

IEA DHC ANNEX TS3: HYBRID ENERGY NETWORKS

FOCUS OF THIS PRESENTATION:

ANALYSIS OF THE STRENGTHS, WEAKNESSES, OPPORTUNITIES AND RISKS

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This presentation has been created in the framework of the international cooperation program IEA DHC Annex TS3 „Hybrid Energy Networks“. More information at www.iea-dhc.org/the-research/annexes/2017-2021-annex-ts3

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BACKGROUND: IEA DHC ANNEX TS3: HYBRID ENERGY NETWORKS



- **An international cooperation program with the aim:**
 - to promote the opportunities and to overcome the challenges for district heating and cooling (DHC) networks in an integrated energy system context
- **Funded**
 - through a task-sharing approach (participants contribute resources in-kind)
- **Lead:**
 - Ralf-Roman Schmidt (AIT); ralf-roman.schmidt@ait.ac.at
- **Runtime:**
 - Fall 2017 – March 2022 (reporting period until November 2022)
- **More information at**
<https://www.iea-dhc.org/the-research/annexes/2017-2021-annex-ts3-draft>

SWOT ANALYSIS

- A SWOT analysis aims at supporting the general understanding of the properties and characteristics of a Hybrid Energy Network
- **Method:** a structured expert involvement:
 - First: collection of SWOT factors
 - Second: comprehensive discussion phase
 - Third: survey
- for the full results please have a look into the **IEA DHC Annex TS3 Guidebook** (available in November 2022)”
- *Some results have been published in:*
 - **Schmidt, R.R. Leitner, B.: A collection of SWOT factors for hybrid energy networks, Energy Reports, Vol 7, 2021, <https://doi.org/10.1016/j.egy.2021.09.040>**



RESULTS

Most relevant aspects based on rating from expert survey

-Average rating & standard deviation

STRENGTHS

	Average	+/-
Higher system flexibility	4.1	1.0
Decarbonization of DHC network	4.1	0.9
Higher degree of freedom for planning/operation	4.0	1.0

Important points discussed:

- *Needs to be shown that this is cost-effective, reliably, and quickly available for future energy systems (RTO, UK)*
- *pure electrification is not the best solution; solar thermal, geothermal, etc. should be part of the diversification strategy aiming at higher efficiency (RTO, Switzerland)*
- *This depends on the value that is seen by the other networks, who may be able to obtain the same services from other sources (RTO, UK)*

WEAKNESSES

	average	+/-
Increasing level of complexity	3.7	1.2
Price signals do not yet take the grid situation into account	3.6	1.1
Present electricity tariffs and taxes are barriers	3.6	1.3

Important points discussed

- ... *shortage of people who can manage such complex systems (government organization , Netherlands)*
- *This is a must. No problem at all with a little metering (RTO, Denmark)*
- ... *existing tariffs for using the electricity grid in Denmark are based on volume (kWh) and not on power (kW) - it should be the other way around. Flexibility must be rewarded (RTO, Denmark)*

OPPORTUNITIES

	average	+/-
Digitalization supports handling of the complexity	4.1	1.0
More research, products, demo projects, trainings etc.	4.0	0.9
Decarbonization incentives can support sector integration	3.9	1.0

Important points discussed

- *The Danish experiences with decentralized CHP units show that the right price signals are more important than digitalization ... (RTO, Denmark) This is a must. No problem at all with a little metering (RTO, Denmark)*
- *Some of the technologies, especially PtX and CCS/U, are still quite immature (solution provider (software)/consultancy; Denmark)*
- *I would reformulate the opportunity as "Current and future decarbonization incentives and measures MUST directly or indirectly support the sector integration" (government organization, Italy)*

THREATS

	average	+/-
A possible disruption of existing business models	3.8	1.2
Risk of stranded investments due to uncertainties	3.6	1.0
Overall higher electricity demand	3.2	1.3

Important points discussed:

- ... *The threat are white elephants such as fossil companies or / and fossil exporting countries that are creating obstacles (RTO; Austria)*
- *Thorough planning and a massive build out of RE electricity should be good remedies against this threat (RTO; Denmark)*
- *Yes, another danger of electrifying everything obsessively... other vectors need to be considered! (association / interest group; France)*

NET ZERO 2050 AND LARGEST LEVERS

- **Net Zero 2050**
 - Sector coupling as a key measure for system decarbonization
- **Largest levers**
 - Providing flexibilities to the power grid
 - Electrification and decarbonization of district heating
 - Use waste heat from electrolysis, increase overall system efficiency

CHALLENGES AND NEXT STEPS

- **Challenges**
 - Increasing complexity regarding interfaces, stakeholders...
 - incompatible price signals and tariffs/taxes in the electricity grid
 - Create awareness for waste heat from electrolysis processes
- **Next steps**
 - Digitalization for handling complexity
 - More demo projects and system level assessment needed



THANKS FOR YOUR ATTENTION!

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