



VPP
Valsts pētījumu
programma

District heating climate benchmark On innovative method for DHS assessment

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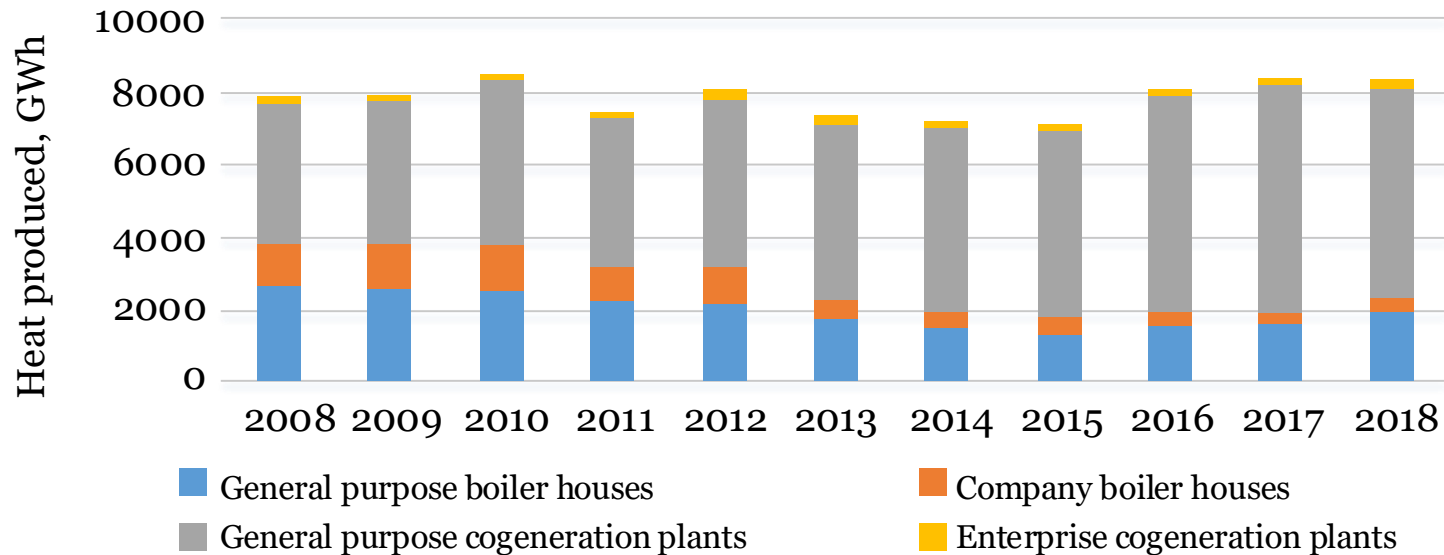


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DEVELOPMENT OF HEAT SUPPLY AND COOLING SYSTEMS IN LATVIA

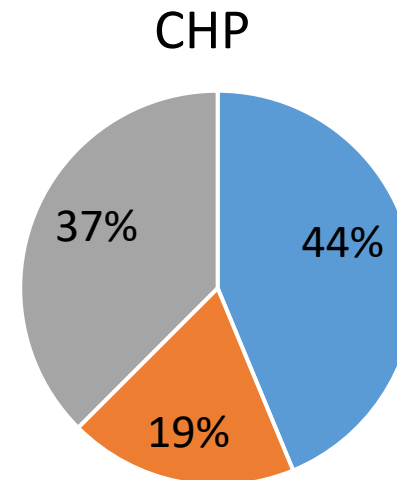
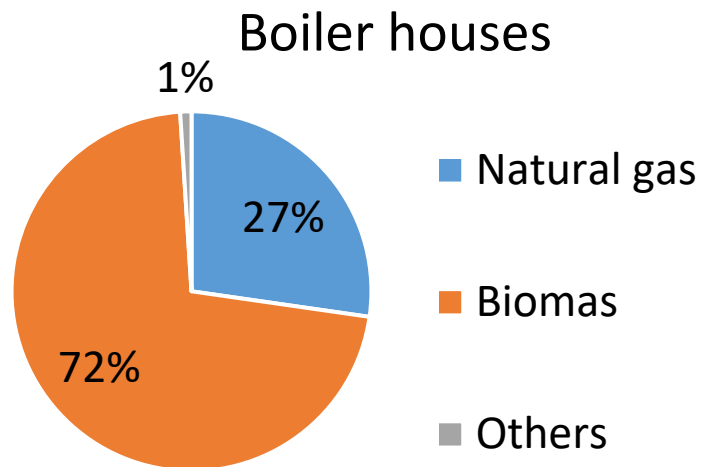
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Heat production technologies



- CSB data

Used energy sources

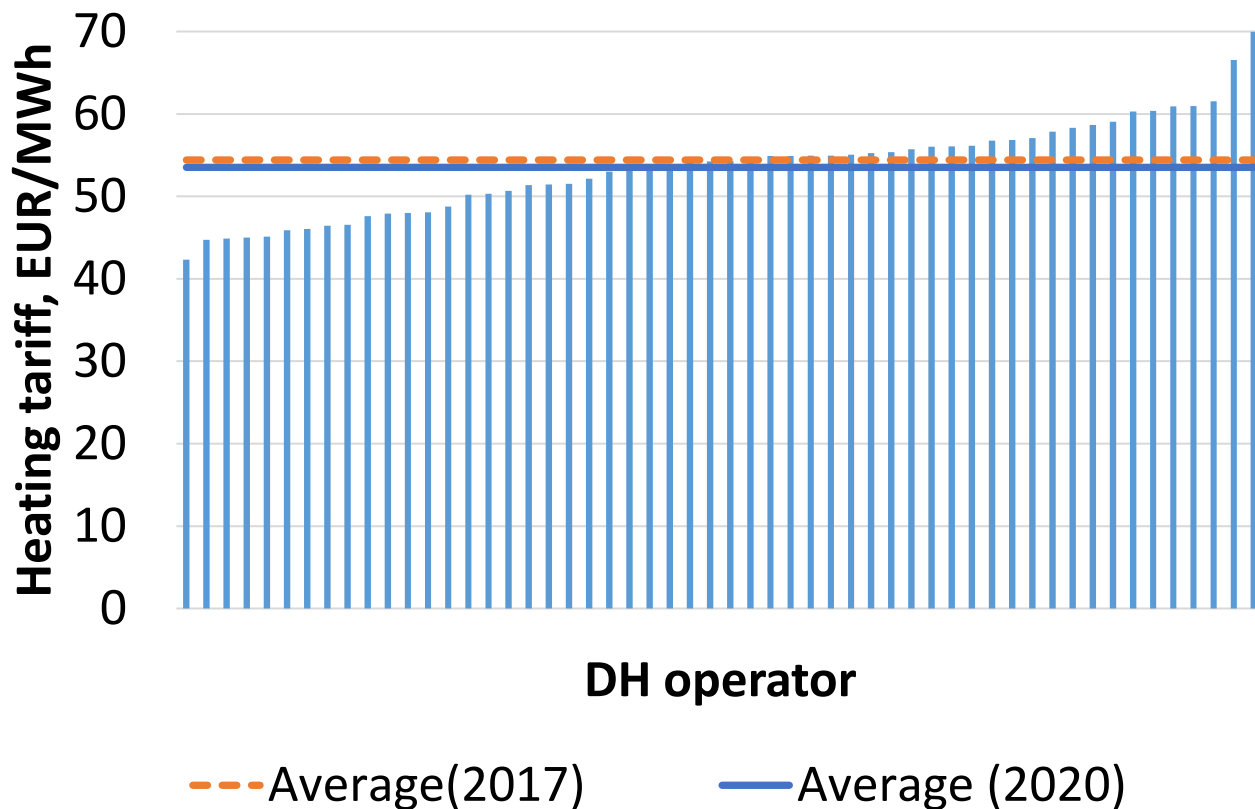


- CSB data, 2018

District heating in Latvia

Heat tariff

- Regulated for largest heat suppliers
- Calculated according “Costs +” methodology
- Approved by PUC
- Average value:
 - 54.4 EUR/MWh (2017)
 - 53.5 EUR/MWh (2020)



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Topicality

- 1. Complicated heat tariff approval process;**
- 2. The tariff does not always reflect the efficiency of heat production and supply;**
- 3. Heat supply operators lack motivation to implement sustainable and innovative solutions for heat production;**

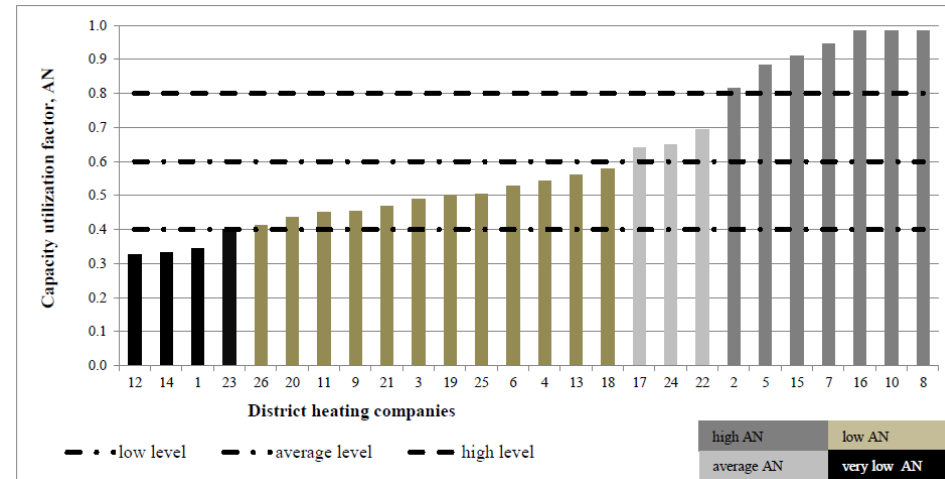
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Previous studies

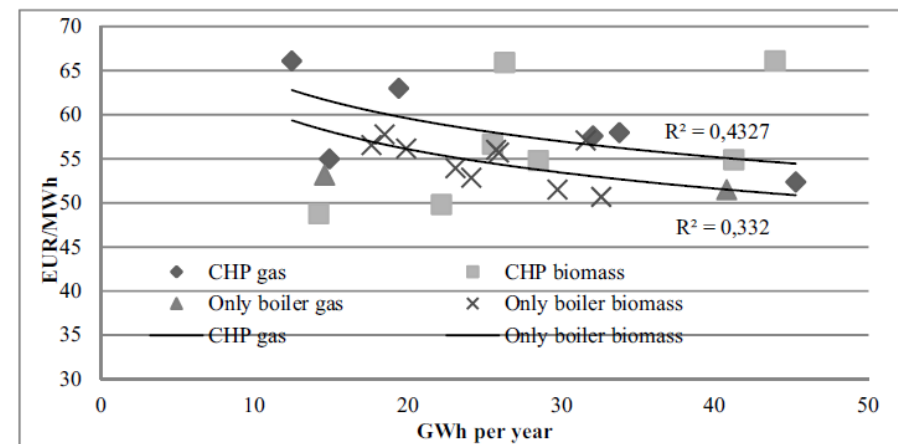
Analyses of district heating tariff benchmark

Sarma U., Bažbauers G. (2017) District heating tariff component analyses for tariff benchmarking model. Energy Procedia 113 104 – 110



District Heating Systems Performance Analyses by focus on heat tariff evaluation

Ziemele J., Vigants G., Vitolins V., Blumberga D., Veidenbergs I. (2014) District Heating Systems Performance Analyses. Heat Energy Tariff. Environmental and Climate Technologies 13; 32-43



Aim of the study

Develop a methodology for calculation of the Climate Benchmark that could be use as:

- **an indicator to assess the effectiveness and sustainability of DH operations;**
- **the criterion for determining the tariff;**
- **motivator to improve performance of DH.**

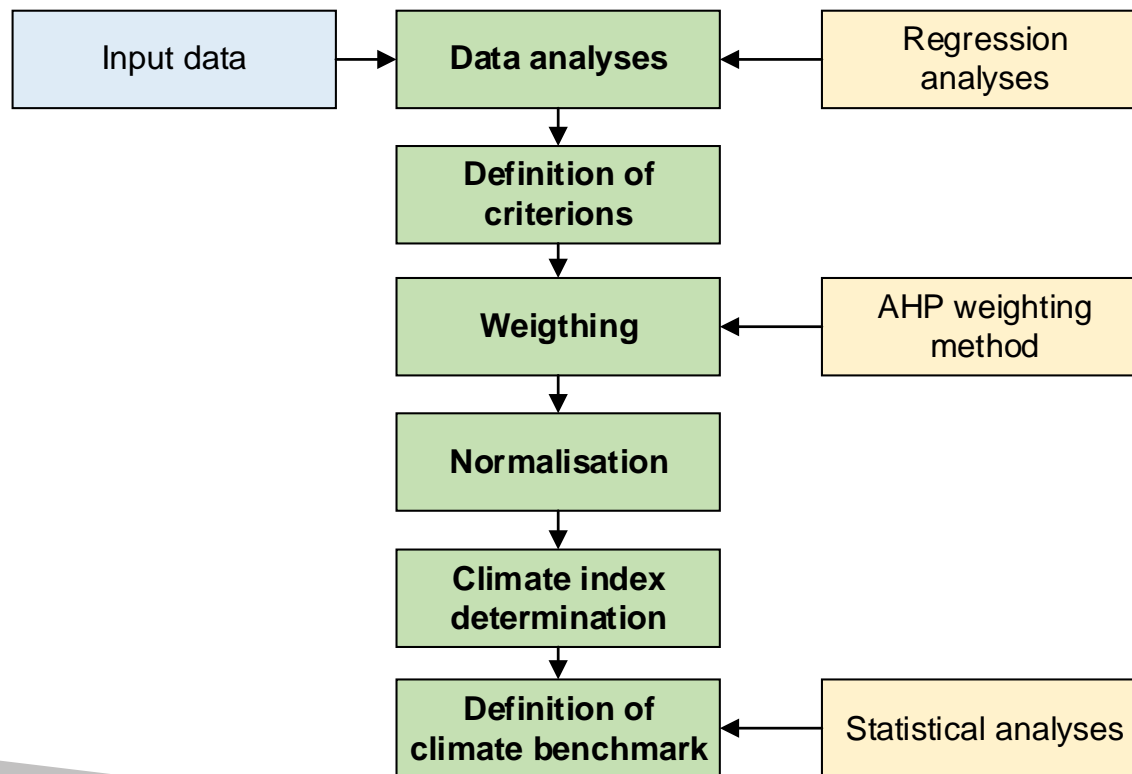
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Methodology

Main aim

To determine the Climate Index benchmark as a indicator for DH performance analyses



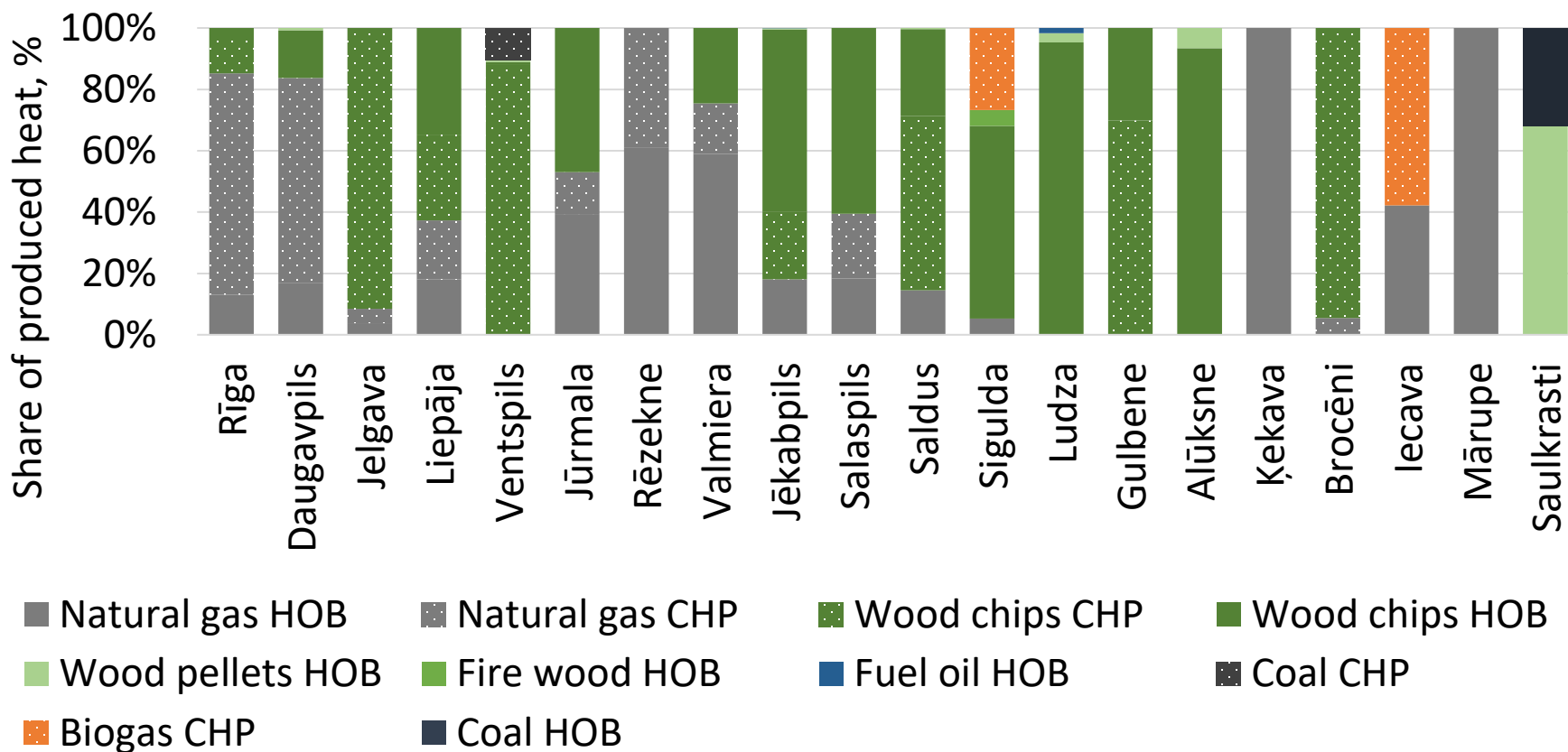
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Data availability

- Data set from 20 Companies
- Fuel consumption - reviews of environmental statistics
- Produced and consumed heat - applications for approval of the heat energy tariff
- Power produced in CHP - amounts paid within the framework of mandatory procurement (feed-in tariff)
- Missing information - annual report of companies

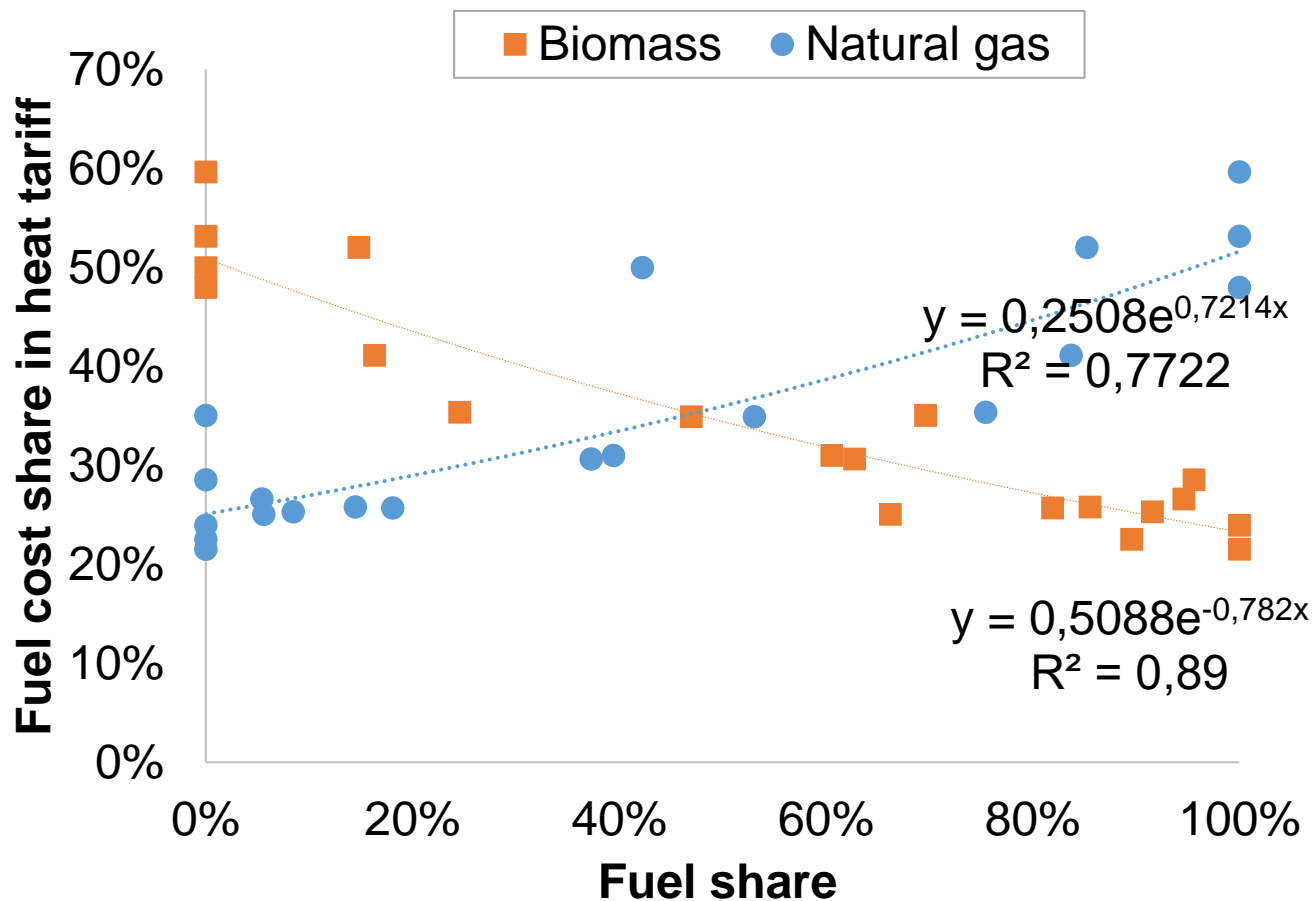
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Evaluated data set



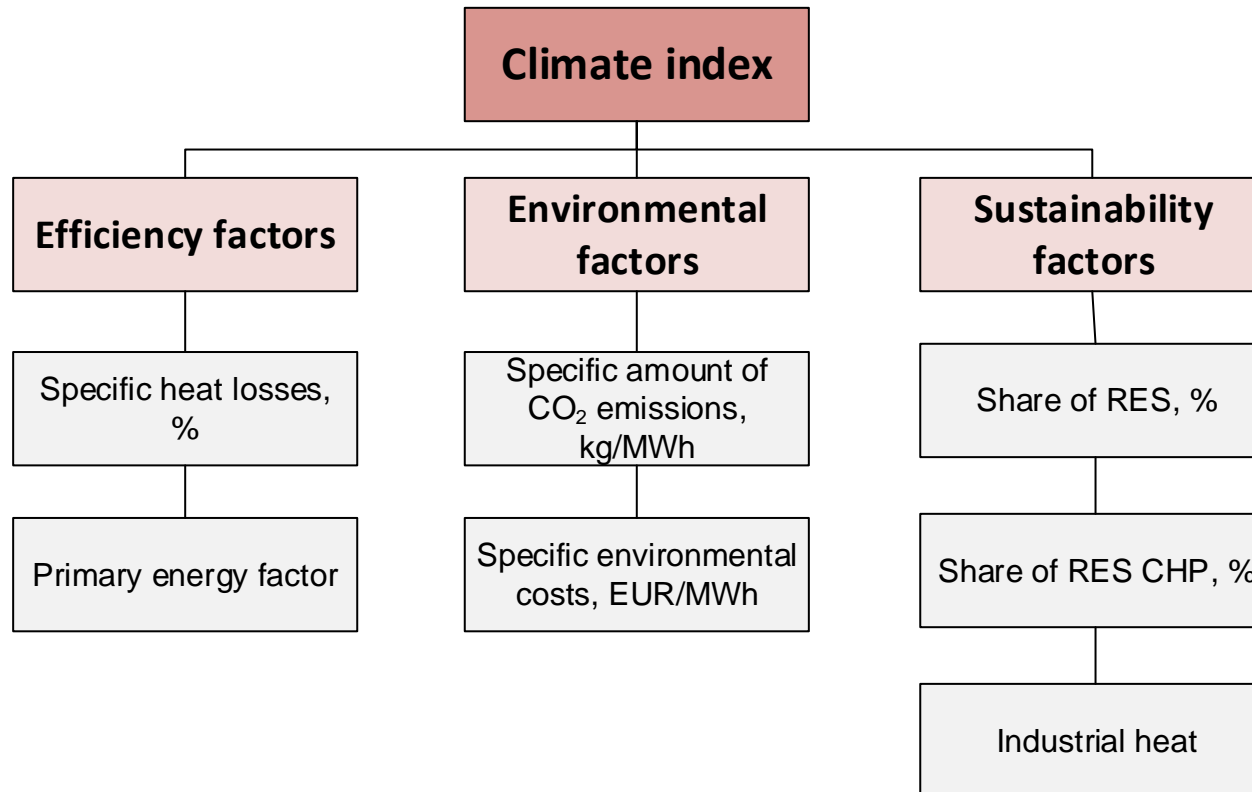
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Regression analyses



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Criteria for Climate Index



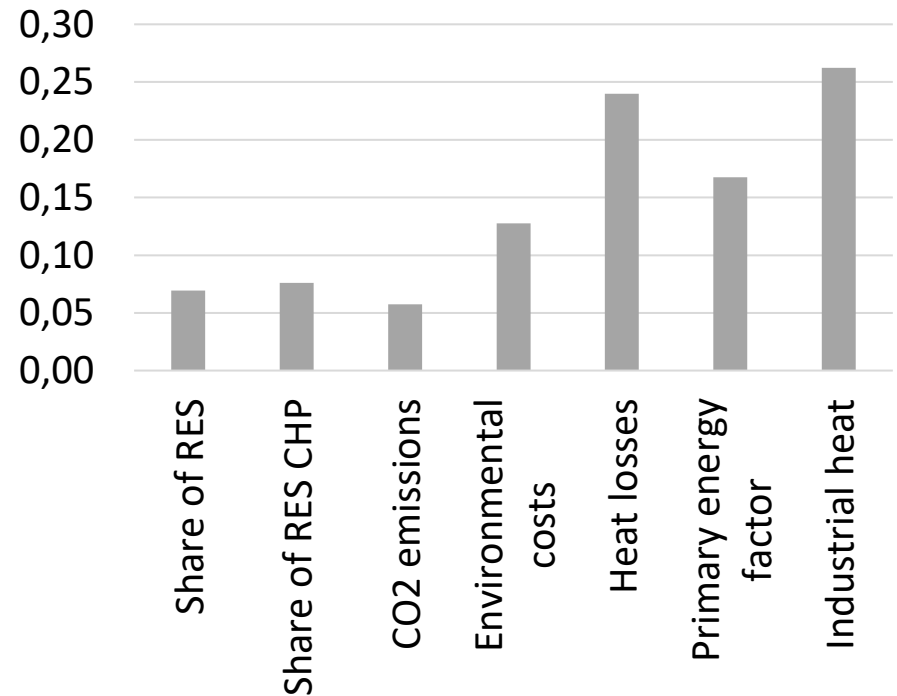
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Methodology

Criteria weights

The Climate Index is calculated as the weighted sum of the normalised criteria

$$I = \sum I_{S,j} * W_S$$



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Results

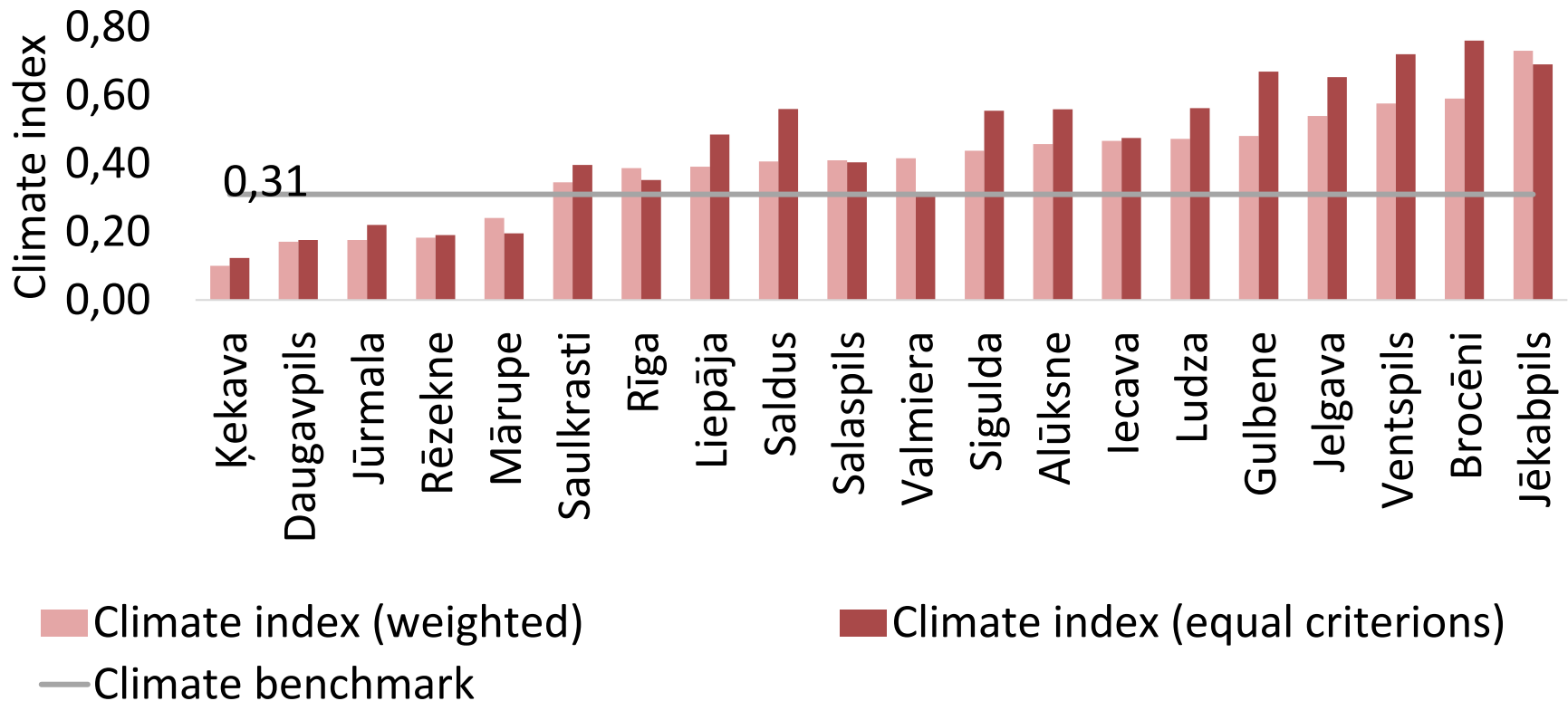
Criterion values (normalised)

DH location	Share of RES	Share of RES CHP	CO ₂ emissions	Environmental costs	Heat losses	Primary energy factor	Industrial heat
Rīga	0.15	0.13	0.19	0.48	0.57	0.95	0.00
Daugavpils	0.16	0.00	0.09	0.40	0.09	0.49	0.00
Jelgava	0.92	0.97	0.36	0.97	0.42	0.95	0.00
Liepāja	0.63	0.30	0.81	0.56	0.30	0.81	0.00
Ventspils	0.90	0.93	0.90	0.87	0.53	0.92	0.00
Jūrmala	0.47	0.00	0.21	0.30	0.00	0.55	0.00
Rēzekne	0.00	0.00	0.47	0.18	0.26	0.42	0.00
Valmiera	0.25	0.00	0.00	0.20	0.66	0.56	0.46
Jēkabpils	0.82	0.23	0.83	0.53	0.56	0.86	1.00
Salaspils	0.61	0.00	0.35	0.41	0.69	0.78	0.00
Saldus	0.86	0.60	0.80	0.73	0.08	0.86	0.00
Sigulda	0.94	0.30	0.95	0.42	0.39	0.87	0.00
Ludza	0.96	0.00	1.00	0.50	0.50	0.98	0.00
Gulbene	1.00	0.74	1.00	0.87	0.09	0.99	0.00
Alūksne	1.00	0.00	1.00	0.51	0.41	1.00	0.00
Ķekava	0.21	0.00	0.39	0.00	0.26	0.00	0.00
Brocēni	0.95	1.00	0.97	1.00	0.42	0.99	0.00
Iecava	0.58	0.61	0.39	0.18	1.00	0.57	0.00
Mārupe	0.00	0.00	0.39	0.00	0.74	0.24	0.00
Saulkrasti	0.70	0.00	0.67	0.21	0.44	0.75	0.00

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Results

Climate Index and Benchmark



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Conclusions

1. **The Climate Index have been introduced as a common indicator to evaluate the performance of DH system efficiency, environmental impact and sustainability**
2. **Main criterions for evaluation share of RES and RES CHP; CO₂ emissions; environmental costs; heat losses; primary energy factor; heat delivered by industrial enterprises**
3. **The obtained Climate Index values for 75% of DH Companies are above the estimated benchmark in case of particular study**
4. **Publication of Climate Index could improve the competition between DH operators and promote moving toward more sustainable solutions**
5. **The Climate Index could be a criterion for the heat tariff calculation. The methodology could be further developed**

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