat tariff regulation — Example from Latvia

- **Cost-plus method** have been used for heat tariff determination. Heat tariff has to be approved by Public Utilities Commission

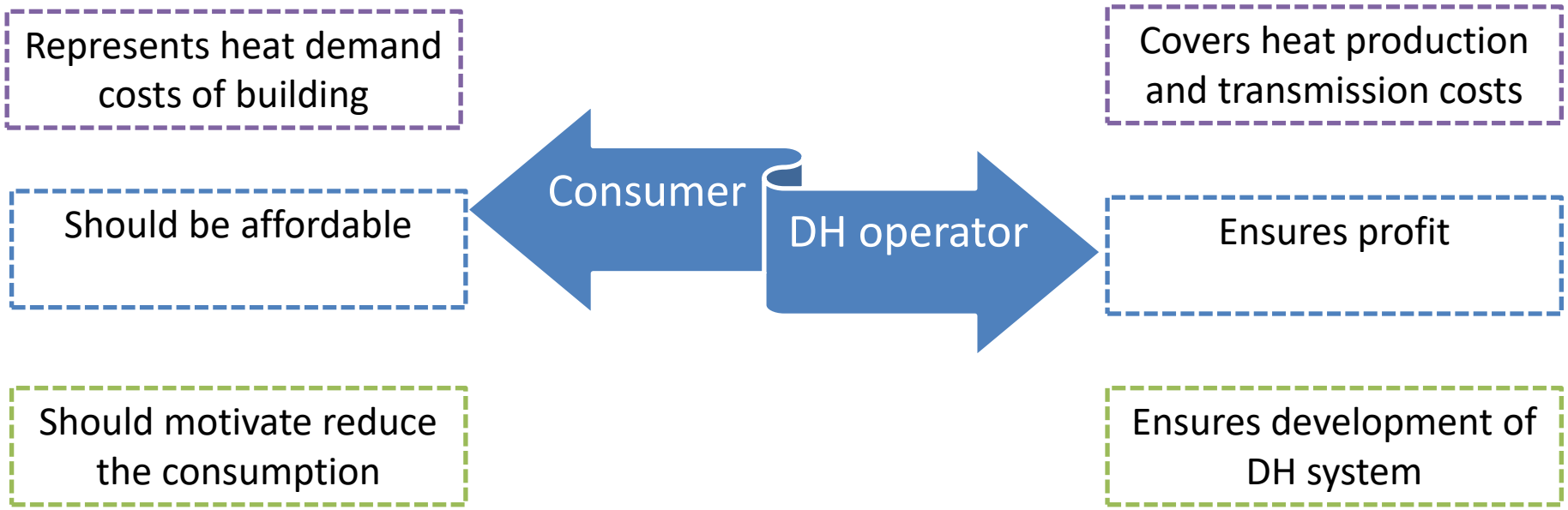
Permits for DH installations — Example from Germany

- The permits needed depend very much on **local regulations**. For example, due to its potential high impact of biomass installations (emissions), they either need a permit according to the Federal Immission Control Act, or to the Federal Building Act.

No specific regulation — Example from Sweden

- National government has **never had a specific regulation on DH**, they provide an overarching policy agenda, such as moving away from fossil fuels.

Role of DH tariff



Smart heat tariffs

Solutions for consumer

- 100% variable heat tariffs
- Heat tariff with fixed load payment
- Seasonally changed heat tariffs
- Discounts for lower return temperature
- Discounts for lower exergy heat

Solutions for DH operator

- Unregulated heat tariff
- Unit price regulation
- Revenue cap regulation
- Heat tariff benchmark
- BAT heat tariff

BAT tariff determination

Identification of BAT technologies for energy efficiency increase in DH system

Heat plants
CHP
Solar thermal systems
Heat pumps
Thermal storage systems
……

Definition of heat generation and transmission criteria, reference values

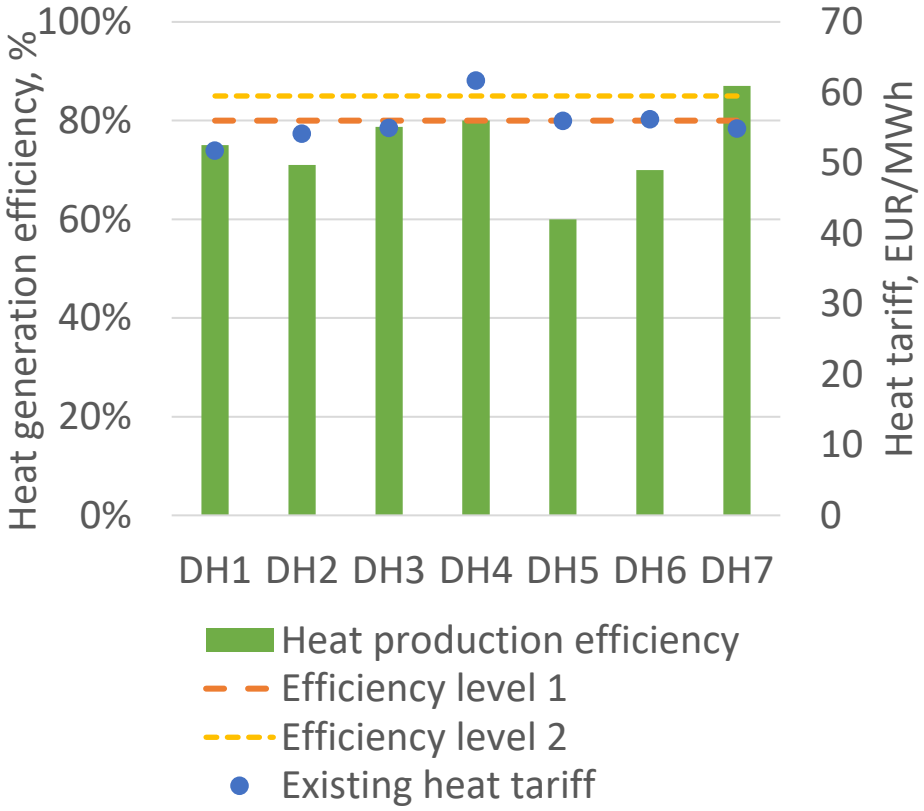
Primary energy consumption
Specific emissions
Combustion efficiency
Specific transmission losses
Environmental costs
…..

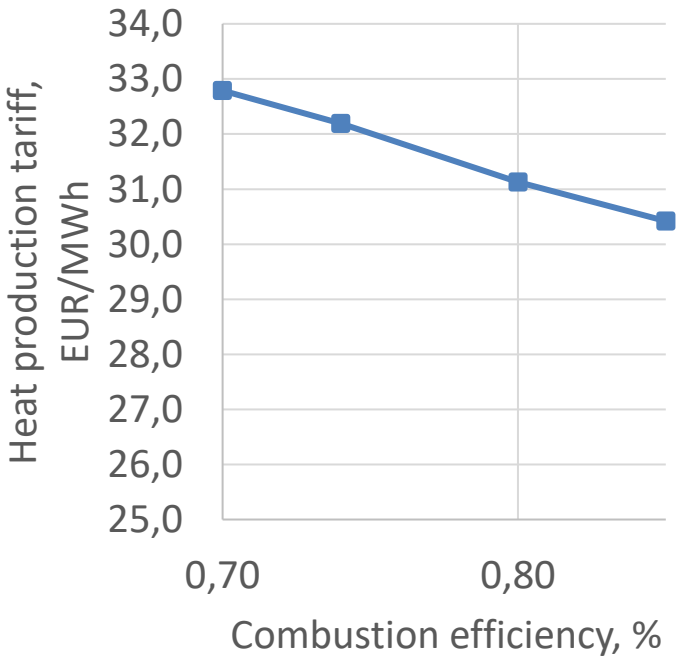
Integration of BAT criteria into the heat tariff methodology

Source: https://eippcb.jrc.ec.europa.eu/sites/default/files/2019-11/JRC_107769_LCPBref_2017.pdf

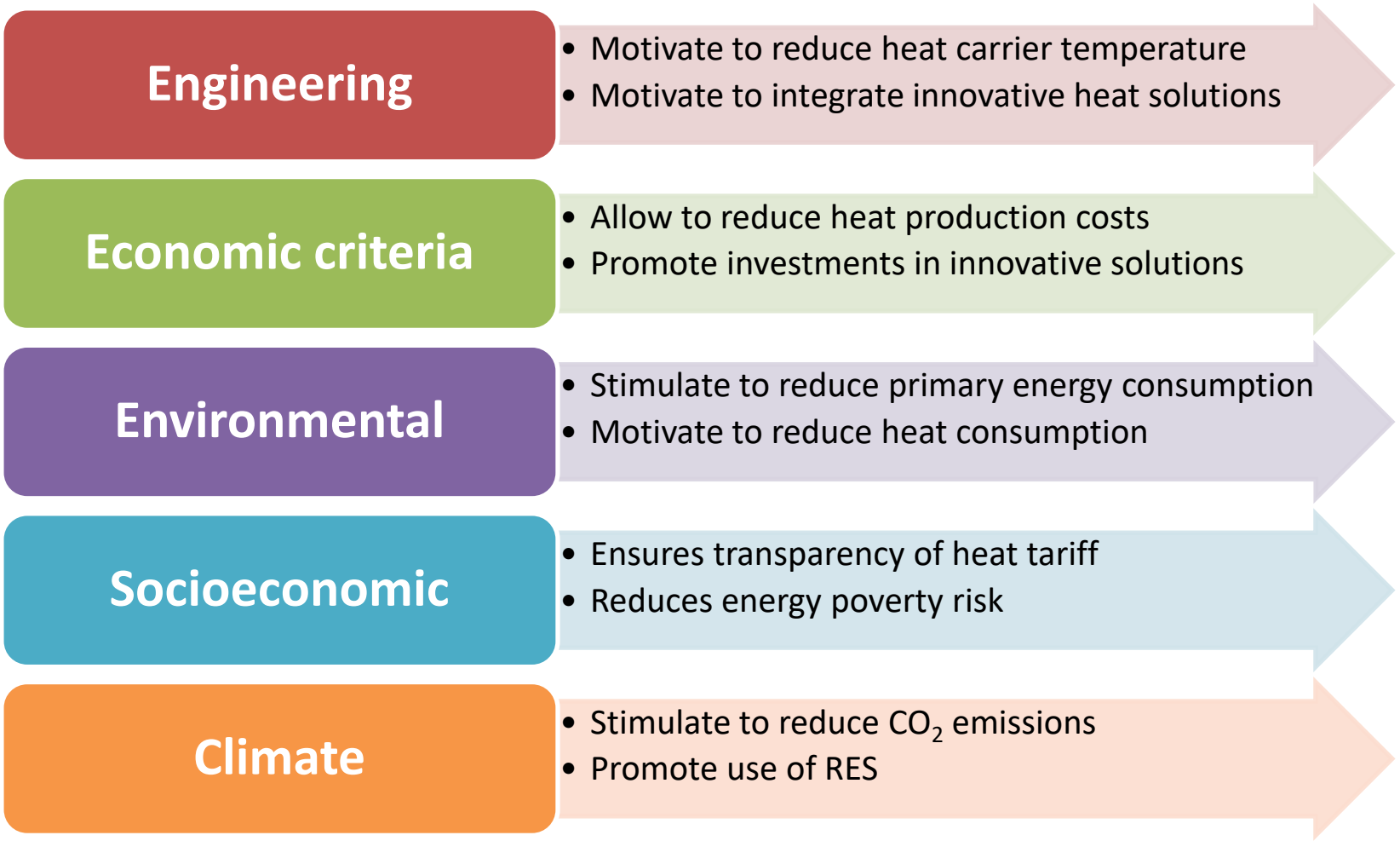
Existing situation analyses

Wood chip boiler house example





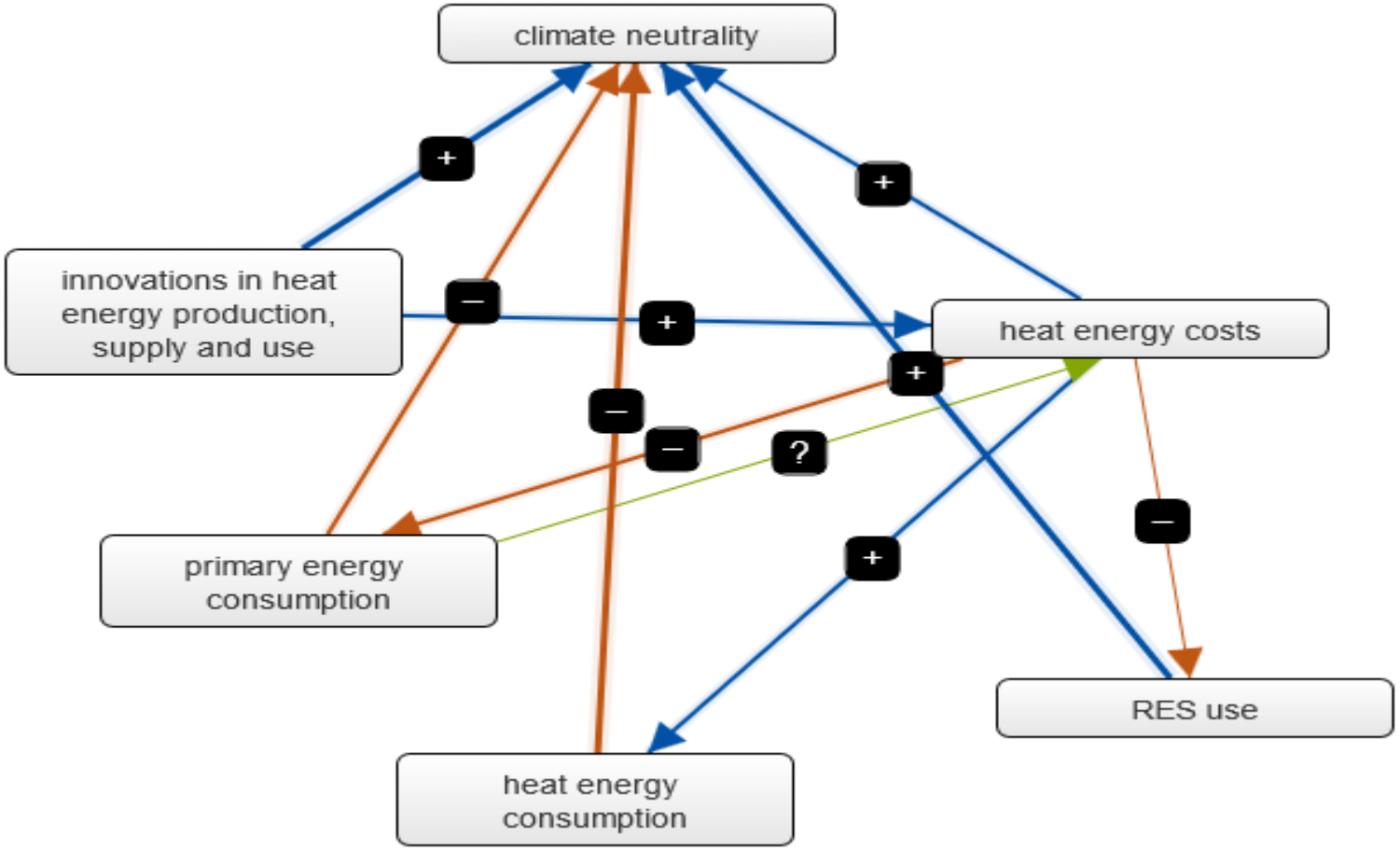
Regulation comparison



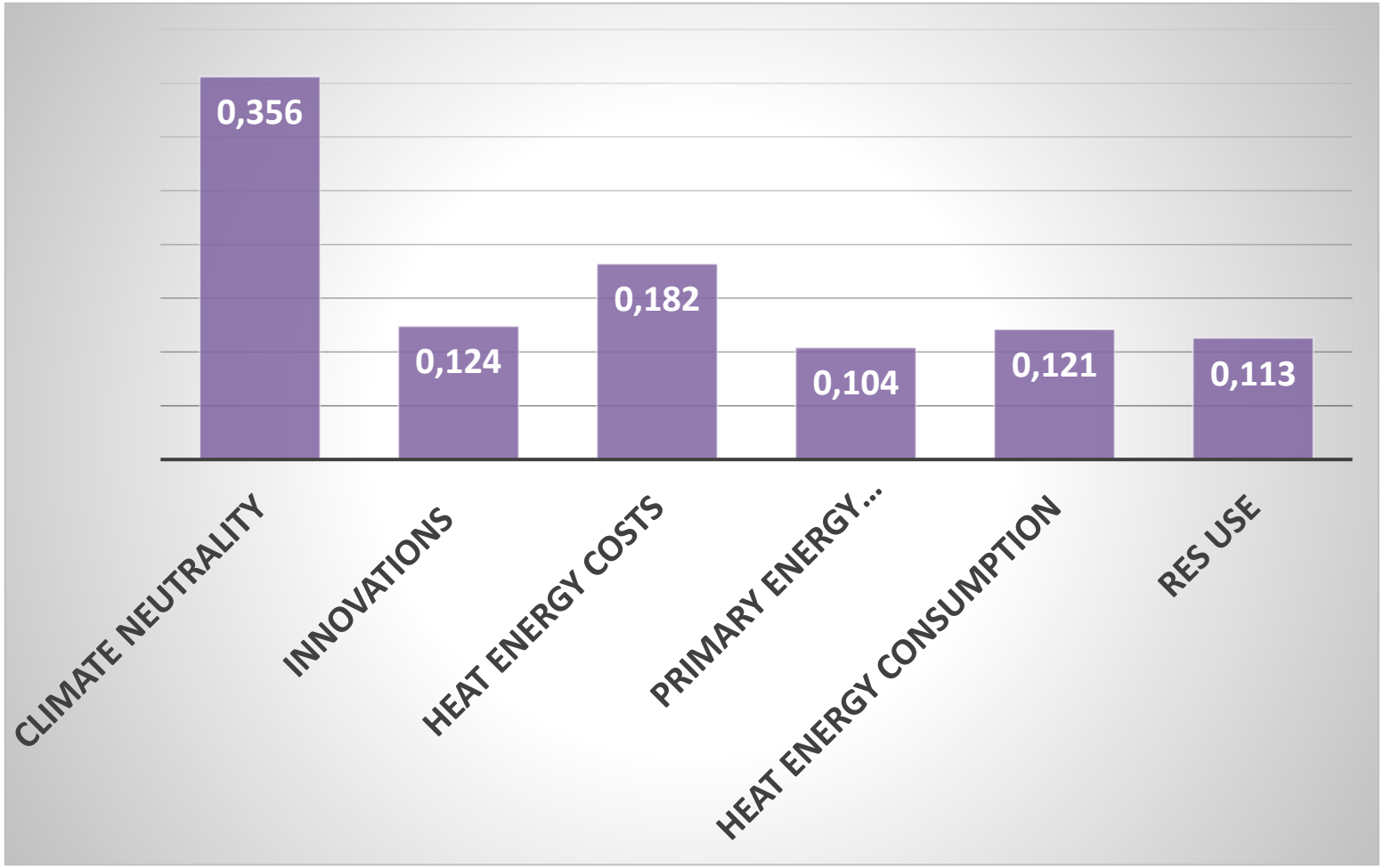
Criteria for evaluation of DH tariffs

- **Motivation towards climate neutrality**
- **Enforcement of innovations in heat energy generation, supply and use**
- **Reduction of heat energy costs**
- **Reduction of primary energy consumption**
- **Reduction of heat energy consumption**
- **Increase of RES use**
- Transparency
- Energy powerty risks
- Temperature levels
- Promotion of investments
- etc

Modelling of Vectors by Fuzzy Logic Cognitive Mapping



Weights of Heat Tariffs Criteria from Vectors Modelling results from Fuzzy Logic Cognitive Mapping



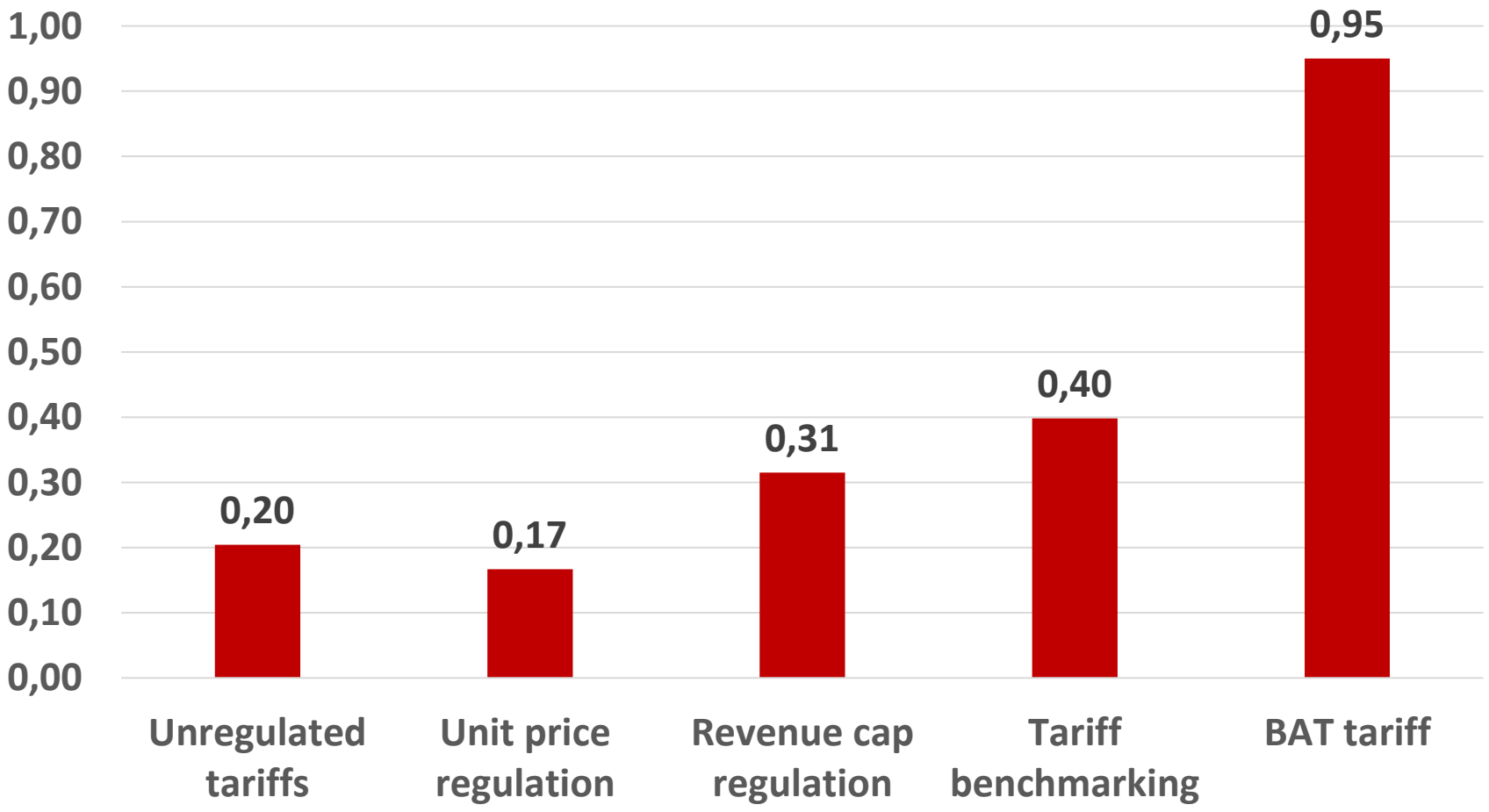
Decision Making Matrix

Criteria	Regulation of heat tariffs				
	unregulated tariffs	unit price regulation	revenue cap regulation	tariff benchmarking	BAT tariff
Innovations	3,1	2,2	3,6	4,8	4,8
heat energy costs	3,3	3,1	3,7	4,1	3,9
primary energy consumptions	3,9	4,3	3,1	3,9	4,6
heat energy consumption	3	3,6	3,5	3,5	4,8
climate neutrality	3,1	3,1	3,2	3,1	4,5
RES use	4,2	3,3	4,8	3,8	4,9

1- do not promote, motivate or ensure

5- strongly promote, motivate ore ensure

Results of Multicriteria Analysis



Conclusions

- Methodologies of heat energy tariffs are different Nordic – Baltic States however the goal of DHC systems development is sustainability and climate neutrality.
- Multicriteria decision analysis (MCDA) methodology with integration of Fuzzy Logic Cognitive Mapping software in TOPSYS MCA model allows to compare and prioritise five heat energy tariffs regulation methods.
- Best Available Technologies (BAT) heat energy tariff methodology shows that future belongs to development of this DH tariffs assesment approach.

The research is funded by the Ministry of Economics of the Republic of Latvia, project "Development of heat supply and cooling systems in Latvia". Project No. VPP-EM-EE-2018/1-0002).

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