

Modelling Renewable Energy Islands and the role in the energy transitions



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hmm@plan.aau.dk

Hannah Mareike Marczinkowski



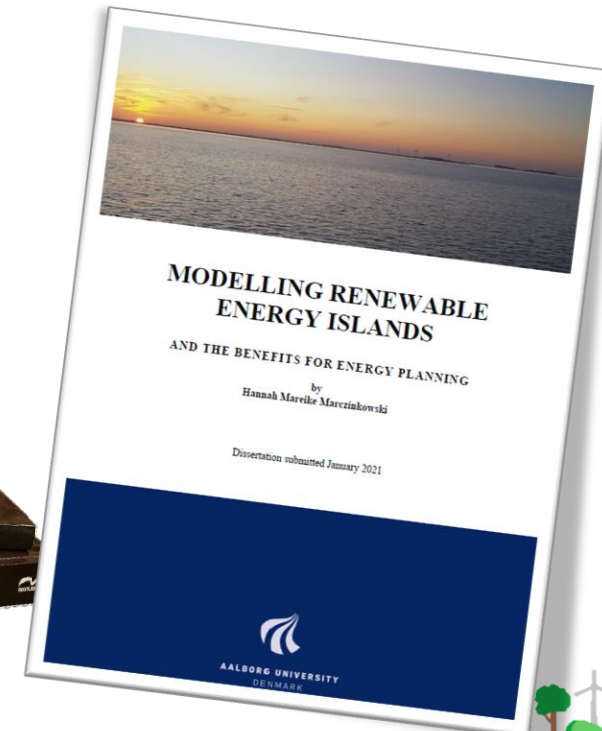
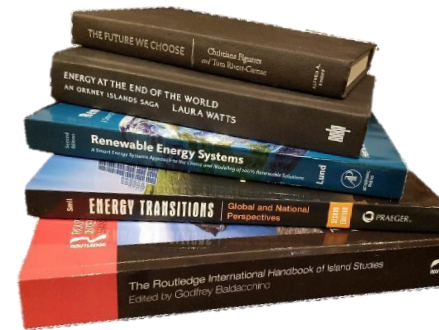
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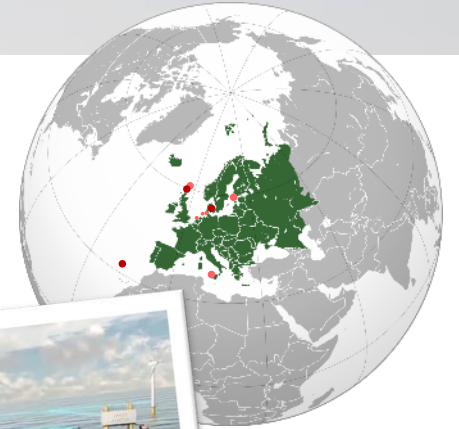
Welcome on Board!

How Modelling Renewable Energy Islands can benefit our understanding and support the energy transitions

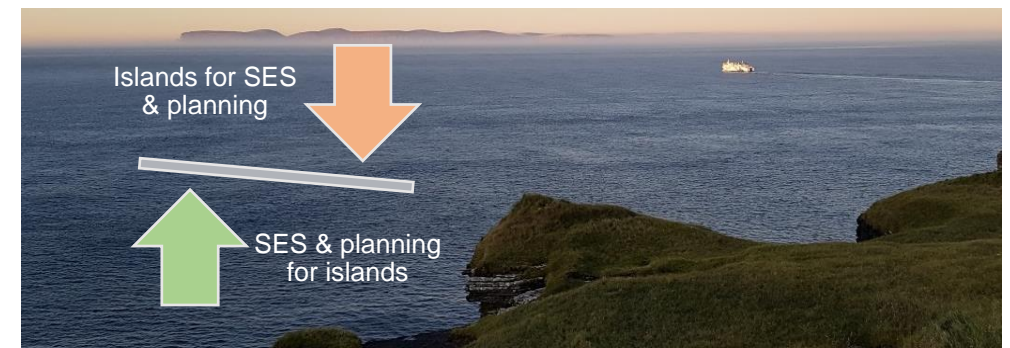
- Point of Departure
 - Background
 - Islands
- Research Journey
 - Research Questions
 - EnergyPLAN analyses
 - Modelling with Islands
- Destination: Islands in Smart Energy Planning
 - Role in Energy Transitions and Further Research
 - Resulting Contribution of Islands



Smart Energy Systems and Islands



- Smart Energy Systems combine smart grids of electricity, heating and gas
- Similarities and differences in scale
- International, national and local relevance
- Testing often beneficiary in small scale
- Demonstration islands as places to explore
- Examples include Samsø, Bornholm, Ærø, Orkney, Madeira, etc.



Why Islands

- 80,000 worldwide
 - 2,700 in the EU
 - 72 in Denmark
 - Many ‘energy-islands’ worldwide
- Islands characterized by secluded-ness yet completeness
 - Close to nature, good for demonstration, recreation, innovation
- Islander and local stakeholders of importance for innovation
- Island mode can be found and relevant in many places

10% of the population

3% (13 million)

60% (8%)

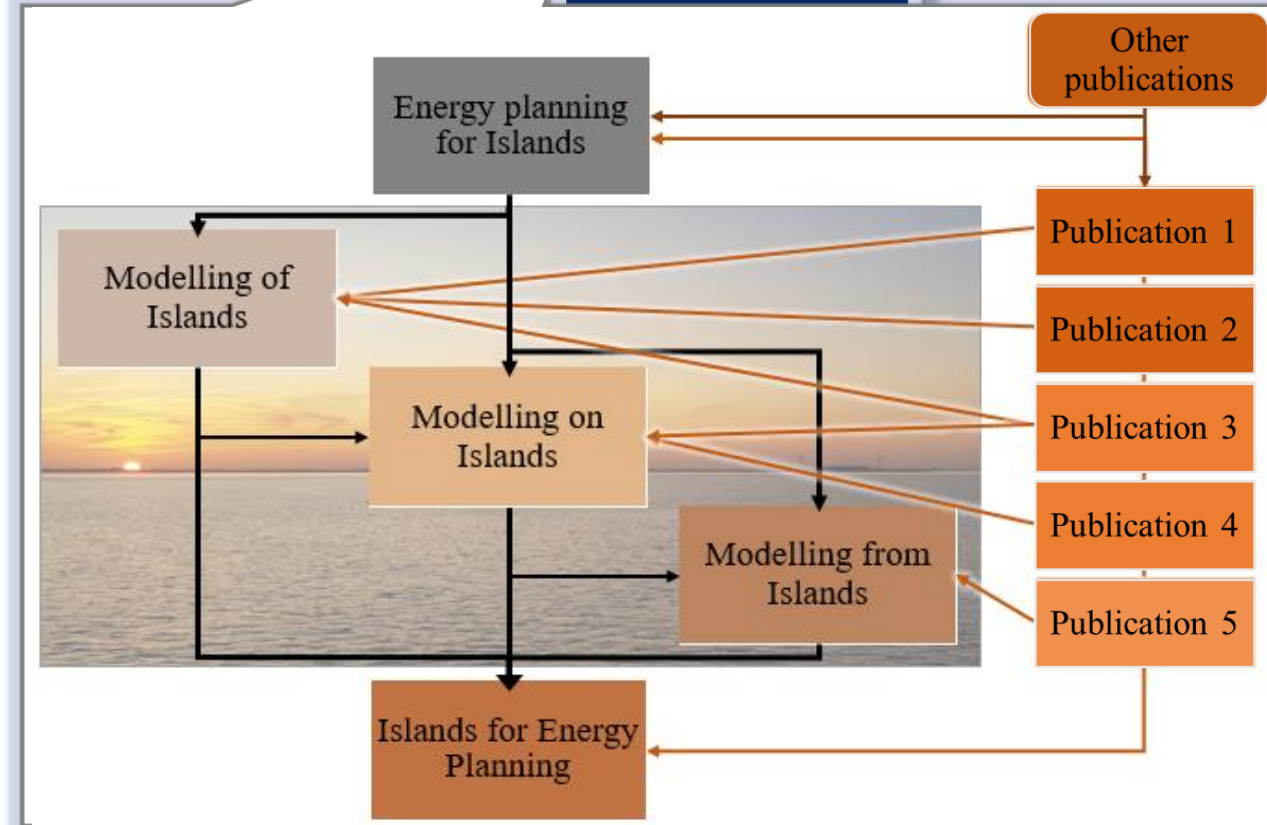
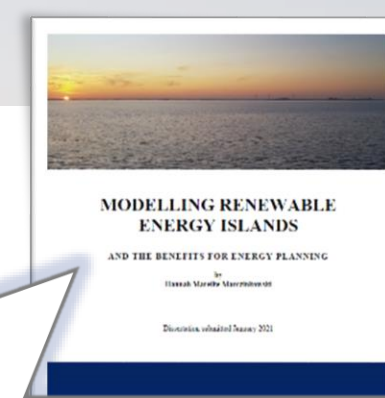
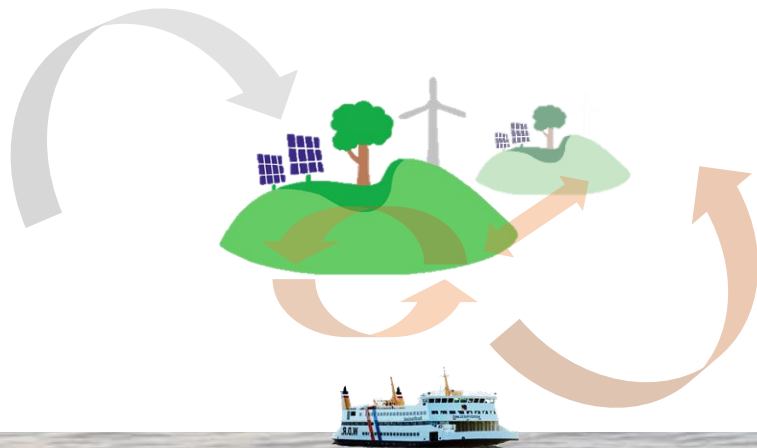
2% of Earth surface



Research Questions

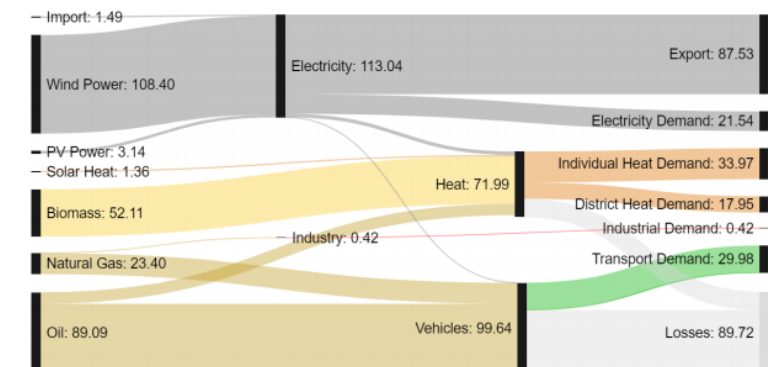
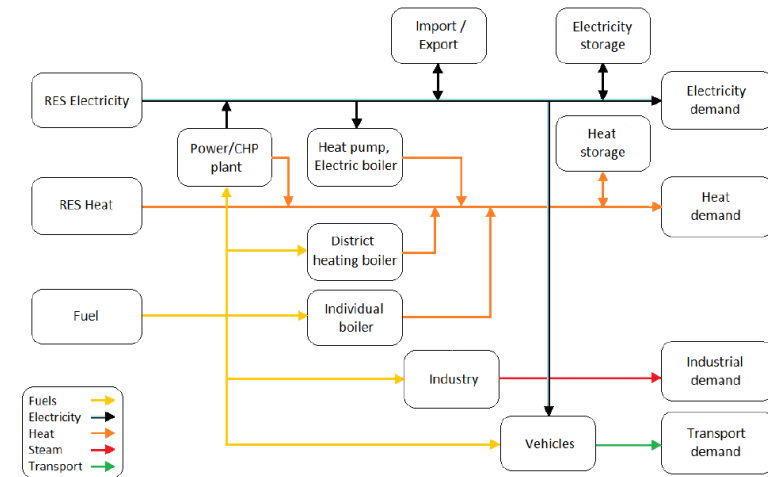
What role can modelling renewable energy islands play in the energy transition?

1. How can **modelling of islands** be used to evaluate renewable energy technologies (and SES)?
2. Why and how should **modelling on islands** be improved by considering and comparing local conditions?
3. How can contextual and institutional alignment elaborate **modelling from islands**?



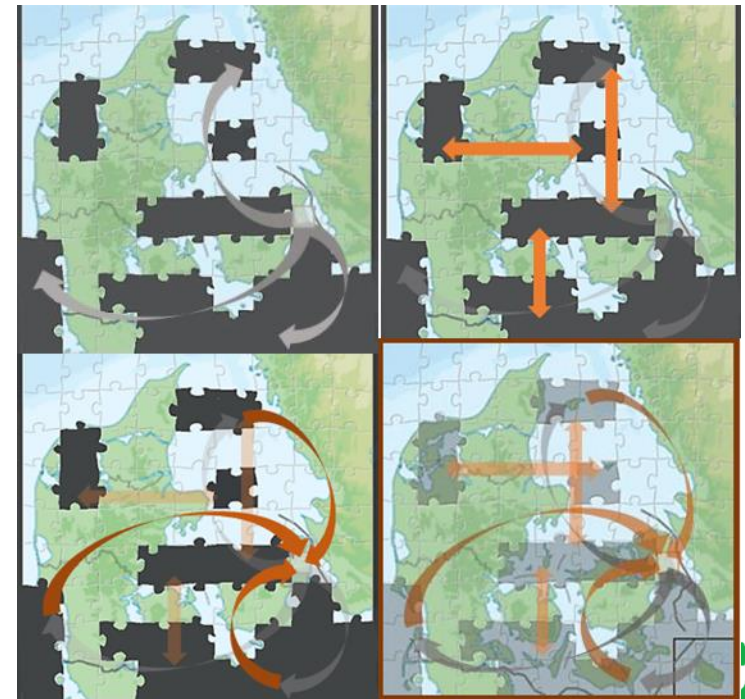
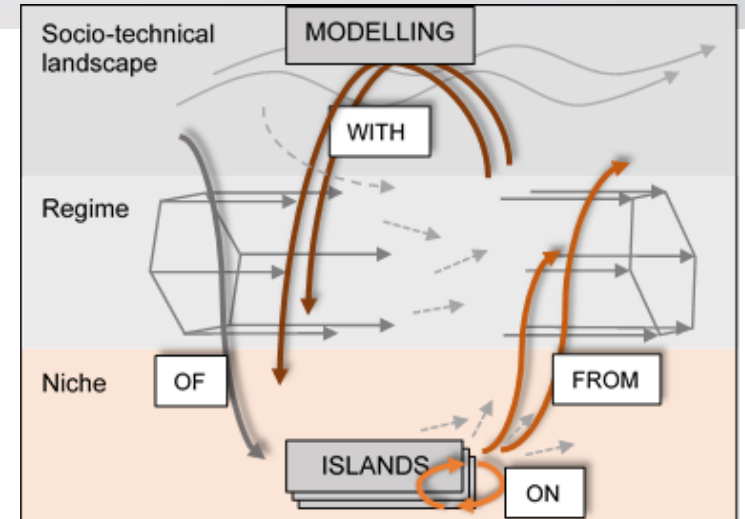
Modelling with EnergyPLAN

- ‘Europe has ambitious energy targets’ [1]
- ‘Energy systems worldwide are facing an energy transition’ [2]
- ‘Islands present special energy systems’ [3]
- ‘Islands’ energy systems are like most other [...] However, they are under more pressure’ [4]
- ‘Energy systems, both large and small, are transitioning towards higher shares of renewable energy’ [5]



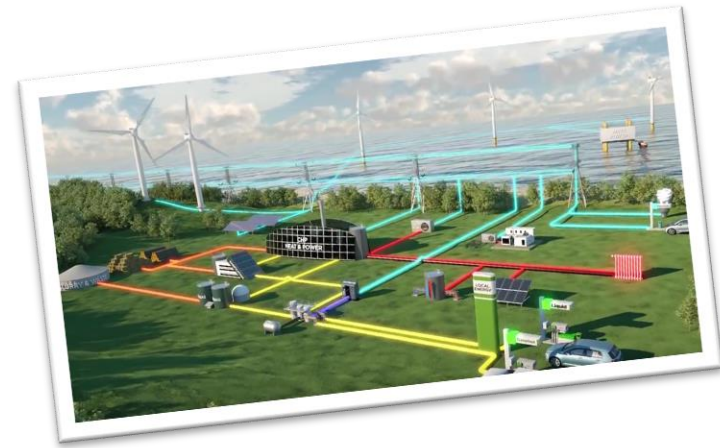
Modelling with Islands

- Modelling *of*, *on* and *from* islands can be summarized as modelling *with* islands
 - Requirement, local development and influence of niche innovation
 - Resulting better inclusion of islands with increased influence and understanding on other levels
 - Combination of top-down coordination, horizontal alignment and bottom-up action
 - Central coordination and decentralised action in strategic energy planning



The Role of Islands in Energy Transitions

- New perspectives, knowledge and resources for modelling and energy planning
- Contributing to cross-sector and cross-border coordination and optimisation
- Benefits from recognition and inclusions of individuality and similarities
- Re-evaluation of island models and island-ness creates balance between planning for/through islands



The Role of Islands in Further Research

- New resulting ‘possibilities from and beyond island modelling’ through resources, understanding and knowledge
- Appropriate local development through self-sufficiency, cross-border collaboration and inclusion (resilience)
- Clarification of ‘energy islands’ and potentials, globally and in the marine sector
- Lighthouse roles and innovative impacts

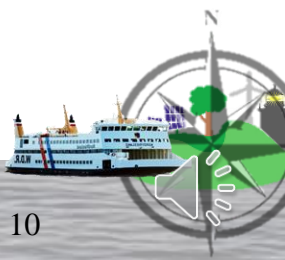


View of Orkney and the surrounding (tidal) energy



The Contribution of Islands

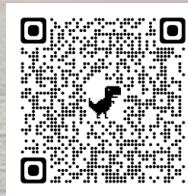
- *'Islands light the way to fight climate change'*
- Modelling *of* islands **enables the evaluation** of renewable energy technologies in an island setting, but with an outside view *of* islands.
- Modelling *on* islands addresses the limitations of the outside view and **improves the modelling** by including and comparing local conditions *on* islands.
- Modelling *from* islands **elaborates the potentials** of island modelling by adding contextual and institutional aspects through perspectives *from* islands and islanders.
- Modelling renewable energy islands **contributes to the energy transition** with potentials for [...] innovation, and island mode optimisation, yet with a global impact [when] done *with* islands.



We have arrived at our final destination

Thank you for your attention

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hmm@plan.aau.dk

Hannah Mareike Marczinkowski



References



If not noted otherwise, all data, photos and illustrations by the author as part of the PhD thesis to be found:
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 - Image ‘World without continents’: <https://i.imgur.com/0V8EyvH.jpg>



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