



Flex4RES

Flexible Nordic Energy Systems



Evaluation of regulation for flexibility – a methodology

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4DH

4th Generation District Heating
Technologies and Systems



AALBORG UNIVERSITY
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Heat Roadmap Europe

A low-carbon heating and cooling strategy

2050



norden

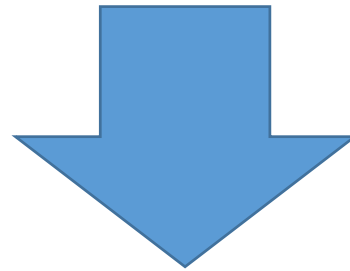
Nordic Energy Research



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

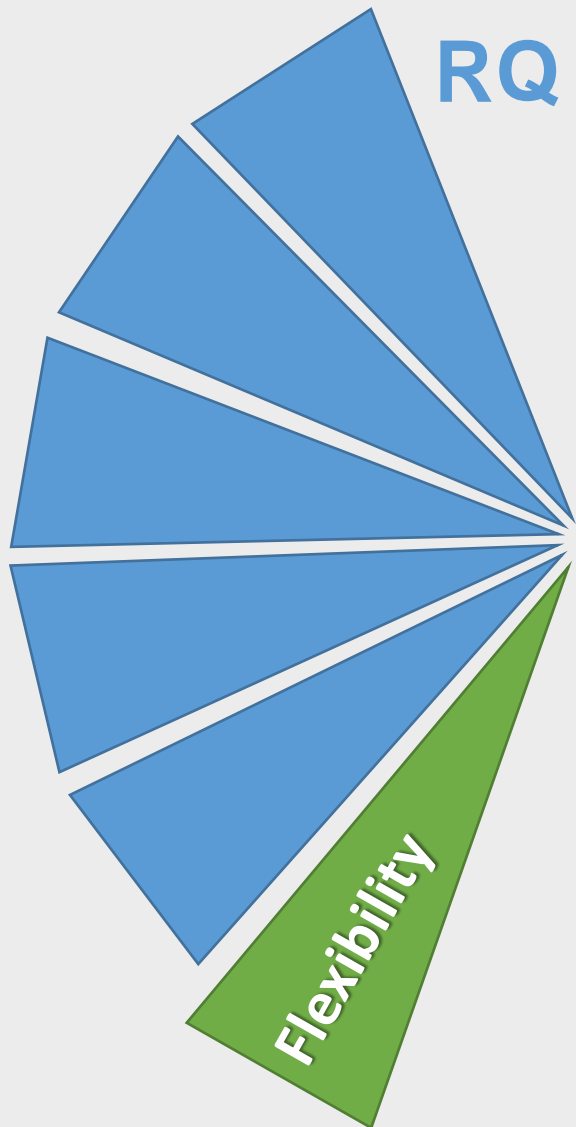
First steps in methodology for evaluation of DH regulation

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

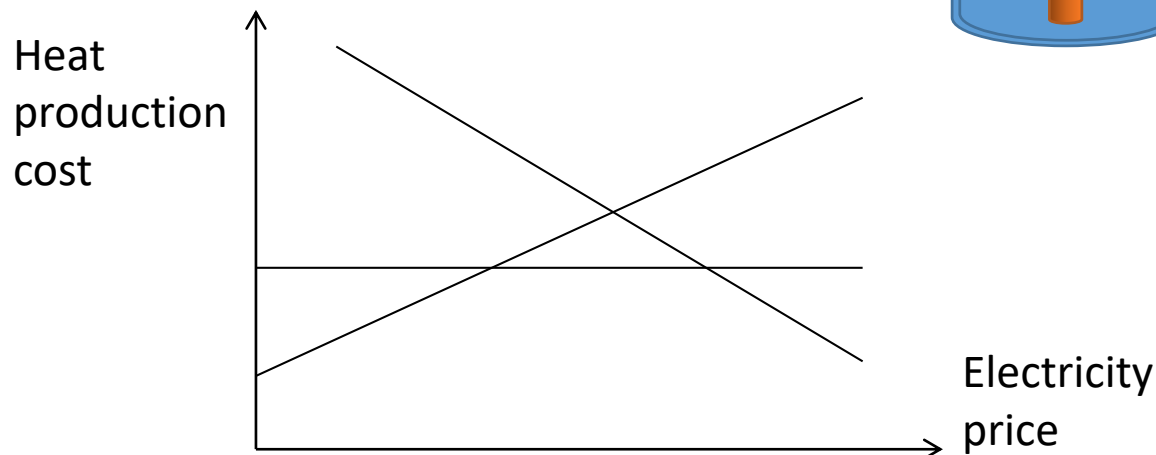


Non-economic regulation

Environmental regulation, technology restrictions, ownership

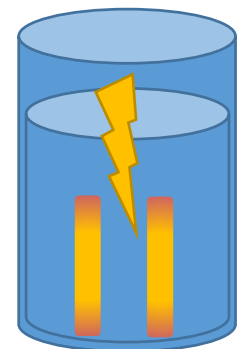
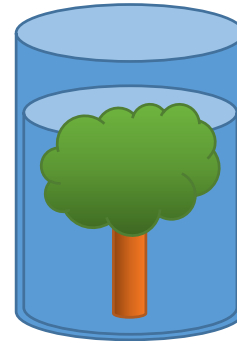
Operation

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

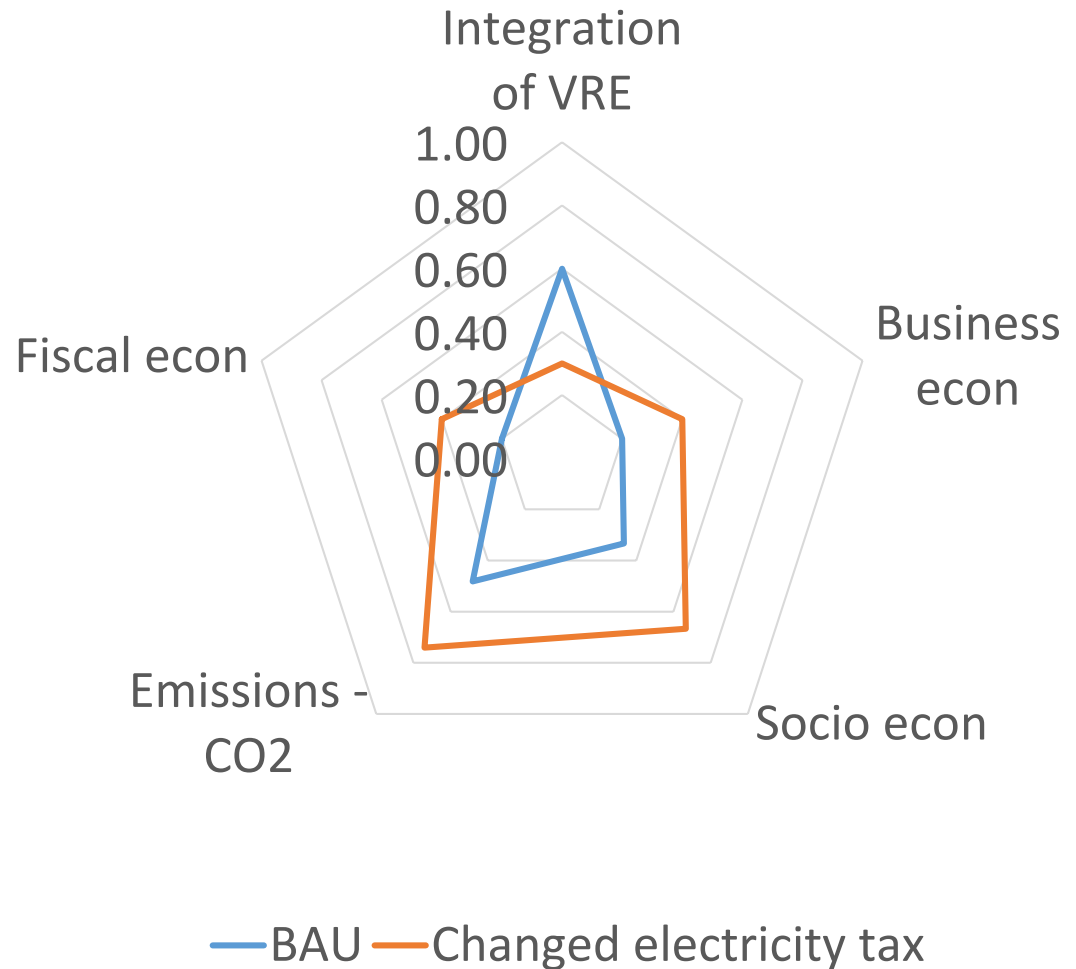
Political goals

- 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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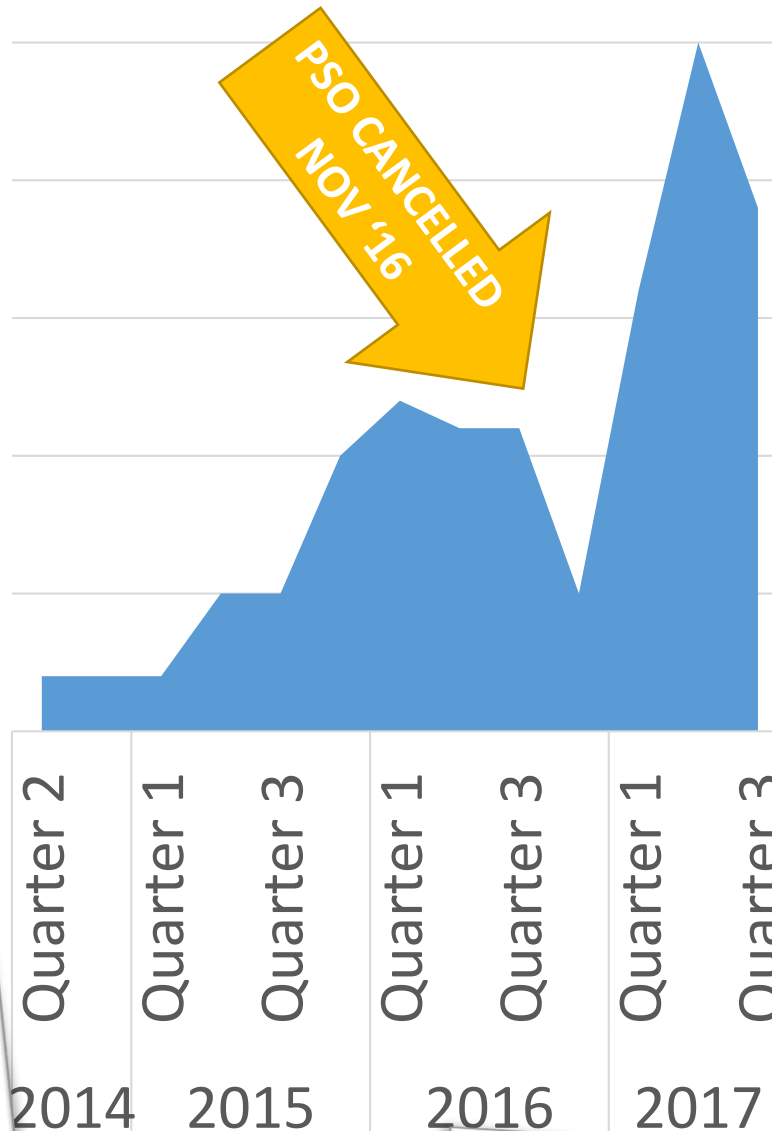
References

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- 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

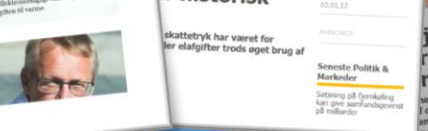
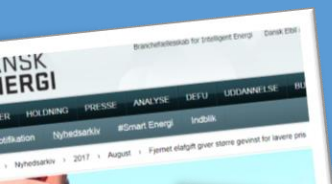
Relevant testing of scoring method: Electricity tax



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E-mails containing "elafgift"



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