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Jørgensen, Michael Søgaard

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Identifying shared and contested elements in climate plans as part of shaping transitions towards a Danish low carbon society

Michael Sjøgaard Jørgensen, Department of Management Engineering, Technical University of Denmark, msj@man.dtu.dk

Abstract

The Danish government's vision about Denmark as a society independent of fossil energy has initiated several Danish energy and climate action plans during 2009-2010 with visions and measures for a 30-40 year time perspective. The paper analyses differences and similarities in action plans from the Danish Society of Engineers, a renewable energy NGO, an environmental NGO and a national climate change commission. The aim is to identify shared and contested elements, which need to be addressed in attempts to establish alignment around transition efforts towards a fossil free Danish society. The analyses are conducted as part of a project about sustainable transitions towards a low carbon society.

The plan from the renewable energy NGO is an energy plan, while the other plans are climate plans, which include non-energy related greenhouse gasses from land use changes and use of fertilizers in agriculture. The plans differ with respect to whether and how agricultural production and Danish food consumption should change as part of transitions towards a low carbon society.

All four plans agree about a significant increase in Danish wind turbine capacity and stronger energy saving efforts in Danish production and consumption activities. The plans differ with respect to how big reduction of energy consumption it is possible to obtain and how big the future energy consumption will be. This has implications for how big wind turbine capacity the plans assume is necessary and possible to build, ranging from 200% to 500% increase.

The different assumptions about the future energy need and the wind turbine capacity imply also big differences in the future role of biomass as energy source, ranging from 50% to 250% increase of the present consumption, which could imply quite different ecological and climate impacts.

The plans build upon different scenarios for the overall Danish energy system concept, which have implications for investment needs in energy system infrastructure. The national commission's plan describes a system continuously exchanging energy with other countries through a transnational grid, while the other plans build upon scenarios for a more independent national energy system, where wind turbine energy mainly is used or stored in Denmark.

Other differences in the plans show that creation of alignment about future transitions efforts also needs to address assumptions about the roles of economic growth and technological optimization, and of different public regulation efforts, not least whether economic measures and market development can initiate transitions towards a low carbon society.

Introduction

In analyses of sustainable transition of energy production and consumption it is important to have a focus on different actors' assumptions about the 'nature' of energy production and consumption since such assumptions are an integrated part of actor strategies and statements about the kind of transitions that can or should take place. Some of these assumptions have been articulated as part of the report of the Danish Climate Change Commission and as part of the debate about the report. Furthermore, the climate and energy plans from the Danish organisation Renewable Energy (Vedvarende Energy, earlier OVE), the Danish environmental NGO Friends of the Earth Denmark (also called NOAH) and the Danish Society of Engineers have similarities and differences in terms of the amount of energy services needed in society and the wind turbine capacity, which is possible to install at a certain time. Some of the statements are related to the type of energy system more than to specific technologies which should be developed. These statements and debates show how 'energy system concepts' are characterised, sometimes as part of positioning certain technologies or investments. In the following some of the assumption, which have identified as part of the recent energy and climate debate in Denmark - and some possible implications of these assumptions, are presented and discussed.

The four plans have directly or indirectly been initiated by the Danish government's vision about Denmark as a society independent of fossil energy initiated several Danish energy and climate action plans during 2009-2010. All the plans describe visions and measures for a 30-40 year time perspective.

The overall aim of the paper is to identify shared and contested elements of these plans. The overall idea behind this analysis is that such an identification of shared and contested vision elements is necessary for alignment around transition efforts towards a fossil free Danish society. From a transition perspective, shared visions could imply that the implementation of these visions could be planned, while contested visions identify issues where disagreements need to be handled in order to move the development in relation to this issue ahead.

The overall approach to sustainable transition behind the paper is that technical opportunities not automatically implemented and that it is not possible to develop blueprints for transitions in a 30-40 year time perspective.

Overall characteristics of the four plans

A few overall characteristics of the four plans are shown in the table below (the plans from the renewable energy NGO and the environmental NGO are presented in the same line, since they share these characteristics). The four plans are three climate plans and one energy plan published during 2009-2010:

- 2009: Climate plan from the Danish Society of Engineers,

- 2009: Energy plan from a renewable energy NGO
- 2010: Climate plan from an environmental NGO
- 2010: Climate plan from a national climate change commission

<i>Plan</i>	<i>Primary energy use (year)</i>	<i>Wind turbine capacity (year)</i>	<i>Biomass for energy (year)</i>
Danish Society of Engineers	550 PJ (2030) 450 PJ (2050)	9,000 MW (2050)	300 PJ (2050)
Renewable Energy NGO/ Environmental NGO	290 PJ (2035)	10,000 MW (2035)	130 PJ (2035)
Climate Commission	App. 650 PJ (my estimate) (501 PJ by final users)	18,000 MW (2050)	150 – 350 PJ (2050)
Present	850 PJ (2008) (618 PJ by final users)	3,200 MW (2008)	89 PJ (including waste)

The table shows differences among the plans in terms of the estimated future energy consumption, the amount of wind turbine capacity necessary and possible, and the role amount of biomass for energy. Other overall characteristics of the four plans are:

- National Climate Change Commission:
 - The plan is developed by a so-called independent commission, which was heavily influenced in its analyses by the Danish Ministry of Finance
 - The Commission wants to show that continuous economic growth and a low carbon future can be combined
- Danish Society of Engineers:
 - The plan was developed by members of a number of the technical societies within the organisation, supported by the secretariat of the organisation. It was developed as part of an international project initiated by the organisation called 'Future Climate, where around 10 other engineer societies from other countries developed proposals for national climate plans before the COP15 meeting in Copenhagen 2009.
 - One of the ideas behind the Danish plan was to show 'The engineers have the answers', but also that a transition to a low carbon future is economically beneficial for society.
- Renewable energy NGO and environmental NGO, Friends of the Earth Denmark:
 - Both plans believes it is necessary and possible to obtain a strong reduction of energy consumption in Denmark and that a fast and substantial growth in the wind turbine capacity is necessary
 - The Energy NGO's plan is only an energy plan and is not covering non-energy related greenhouse gas emissions from agriculture and land use and land use change, while the environmental NGO's plan includes these emissions.

The following paragraphs discuss some of those issues which the comparative analyses of the four plans have identified.

Assumptions about future societal development

Assumptions about the size of the future energy consumption are very important for the future energy system which the plans describe, including the need for energy production and the need for focus on energy savings and how these savings are achieved. The four plans are quite different with respect to assumptions about the future energy need, which, as shown above, has implications for the need for wind turbine capacity and the need for biomass since the plans describe scenarios with an increase in wind turbine capacity ranging from 200% to 500% increase.

The different assumptions about the future energy need and the wind turbine capacity imply also big differences in the future role of biomass as energy source, as also shown above, ranging from 50% to 250% increase of the present consumption, which could imply quite different ecological and climate impacts.

The role of wind energy

The debate about a low carbon Denmark has shown that several actors try to draw a picture of wind turbines as a complicated technology because of the limited capability of wind turbines to provide a stable energy supply. A comparison of the four plans show differences in the role of wind energy, which have implication for the scenarios for the overall Danish energy system concept the plans are describing and for the investment needed in energy system infrastructure. The National Climate Change Commission describes a future with a energy system continuously exchanging energy with other countries through a transnational grid of cables, which implies big investments in such transnational cables. The three other plans develop scenarios based on more independent national energy systems, where wind turbine energy mainly is used or stored in Denmark. This implies that these plans highlight the importance of development of and investments in national storage and conversion technologies.

The problem with wind turbines is seen as the time 'when the wind is not blowing' and the time when the wind is blowing so strong that the production is bigger than the energy consumption at the same time. The need for a stable energy supply is proposed to be ensured in several different ways in the different energy and climate plans and in statements from different stakeholders as comments to these plans:

- Biomass as the necessary stabilizing back up for wind turbines
- Investments in electricity cables for exchange of electricity with the European grid /energy market
- Investments in electricity cables for exchange of electricity with Norwegian hydropower capacity
- Sustaining a certain capacity of coal fired power plants in Denmark
- Storage of electricity from wind turbines in batteries, including a large number of electrical car batteries
- Using wind turbine electricity as energy source in production of hydrogen or production of other types of fuels for vehicles

- Conversion of electricity from wind turbines into heat energy in storages and afterwards used for heating and/or low temperature electricity generation

The interesting aspect from a transition perspective is that these different ways of integrating wind turbine electricity into the energy system call upon very different innovation paths and different types of investments. One of the major differences is also what role biomass should play as future energy source and the global and national ecological impacts related to this.

The role of food and agriculture

Food and agriculture is not part of most climate plans. However, based on the discussions initiated by the plan from the Danish Society of Engineers food and agriculture and the non-energy related greenhouse gas emissions related to this are part of three of the four Danish energy and climate plans. The issue is handled rather differently in the three plans:

- The plan from National Climate Change Commission:
 - Technological optimisation of the agriculture enables a reduced need for agricultural land and gives thereby more space for growing Danish energy crops
 - The optimization is assuming, mainly based on a forecast from the earlier possibilities for optimization that dairy cows will give 30 % more milk and that sows will give birth to 30% more sows.
- The plans from Danish Society of Engineers and from the environmental NGO:
 - Need for substantial changes of Danish food consumption
 - Need for new strategy for the Danish meat sector

The role of biomass

As the table showed biomass is also an area where the four plans are quite different. The Engineers' plan includes the biggest amount of biomass, because it is less optimistic than the renewable energy NGO and the environmental NGO with respect to how fast the wind turbine capacity can be developed and not least how much it is possible to reduce the future energy consumption. All three plans agree that the future increase in use of biomass for energy should be based on Danish biomass and not an increased import of biomass. The National Climate Change Commission has developed two scenarios for biomass. One which resembles the one from the Engineers and one which is based on less biomass in order not to make Denmark too dependent on future import of biomass.

All four plans agree that biomass for energy maybe implies little or no CO2 reduction, depending on the type and origin of the biomass. Furthermore that biomass may imply a number of other environmental impacts from the use of water, fertilizer, and pesticides etc., which are also important to be aware about.

The role of mobility

The amount of transportation of goods and the role of private cars are assumed to increase and no efforts for substantial increase in public transportation is described, because the Commission did not find this realistic to achieve. This is quite contradictory to the scenarios developed in the plans from Danish Engineers and the renewable energy NGO and the environmental NGO.

The role of different types of measures for realizing the plans

Mainly the National Climate Change Commission and the Engineers' plan discuss which societal measures are necessary for implementing the plans. The two plans are different with respect to what public regulation efforts are necessary and possible. The Climate Change Commission are mainly focusing on economic measures when they describe how transitions towards a low carbon society should be achieved, maybe because the Commission had three economists among its members and no persons with a political science or innovation science background. The Engineers' plan is also highlighting the need for research and development programs, combined with economic measures like energy taxes.

The renewable energy NGO's plan is the only plan which directly describes the need for a phasing-out plan for the fossil fuel based power plants in Denmark.

Concluding remarks

The Danish government has recently initiated negotiations among the political parties in the Danish parliament because an earlier national energy agreement is running out. The government has for 2-3 years said that a Danish climate would not be developed before the plan from the Climate Change Commission was ready. This plan from the Commission was released around half a year ago. The government has recently published a paper called Energy strategy 2050. Based on this paper it seems like the government's vision about a fossil free future - a low carbon society - was more a political statement than a true interest in supporting a development in this direction. The strategy document is more focused on how the plan can be economically neutral and highlight the need for measures which can substitute the present energy taxes and CO2 taxes need to be 'recovered'. The document is not a climate strategy paper but an energy strategy paper. The government seems to think that its Green transportation plan from 2009 can ensure a reduction of climate impact from mobility. However that transportation did not have much focus on changing mobility patterns, including how the use of private cars can be reduced.

With respect to food and agriculture the government seems to see its draft for a plan called 'Green growth in agriculture' should ensure a reduction of climate impact from agriculture. However this plan does not include focus on the need for changes in dietary patterns towards less consumption of meat and dairy products.

The paper has identified different issues which need to be addressed in the future Danish analyses and debates around transition to a low carbon society. The project 'Enabling and governing transitions to a low carbon society' which is the research framework for the analyses in this paper plans to organise social dialogues during 2011-2013 where these issues can be discussed further. As part of these discussions we will give voice to different stakeholders and we will analyse what existing regimes that need to be addressed as a hindrance to transition towards a low carbon society, but also whether certain decisions in the near future could create such hindrances. It has been said by some stakeholders outside the energy sector that permissions to the utility companies for conversion of the big fossil fuel based power plants to be run on biomass will imply investments in the energy sector because several of the power plants are rather old, which will create a path dependency in the energy sector that will make it difficult to make fast achievements towards more wind turbine capacity and solar energy capacity in the Danish energy sector. Also strong economic support for the development of bio-ethanol for vehicles, based on the Danish global business interests in development of enzymes for production of first and second generation bio-fuels, may create path dependencies towards a stronger role for biomass in the energy sector than several of the discussed plans would like to see, including creating big energy losses from the production of bio-ethanol. Both decisions could imply an increase in biomass import to Denmark, which could have social and environmental impacts in those countries.

References

The four plans discussed in this paper can be found at these websites:

National Climate Change Commission: www.klimakommissionen.dk

The Danish Society of Engineers (Ingeniørforeningen IDA):
<http://ida.dk/News/Dagsordener/Klima/Klimaplan2050/Sider/Klimaplan2050.aspx>

The Renewable Energy NGO (Vedvarende Energi) : <http://ve.dk/vores-vision-2030>

The environmental NGO Friends of the Earth Denmark (NOAH): <http://www.global-klima.org/>