TOP-NEST

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Technology Opportunities in Nordic Energy System Transitions (TOP-NEST)

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Sustainable Energy Systems 2050
NORDIC ENERGY RESEARCH PROGRAMME

Outline

1. What was our research about?

2. Who was involved?

3. Main results:
   - Spatial perspectives on sustainable transition processes
   - Use of electric vehicles or hydrogen in the Danish transport sector
   - Role of lock-in mechanisms in transition processes
   - Participatory and prospective value network analysis in Finland
   - Path creation in Nordic energy and road transport systems

4. Policy conclusions

What was our research about?

Interlinkage between the energy sector and road transport.

Three technology platforms:

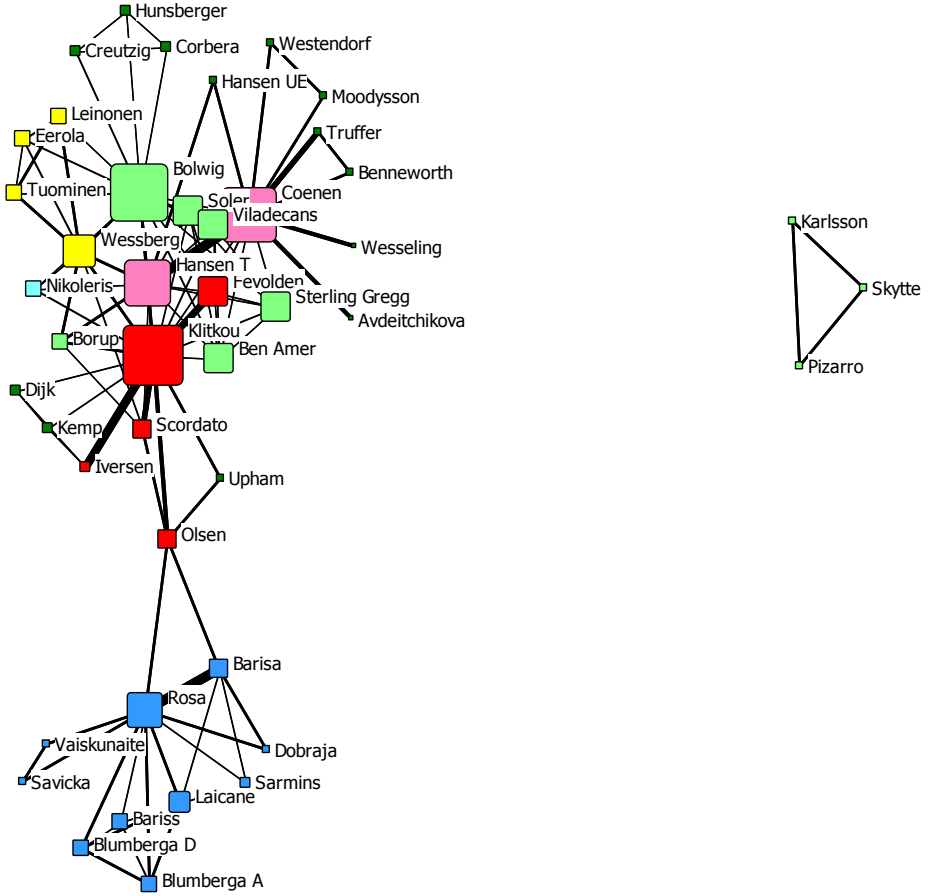
1) Electricity systems and battery electrical vehicles
2) Advanced liquid and gaseous biofuels
3) Fuel cell electrical vehicles and hydrogen systems

How can they give rise to new value chains and create new entrepreneurial opportunities?

Who was involved?

- NIFU – project leader, responsible for WP3, WP0 & WP7
- CIRCLE – responsible for WP1,
- DTU – responsible for WP2 & WP6
- LTH – responsible for WP5, supervisor for PhD
- VTT – responsible for WP4

- Riga Technical University – contributions to WP2, WP3 and WP6



Co-authorship for all TOP-NEST articles (N=18) and TOP-NEST conference papers (N=19), based on degree centrality. Graph created with Borgatti, S.P. 2002. NetDraw

Spatial perspectives on sustainable transition processes

Regional Studies
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http://www.tandfonline.com/loi/cres20

Environmental Innovation and Sustainability Transitions in Regional Studies

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Published online: 09 Jan 2012.

Various papers on the geography of transitions.
Previous research and theory development in Sustainable Transitions has been largely a-spatial.

Core of 'Geography of Transitions' Agenda

1. Whether and why transitions unfold unevenly across space
2. Whether and how context matters for transition processes
3. How the spatial dimensions of networks (local-global) influence transitions processes
4. Governance of transitions at and across different scales

Transition policy should be place-based!

Use of electric vehicles or hydrogen in the Danish transport sector

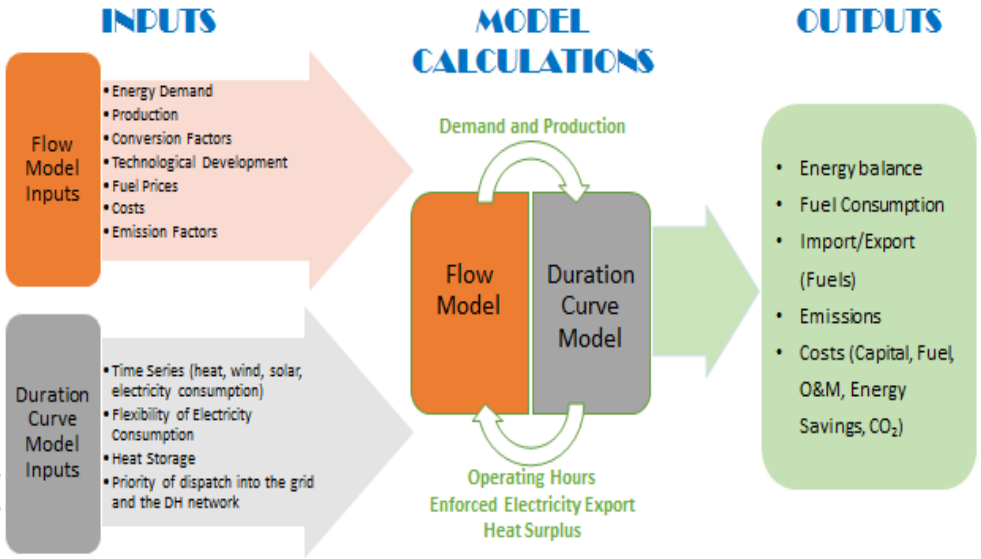
Skytte, K., Pizarro, A. R., & Karlsson, K. B. (2015). Use of electric vehicles or hydrogen in the Danish transport sector in order to ensure a stable and sustainable energy system in 2050? . *Wiley Interdisciplinary Reviews: Energy and Environment.* Forthcoming.

Comparison of three scenarios for the Danish transport sector in 2050

1. Carbon neutral scenario (CNS) in Nordic Energy Technology Perspectives (2013)
2. EV scenario
3. H_2 scenario

The major findings:

- Increased share of BEVs could reduce the socio-economic cost.
- Electricity demand for H_2 generation more flexible.
- H_2 production to out-balance variable electricity surplus.
- Energy generation mix more affected in the H_2 scenario than in the EV scenario.
- Improved efficiency of electrolyser can change the costs towards 2050!



Role of lock-in mechanisms in transition processes

Contents lists available at ScienceDirect

Environmental Innovation and Societal Transitions

journal homepage: www.elsevier.com/locate/eist

The role of lock-in mechanisms in transition processes: The case of energy for road transport

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- How do different lock-in mechanisms of socio-technical regimes influence new transition pathways, specifically for road transport in the Nordic countries?
- Improved theoretical framework for understanding transition processes.
- Comparative analysis of case studies on battery electric vehicles in Denmark, hydrogen and fuel-cell electric vehicles in Norway, and advanced biofuels in Finland and Sweden.
- Cases placed in different socio-technical contexts regarding energy system, industrial structure, actor constellations, and policy.
- Important lock-in mechanisms across all case studies: learning effects, (dis)economies of scale, network externalities, and public regulation at national or EU level.
- Interactions between the different lock-in mechanisms.

Participatory and prospective value network analysis in Finland

Eur J Futures Res (2015) 3:6
DOI 10.1007/s40309-015-0064-y

ORIGINAL ARTICLE

Participatory and prospective value network analysis: supporting transition towards biofuels in Finnish road transport

Anu Tuominen[1] · Nina Wessberg[1] · Anna Leinonen[1]

Socio-technical change towards a 2050 road transport system based on biofuels in Finland.

Novel participatory and prospective value network analysis combines foresight, sociotechnical change at multiple levels and value network analysis.

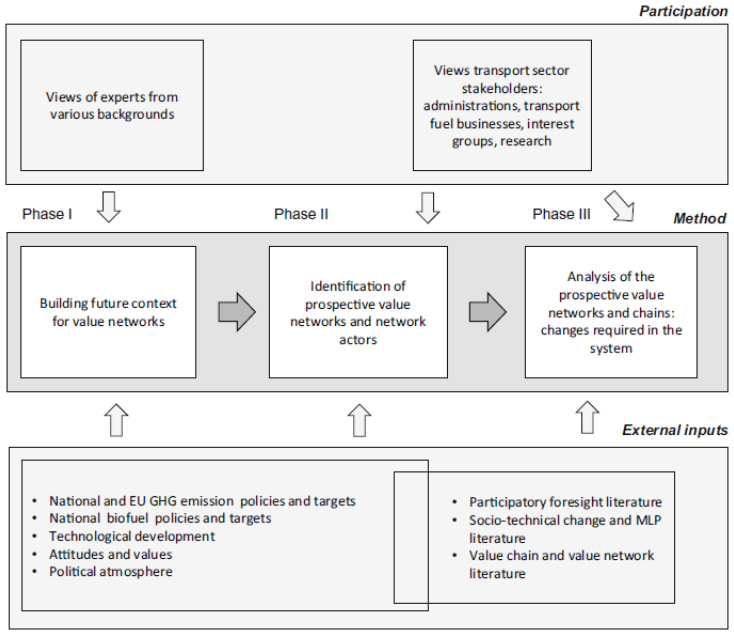
Three phases:

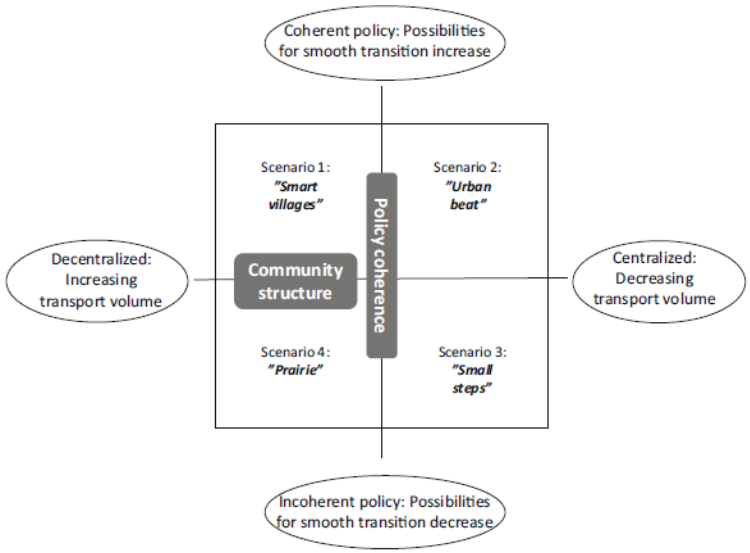
(1) Building future contexts for the prospective value networks,

(2) Identification of value networks and network actors, and

(3) Analysis of value networks & chains and finding the major elements needing change in the system.

Proposed approach widens the scope of system actors from linear value chain thinking to a transition-oriented network approach.

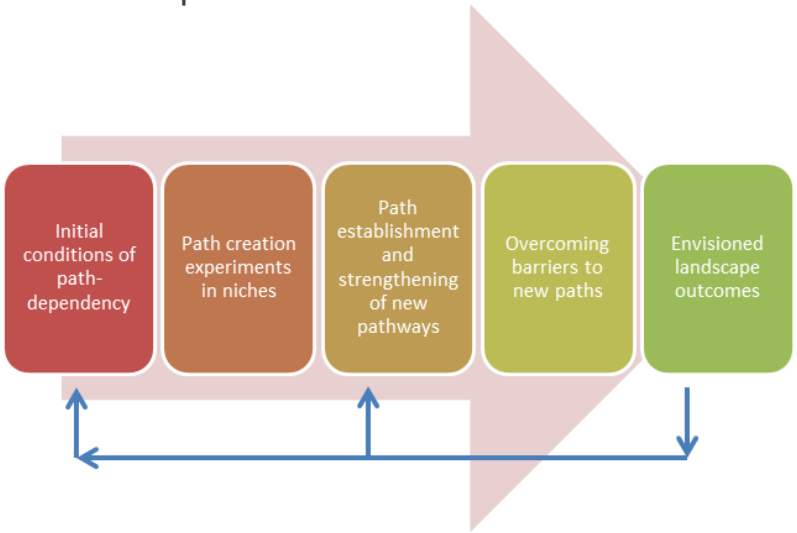




Path creation in Nordic energy and road transport systems

Hansen, T., Klitkou, A., Borup, M., Scordato, L., & Wessberg, N. (Under review). Path creation in Nordic energy and road transport systems. Renewable & Sustainable Energy Reviews.

- Review recent work on path-creation processes in Nordic transport systems.
- Analyse how new paths are being created, how existing lock-in mechanisms are sought to be un-locked and how sub-optimal solutions are avoided.
- Comparative analysis of four case studies.
- Discussion of common challenges for path-creation processes.



- Initial conditions influence path creation processes.
- Public support to path-creation experiments and path-establishment processes.
- Important cracks in the existing fossil fuel-based regime.
- Discussion of barriers and opportunities for further developments.
- Different logics of the energy and transport systems.
- The differences between the Nordic countries require greater policy coordination.
- Danger of getting locked into sub-optimal solutions.

Policy conclusions

- Path creation processes are key processes for the transition to sustainable road transport.
- Transition policy should consider specific local, regional or national conditions for transitions and not just copy policy.
- Need for policy coordination between different policy domains, between different policy instruments, and between the Nordic countries.
- Development of the technology platforms are significantly conditioned by EU policies and the Nordic countries could gain from aligning positions, despite differences between the countries.
- Governments have a choice between strategic long-term policy and weak political leadership.