THE COST OF GREEN TRANSITION IS NOTHING COMPARED TO OUR HEALTH AND ENVIRONMENTAL COSTS

A study on Danish environmental effects, by Energy Modelling Lab ApS (EML), Aarhus University (AU), Aalborg University hospital (AAU) and Copenhagen University (CU)

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WHY EVEN LOOK INTO HEALTH IMPACTS FROM AIR POLLUTION?
EMISSIONS KNOWS NO BOUNDARIES

Only 30% of heath costs in Denmark relates to Danish emissions

20 billion DKK annually from Danish emissions

Navigation in the North sea and Baltic sea is estimated to have a socioeconomic cost of more than 1000 bill DKK every year.
BACKGROUND FOR LINKING AIR POLLUTION AND ENERGY SYSTEM MODELS

• The team who has developed the linking of air pollution modelling and energy system modelling to include health impacts in the evaluation of future scenarios is originally from the CEEH project - Centre for Energy, Environment and Health headed by Prof. Eigil Kaas, KU

• Development of the method for linking was mainly done by Prof. Jørgen Brandt, Aarhus University and PhD Kenneth Karlsson now EML and IVL (formally DTU)

• In the recent EU H2020 project REEEM – a similarly linking was done including the same Danish teams

• Based on this methodology a couple of “real world” analysis has been carried out: “Klimakommissionen…..” + Notat 1 “Husk Helbredomkostningerne”
MODELLING SETUP
MODEL SYSTEM SETUP

- **Air Pollution Dispersion Model** - DEHM
- **Energy System Model** – TIMES/Balmorel
- **Health Costs Evaluation Tool** – EVA

**Results**
- Energy consumption sectors
- Emission trajectories
- Health impact costs
- Exposure geographically
- Exposure from sectors
- Physical health impacts and costs
- Unit costs e.g. kr./kg SO2
- Emission concentration level
  - 1x1 km and 100x100m
  - Emission tracked from sectors
POST CALCULATION OF HEALTH COSTS

Energy consumption sector level

Energy System Model – TIMES/Balmorel

Emission factors and unit costs

Emissions and health impact costs
RESULTS
DANISH POLLUTION IN DENMARK

Health cost in Denmark today from Danish emissions in residential and road transport

- Husholdninger
- Vejtransport

Bill. DKK/year

- Diesel/olie
- Benzin
- Naturgas
- Biobrændsler
- Brændeovne
- Træpiller+halm
- Dæk og bremsen
FUTURE PROJECTIONS

Healt costs in Denmark from danish emissions
ESTIMATED COSTS OF ENERGY SECTORS
THE GREEN TRANSITIONS IN DENMARK TO ACHIEVE A 70 % GHG REDUCTION IN 2030

<table>
<thead>
<tr>
<th>TIMES-DK scenarios</th>
<th>CEPOS</th>
<th>EA energianalyse</th>
<th>Climate partnerships (Danish industrial collaboration)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-15 Bill DKK/year</td>
<td>27 Bill DKK/year</td>
<td>13 Bill DKK/year</td>
<td>15 Bill DKK/year</td>
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</tbody>
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CONCLUSION

- Danish air pollution costs in Denmark only is estimated today to cost approx. 19 billion DKK annually
  - Saving potential is between 10 and 14 billion DKK depending on biomass consumption
- Global cost from Danish emissions is approx. 45 billion today
  - Global saving potential is between 15 and 20 billion DKK depending on biomass consumption
- Cost of the Danish 2030 target is estimated to be approx. 15 billion in 2030
THANK YOU FOR YOUR TIME

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www.energymodellinglab.com
REFERENCES

- https://energymodellinglab.com/publications/
  ske_beregningspriser_for_ekmissioner.pdf