



A more resource efficient and climate neutral electric energy system by 2030: views of Nordic experts

Transition to a resource efficient and climate neutral electricity system (EL-TRAN)

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Sarah Kilpeläinen
Prof. Pami Aalto
Pasi Toivanen



EL-TRAN

- Transition to a resource efficient and climate neutral electricity system (EL-TRAN consortium)
- social scientists, energy engineers, future researchers and lawyers
- policy advice

Research Design

- extension of a previous study on Finland only (Lehtonen et al 2016)
- How to develop the electric energy system on the way towards 2030?
- reports, studies and scenarios on the energy system published by the key stakeholders in the public, energy industry, business and NGO sectors

	Interests vis-à-vis the electric energy system		
Component of the electric energy system	a. Resource efficiency	b. Climate neutrality	c. Further interests
A. Production	Aa	Ab	Ac
B. Network	Ba	Bb	Bc
C. Consumption	Ca	Cb	Cc

Respondents' sorts

- 43 respondents from Nordic countries, senior experts in Nordic ministries, business associations, energy companies, NGOs
- 48 statements sorted in the grid, interview
- completed sort represents organizations' view on how to develop the electric energy system on the way to 2030

-5: most unlike our view

0: Neutral or no clear position

+5: most like our view

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5

Participants' loading on factors

participant	F1	F2	F3
35	0.2178	0.3336	0.3530
36	0.0369	0.5953X	0.1952
37	-0.1548	0.7787X	0.0869
38	0.1001	0.0054	0.3858X
39	0.0958	0.7685X	0.0349

Example of participants loading on factor. Significant loading at $1/\sqrt{48} * 2.58 (SEr) = 0.37$ (Brown 1986: 64) with next loading at least $.20 <$.

- Participants' sorts are factor analysed
- similar sorts form 3 factors, that is viewpoints
- significant loaders exemplify the factor
- explained variance of 44%

Initial results

- 3 factors identified that represent approaches to the development of the electric energy system
 - Factor 1: "highlighting the central role of the market"
 - Factor 2: "the role of transport in energy transitions"
 - Factor 3: "society as central component & ensuring secure supply"
- a set of consensus statements that point to lines of agreement

Factor 1: highlighting the central role of the market

- Explained variance: 15%
- 9 participants load on this factor
- DK, FI, NOR, SWE

Factor 1

Electricity production must be based on **competition** between solutions of different types and sizes. (5)

The flexibility of demand must be promoted, but primarily through the **market pricing** of electricity. (5)

Focus on market based solutions and competition

When building the electric energy system of the future, the increase in the price of energy must be kept reasonable in order to **support competitiveness** and the well-being and purchasing power of consumers. (4)

Factor 1

The bottlenecks in the electricity transmission grid must be removed by connecting the production resources to consumption both on the state and regional levels, because it is energy and cost efficient. (4)

Microgrids must be developed systematically, above all by ensuring that the people within their scope are committed to building a low carbon society. (-4)

Development of grid solutions

The regulation method of network operators must also promote new types of flexible smart grid solutions, in addition to investments into the primary network, in order to develop energy efficiency. (4)

Factor 2 – the role of transport in energy transitions

- 16% explained variance
- 9 participants load on this factor
- DK, NOR, FI

The society must promote the use of **electric vehicles** not only as a solution to the energy problems of transport: they also help with directing loads and storing energy and can even function as reserve power solutions in homes. (4)

The **energy efficiency of the transport system** must be improved by promoting the use of smart grids and electric vehicles. (5)

Smart transport solutions at the centre of electric system development

Vehicles using biofuels compare unfavourably to electric vehicles, when the aim is to make the energy consumption of transportation more environmentally friendly. (4)

Factor 2

Wind and solar power must be taken into account in developing the electricity grid. Grid connection must be available cost-effectively, in suitable locations and with light permitting processes. (5)

The use of **forest-based biomass** in energy production must be increased. (-5)

Questions of resources

The use of **natural gas** to produce electricity and heat must be ensured during the transition towards lower-emission technologies. (-5)

The production of **wind power** must be supported both offshore, far away from human settlements as well as onshore when people produce it locally on their own back yards. (4)

Factor 3 – society as central component & ensuring secure supply

- 13% of explained variance
- 7 participants load on this factors
- FI

Factor 3

The **commitment of citizens and companies** to a **climate neutral society** must be ensured by providing more information about the objectives of energy efficiency and climate neutrality at the time of selecting the energy solution. (5)

Important role for society

When building the electric energy system of the future, the increase in the price of energy must be kept reasonable in order to support competitiveness and the **well-being and purchasing power of consumers.** (5)

Factor 3

Our country must be at least **self-sufficient** in producing electricity and preferably a net electricity exporter. (4)

Network operators must have the possibility of using **energy storages** as a part of grid operations. (4)

Security of supply

The potential of energy islands in using local resources efficiently and improving the **security of supply vis-à-vis disruptions** must be explored and tested. (4)

Examples of statements on bio-energy

- The use of forest-based biomass in energy production must be increased.
(0, -5, -1)
- Vehicles using biofuels compare unfavourably to electric vehicles, when the aim is to make the energy consumption of transportation more environmentally friendly. (0, 3, -4)

Lines of agreement

- The regulation method of network operators must also promote new types of flexible smart grid solutions, in addition to investments into the primary network, in order to develop energy efficiency. (4,2,3)
- The benefits of geo-thermal heat pumps in the efficient use of resources must be questioned, because they increase the use of electricity and endanger the future of the existing district heating network. (-3, -4, -4)
- Underground cabling is weatherproof and as such the only solution for ensuring the security of supply of the network. (-3, -4, -2)
- Small-scale electricity consumers and the aggregators representing them must be steered towards investing in the flexibility of demand by tariffs and electricity taxes. (3, 2, 1)

Contact us!

- www.el-tran.fi
- [@Eltranteam](https://twitter.com/Eltranteam)
- pami.aalto@uta.fi (consortium director)