Energy Sufficiency and Energy Transition in Denmark and EU

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Definitions of Energy Sufficiency

1. “Energy sufficiency refers to changes in individual behaviours that lead to lower demand for energy services” (Moser et al. 2015)

   Energy demand = Human needs/wants * energy sufficiency * energy eff.

2. Energy sufficiency is “a state in which people’s basic needs for energy services are met equitably and ecological limits are respected” (Darby and Fawcettt 2018 / ECEEE theme)
Recent Transition Scenarios for Europe

- Paris Agreement Compatible (PAC) Scenario with CAN-Europe, EEB, combined version 2019, 65% reduction 2030, climate neutral 2040

- negaWatt Scenario, coming 2022

- Energy Wattch Group / Lappeenranta University of Tech., 2019+updates

- Development of detailed statistics and forecast for each country (Dashboard)
- Story lines for sectors: cement, steel, glass, alu, paper, chemicals & plastic
- Joint agreement on assumptions and sufficiency
- Combine national scenarios into EU-wide scenario
- EU-wide results in mid 2022
negaWatt scenario:

Basis for consumption corridor:
• Higher efficiency
• Lower demand
• Recycling
Danish Sufficiency Scenario
INFORSE-Europe + Aalborg University: Integrating Energy Sufficiency in Danish Plans

• Basis is ”Ida Klimasvar” an alternative scenario with 70% emission reductions from energy in 2030 and 100% in 2045.

• We propose energy sufficiency above existing scenario for
  • space & water heating,
  • domestic electricity use,
  • personal transport

• We use the definition of energy sufficiency: changes in individual behaviours that lead to lower demand for energy services (without harming well-being)

Project lead by Aalborg University, supported by Nordforsk
Housing, Heating Sufficiency Measures

• Better use of existing buildings instead of increasing building area with construction of new buildings and extension existing buildings

• Lower indoor temperatures and other heat saving practices, (reducing over-ventilation, etc.)

• Water saving with showers, taps etc. that use less water

• Water saving practices (water saving customs as shorter/fewer showers, lifestyle changes)

Expected reduction: 6% of total heat demand beyond IDA Klimasvar
Housing, electricity sufficiency measures

- See TV more together in family (-40%)
- Less families with two fridges (-14%)
- Fill dishwasher and washing machine more often (-40-50%)
- Dry cloth on line instead of dryer every second time (-50%)
- Turn off light when no needed (-30%)
- Optimise cooking (-20%)
- Turn off router at night (-50%)
Electricity in dwellings: 20% reduction with sufficiency
Personal Mobility, (sufficiency) Measures

- More passengers into trains with:
  - Improved railways with frequent trains on most lines,
  - Develop railway stations into mobility centres with good opportunities to change
  - Better opportunities to carry bicycles in trains and buses
- Urban planning with:
  - less space and less parking for cars in cities,
  - with the principle of having most functions available within 15 min by bicycle and
  - with “traffic islands” in cities, with only one car entrance
- Super bicycle paths for distances 4-20 km (popular for users of electric bicycles).
- General reduction of road speed, motorway speed 100 km/h urban speed to 30 km/h
- More expensive parking
- Increase use of car sharing, support of car-sharing associations etc.
- Reform of ticket prices on public transport to reduce prices on longer distances,
- Reduce state subsidies for commuting,
- Roadpricing for cars.
- Employers should be allowed to give bicycles to workers without taxation
  (developed by Society for Green Technology and other groups in IDA)
Effects of Mobility Sufficiency Measures

• Reduce car traffic in average 43%, varying from 90% for trips below 2 km to 25% for trips 50 - 100 km (30% for longer distances >100 km)
• Reduce CO₂ emissions from cars with 70% including electric cars
• Co-benefits from more cycling, more equal access to mobility, less CO₂ from new road construction, less CO₂ from less demand of cars
Integrating all Sufficiency in EnergyPlan

Fuel use

TWh/year

Preliminary
results

<table>
<thead>
<tr>
<th></th>
<th>IDA Klimasvar</th>
<th>IDA Klima+Sufficiency</th>
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<tbody>
<tr>
<td>CO₂, fossils (mio tons)</td>
<td>11,99</td>
<td>8,02</td>
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<tr>
<td>Cost (mill. €)</td>
<td>21963</td>
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Possible Additional Sufficiency Actions:

Housing:
• Tiny house development

Transport:
• More work from home
• Land-use planning for workplaces and dwellings to reduce commuting
Thank you

Read More:
INFORSE-Europe’s web site  www.inforse.org/europe

Integrating Energy Sufficiency into Modelling of Sustainable Energy Scenarios
https://www.inforse.org/europe/Energy-Sufficiency-Project.htm

INFORSE-Europe Seminar Proceedings:
www.inforse.org/europe/seminar_2021_INFORSE-Europe_DK.htm