



Evaluation of regulation for flexibility – a methodology

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Flexible Nordic Energy Systems



Evaluation of regulation for flexibility – a methodology

COPENHAGEN, 12–13 SEPTEMBER 2017

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AALBORG UNIVERSITY
DENMARK



2050
Heat Roadmap Europe
A low-carbon heating and cooling strategy



norden

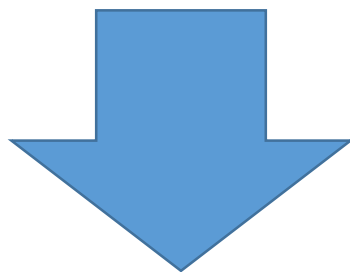
Nordic Energy Research



Last year's presentation

→ 2 papers

- Last year's 4GDH: "*Framework conditions for flexibility options in the district heating–electricity interface*"



"Regulatory incentives for flexible district heating plants in the Baltic countries"

- Accepted for *Utility Policy* (revisions)

"Incentives for flexible district heating in the Nordics"

- Final touches before submission



Objectives for today's presentation

1

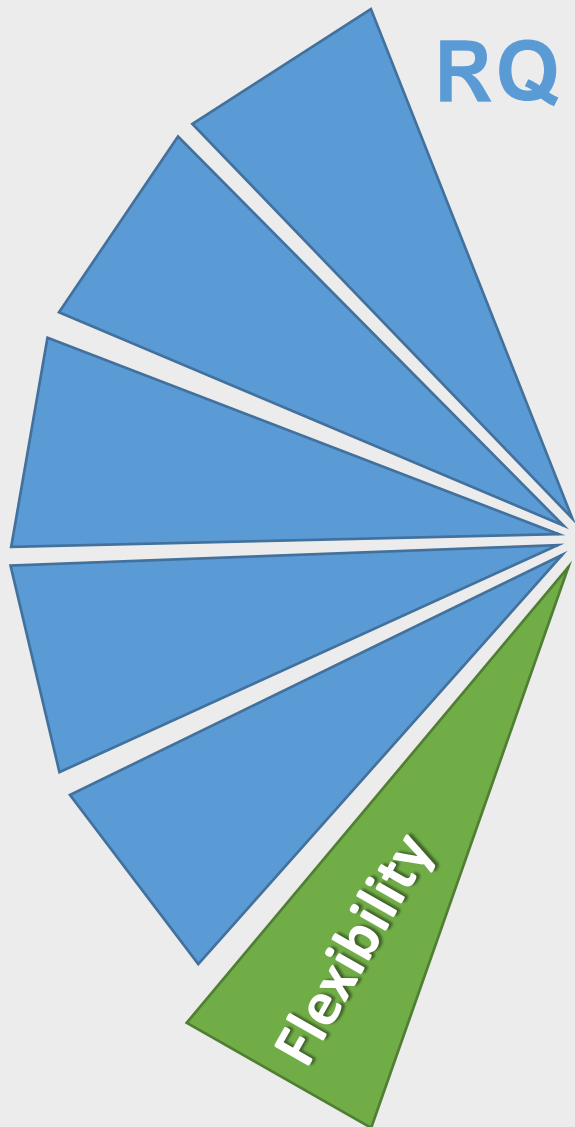
First steps in methodology for evaluation of DH regulation

Next steps: Using it

2

Get your feedback and criticism

– similar studies, contacts, literature



How can regulation for flexibility be evaluated in a comprehensive system- and societal impact analysis?

Why score regulation?



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Flexibility for flexibility's sake

=

One-eyed & irrelevant

Flexibility for society's + energy system's sake

=

Comprehensive & relevant



3 areas of flexibility-regulation

- Increased **Operation** of flexible DH
- Increased **Investment** in flexible DH
- **Non-economic regulation** affecting flexible DH

As described and defined in

Møller Sneum, D., Sandberg, E., Koduvere, H., Olsen, O.J., Blumberga, D., 2017. Regulatory incentives for flexible district heating plants in the Baltic countries. Submitted.

Møller Sneum, D., Sandberg, E., Rosenlund Soysal, E., Skytte, K., Olsen, O.J., 2016. Framework conditions for flexibility in the district heating-electricity interface, Flex4RES Project. Lyngby.

3 areas – examples of regulation



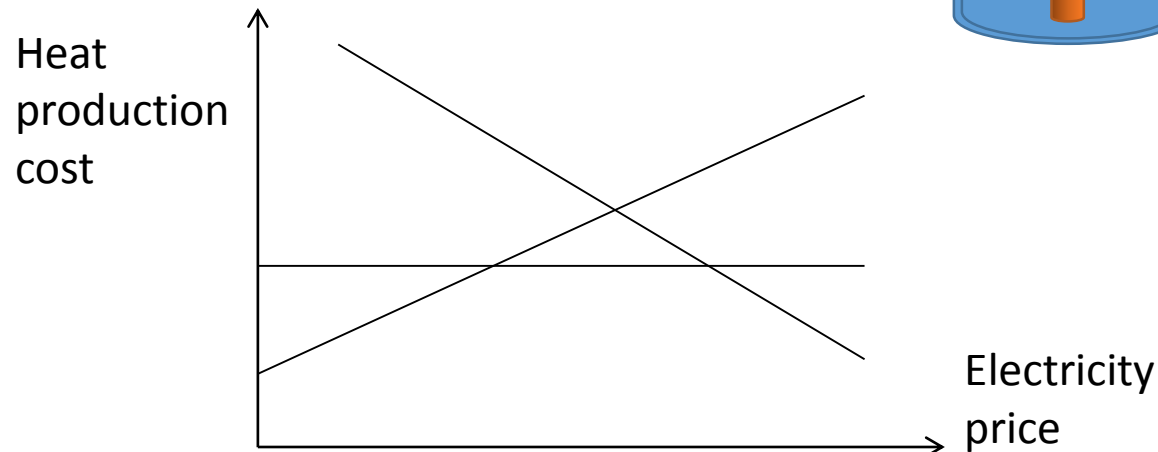
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Non-economic regulation

Environmental regulation, technology restrictions, ownership

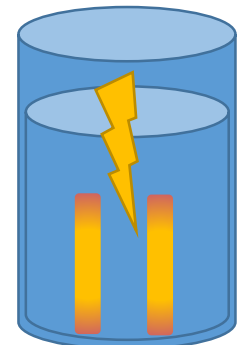
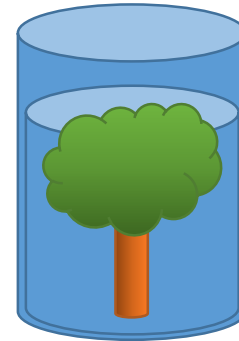
Operation

Taxes, subsidies, grid tariffs



Investment

Subsidy, rate of return requirements, financing requirements





Parameters for scoring

Flexibility

- Ability to integrate VRE (CEEP)
 - Lund, 2014, Lund et al., 2014
- Total share of RE
 - IEA, 2014; Lund and Mathiesen, 2015

Socio-economy

- Fiscal impacts – increase or maintain state revenue
 - Danish Energy Agency, 2007
- Externalities
 - Ministry of Finance, 1999; Lauber, 2005; Miljøministeriet, 2010; Norges vassdrags- og energidirektorat (NVE), 2003; The Environmental Economic Council, 2017, 2016, Ea Energy Analyses, 2016

Business economy

- Increase or maintain company revenue (suppliers as well as grid companies).
 - Assumption

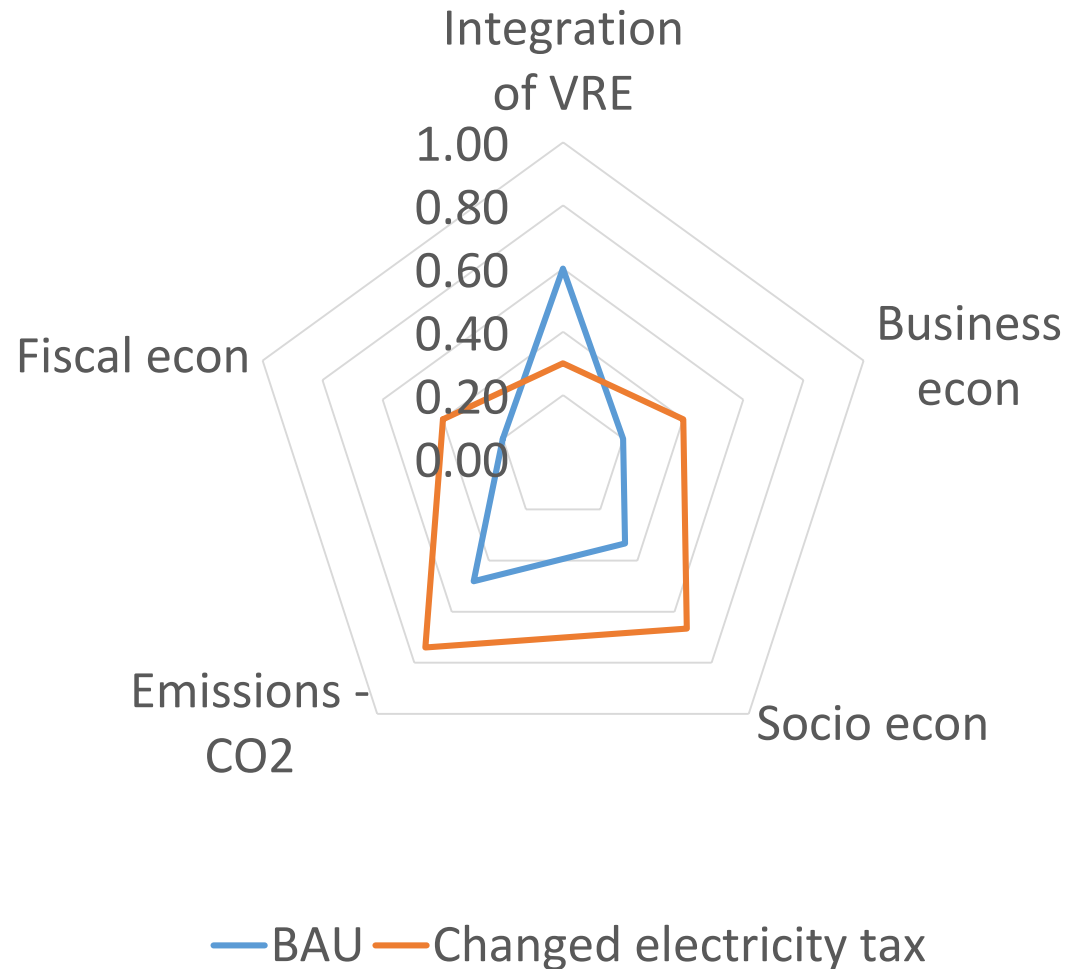
Political goals

- Decrease GHG or other environmental targets
 - Current policies
- Welfare
 - Webb, 2015



Values
purely based
on numbers:
TWh
TCO₂
EUR
etc.

THIS IS AN
EXAMPLE



Next steps



1. Expert review of scoring method

2. Testing the scoring method



3. Applying method on flexibility-related regulation (following studies; not this one).

4. Recommendations for regulation



FYI: Study on modern DH in US coming up!

Framework conditions for DH in US starting January 2018

Inputs and ideas very welcome

- Collaboration
- Contacts
- Previous studies
- Financing for the research

Objectives



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1

First steps in methodology for evaluation of DH regulation

Next steps: Using it

2

Get your feedback and criticism

– similar studies, contacts, literature



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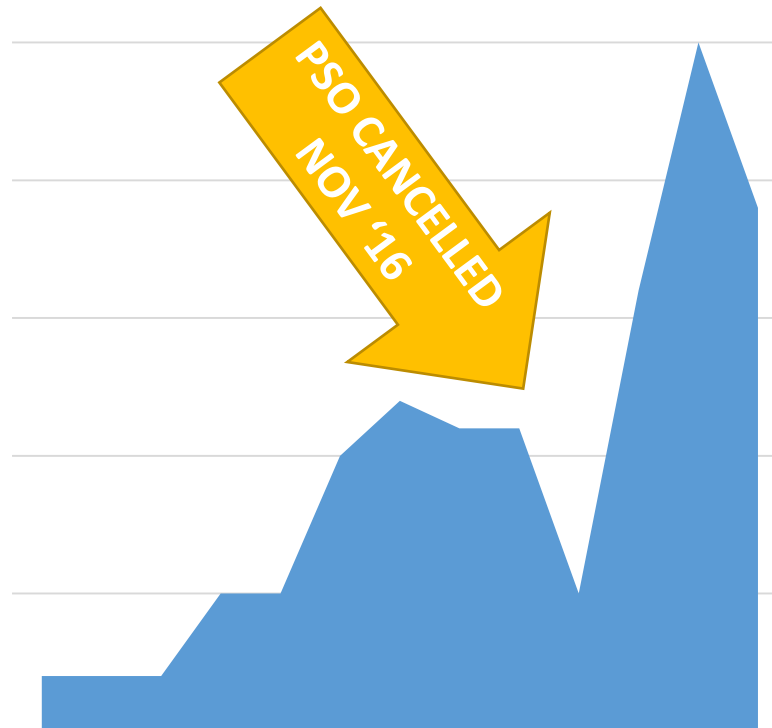
References

- Lund, H., 2014. Renewable Energy Systems, 2nd ed. Academic Press, Incorporated.
- Møller Sneum, D., Sandberg, E., Koduvere, H., Olsen, O.J., Blumberga, D., 2017. Regulatory incentives for flexible district heating plants in the Baltic countries. Submitted.
- IEA, 2014. The power of transformation. IEA, Paris. doi:10.1007/BF01532548
- Lund, H., Werner, S., Wiltshire, R., Svendsen, S., Thorsen, J.E., Hvelplund, F., Mathiesen, B.V., 2014. 4th Generation District Heating (4GDH). Integrating smart thermal grids into future sustainable energy systems. Energy. doi:10.1016/j.energy.2014.02.089
- Lund, R., Mathiesen, B.V., 2015. Large combined heat and power plants in sustainable energy systems. Appl. Energy 142, 389–395. doi:10.1016/j.apenergy.2015.01.013
- Danish Energy Agency, 2007. Vejledning i Samfundsøkonomiske Analyser På Energiområdet 2005, 1–37.
- Ministry of Finance, 1999. Vejledning i udarbejdelse af samfundsøkonomiske konsekvensvurderinger.
- Lauber, V., 2005. Switching to renewable power: A framework for the 21st century. Taylor and Francis. doi:10.4324/9781849772822
- Miljøministeriet, 2010. Samfundsøkonomisk vurdering af miljøprojekter, ISBN PDF version: 978-87-92548-71-9.
- Norges vassdrags- og energidirektorat (NVE), 2003. Samfunnsøkonomisk analyse av energiprojekter.
- Ea Energy Analyses, 2016. Den samfundsøkonomiske meromkostning ved en fossilfri energiforsyning. Copenhagen.
- The Environmental Economic Council, 2017. Økonomi og Miljø 2017. Copenhagen.
- The Environmental Economic Council, 2016. Økonomi og Miljø 2016. Copenhagen.
- Webb, J., 2015. Improvising innovation in UK urban district heating: The convergence of social and environmental agendas in Aberdeen. Energy Policy 78, 265–272. doi:10.1016/j.enpol.2014.12.003

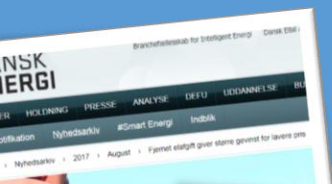
Relevant testing of scoring method: Electricity tax



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E-mails containing "elafgift"



Quarter 2
Quarter 1
Quarter 3
Quarter 1
Quarter 3
Quarter 1
Quarter 3

2014 2015 2016 2017

Based on the following newsletters since April 2014:
 Danish District Heating Association
 Danish Energy Association
 EnergiWatch
 Danish Ministry of Energy, Utilities and Climate

