Meeting Report - CEESA WP Leader Seminar, October 2008

Background
At the consortium meeting at Avernæs in June 2008 it was decided to make a first draft of the contents of the final report including a draft proposal of the potential conclusions.

Purpose
The purpose is two-fold. First to raise awareness among all of us on the coherency of the project and what each of us are doing. Next – and not least – to identify expected inputs/outputs between the individual work-packages and possible missing areas and subjects if any. Moreover such information will help in setting up time-schedules and work plans.

Seminar
A seminar was held in Klitgaarden, Skagen, 7-8 October 2008 with the following participants:
Poul Erik Morthorst, Risø-DTU (WP1)
Henrik Wenzel, SDU (WP5)
Niels I. Meyer, DTU/AAU (IAP)
Henrik Lund, AAU (coordinator)
Frede Hvelplund, AAU (WP4)
Poul Alberg Østergaard, AAU (WP3)
Brian Vad Mathiesen, AAU (WP2)
Mette Reiche Sørensen, AAU
Prior to the seminar WP leaders had made a draft of contents and potential outcome of each WP.

Outcome
This meeting report consists of the following:

1. Draft proposal of conclusions of each WP including important coming work tasks together with draft main conclusions of the overall project.
2. Table of contents for the final report (draft)
3. Highlight of work programme and important deadlines up till next consortium meeting in June 2009.

1. Conclusions and work plan for each WP

The duration of the WPs is not by numbers but listed in accordance with how the conclusions fit into the coherency of the project., i.e. in the following way:

WP2 – Transport and biomass

- Projection of business as usual (BAU) passenger and goods transport demands within all modes of transport
- Such demands can be covered with significant amounts of wind power in battery or direct electricity based technologies, but not with biomass resources in ICE, even when using the entire area of land available in Denmark.
- However, electricity technologies have limited range, batteries are rather costly, and biomass is required for aviation and lorry goods transport
- The recommended transport system takes into consideration the management of transport demands and technologies meeting transport demands, considering technology development, costs and infrastructure as well the maintenance of an efficient system.
- Both passenger and goods transport should be based on battery or direct electricity supply to the largest extent possible and demands have to be managed.
- Transport is limited to all transport units which refuel in Denmark
- Both present and future technologies are considered in the scenarios
- The geographical framework is Denmark, 100% RE based on Danish resources
- Wind power and biomass may be exported/imported, but seen over the years, Denmark is self-sufficient.
- In the introduction to the final report, we explain why Denmark is chosen as a case
- The selection of technologies in a self-sufficient system will be justified and adjusted to the demand
- We focus mainly on electricity, batteries and fuel cells and include as much electricity for transport as possible
- We work with flexibility in transport and infrastructure; we do not only use one type of vehicle, but define several alternatives (strong standard models)
- Curves must show the significance of battery size vs. hybrid solutions
- We test a series of pure scenarios (hydrogen, electricity, etc.) and describe the consequences of applying these scenarios
- BAU scenario combined with biomass is not a sustainable solution
- We investigate the possibilities of using road pricing.
- By **1 March 2009**, we present a thorough presentation of potential transport solutions

WP5 – LCA and biomass

- Residual resources now and in a BAU 2050 situation
- Consequences of a food neutral redistribution of crops.
- Consequences of increases in land use.
- The effects in the construction phase of 100 per cent renewable energy systems are insignificant.
- The changes into a 100 per cent renewable energy system will have impacts on the surrounding world.
- A scenario for boundary conditions and public regulation in which the consequences are limited is recommended (input to WP4)

- The environmental impacts of biomass production are important in relation to all scenarios
- Biomass resources are limited: We can use all residual resources, but not go beyond this use
- Boundary conditions must be defined
- IEA scenario (Blue) will be used as the scenario defining the surrounding world
- The surrounding world is an important factor in terms of biomass resources: Only if the surrounding world is supplied from residual resources and RE, will it be possible to use biomass to replace oil in Denmark. If this is not the case, the solution will not be sustainable.
- Henrik W. and Thomas will continue to work on an assessment of the biomass potential, including the preconditions for resource assessment and organic farming.
- We will make a calculation of the food neutral redistribution of crops until 2050, including the impacts of this redistribution
- The same calculation is made in a scenario with organic farming in year 2050
- **By 1 March 2009**, we will present the concrete figures of this assessment.

WP3 – Future electric power systems

- Recommendation for future configuration of electric grids using storage technologies and electric vehicles.
- Recommendations for the control of future power systems.
- Improved integration of system stability and short-term balancing in the EnergyPlan model.
- Recommendations for market design to enable active participation of distributed energy resources (input to WP4)
- The design of transmission and distribution grids possibly both using AC and DC that can facilitate 100 per cent renewable energy
- Focus on the geographical distribution of energy resources and demand
- Focus on the cooperation between energy producers
- To which extent do we permit exchange with the surrounding world in the system?
- We will make a recommendation based on the potential now and in the future
- As an input to WP4, we will define the types of plants to be included in the public regulation
- How does the management of the system interact with NordPool?
- We will present a series of alternatives for the configuration of the grid
- Brian will contact Jayakrishnan …
- Before Christmas, Poul will send a draft of the input to WP4 to Poul Erik
- Poul will contact Kai in order to coordinate the work between WP3 and WP4

WP4 – Market development and public regulation

- Catalogue of potential regulatory instruments that can facilitate the technical design of 100 per cent renewable energy systems
- Design of a complete public regulation scheme that can facilitate the development towards and in one of the 100 per cent renewable energy scenarios.
- The design incl. facilitation of significant electricity, heat and transport demand savings, large-scale expansion of intermittent RE and the implementation of a food neutral redistribution of crops.

- Regulation involves both supply and demand
- How do we reach the system in 2050 (road map)?
- We will elaborate a template to describe the relation between the regulatory instruments and their impact
- We will define an ideal regulatory system for year 2050
- We will also suggest a series of proposals which may be used already from 2010
- We will look into market design and flexible demand
- We will work with a series of topics: electric cars, heat pumps, CHP, incentives to encourage the expansion of the district heating area, etc.
- We will present a detailed description of central technologies
- The aim is to demonstrate how public regulation must be adjusted in order to facilitate the implementation of the RE scenarios
- Henrik L. will send Varmeplan Danmark to Poul Erik
- We will begin with the analysis of market design
- Poul Erik will make a draft description of the surrounding world IEA scenario and send it to the group. WHEN?

WP1 - Scenarios

- Significant energy savings, improvements in energy efficiency, intermittent renewable resources and biomass are required.
- Transport should primarily be based on battery or direct electricity technologies and a part of the biomass resources should be reserved for aviation
- Expansion of district heating in combination with energy savings can ensure the utilisation of waste incineration, geothermal energy, industrial waste heat, large-scale heat pumps and solar thermal power.
- This requires public regulation that facilitates such a development.
- The methodology of combining ESA, LCA and economy is…
- One main scenario must be defined in the final report prior to the discussion of instruments.
- After 2009, a new recalculation of transport and biomass will be made.

Main conclusions

- It is technically possible to have a 100 per cent renewable energy system.
- The supply can be based on Danish resources
- Significant energy savings, improvements in energy efficiency
- Transport demands should be managed and be based on battery or direct electricity technologies
- The supply can be based on residual resources in combination with low energy demands, wind power and other intermittent resources
- Public regulation schemes that have been used before can facilitate the implementation of such scenarios.

2. Table of contents for the final report (draft)

1. **Executive summary (20 pages)**

2. **Introduction**
   Describing: Purpose of the project; demand; surrounding world; methodology; development in demand; boundary conditions; public regulation; three overall scenarios; screenings and calculations.

3. **Three overall scenarios, screenings and calculations**
   1. **Biomass** (limited)
   2. **Transport** (limited – according to demand)
   3. **Selection of one main scenario**

   In this part, we make a selection of the aspects we wish to include in the analysis of the three scenarios. This selection should lead to a delimitation, which then forms the basis for the analysis of one main scenario in section 4.

4. **The main scenario selected**
   a. **Transport**
   b. **Electricity grid**
   c. **Energi system analysis, waste, district heating, energy storage, etc.**
   d. **Evaluation of technical alternatives in relation to the main scenario, methods, etc.**
   e. **Road map, years 2010, 2020, 2030, 2050**

5. **Instruments of the main scenario**

6. **Conclusions (technical instruments, recommendations)**

7. **Conclusions (methodological)**

8. **Short description: A Green Vision**

Appendices: Technologies, descriptions, potentials, environmental efficiencies, energy system analyses and calculations, catalogue of instruments.

Comments (explanations) to the above list of content
The idea is to start with the three scenarios of “wind”, “biomass” and “high demand” and then use WP5 and WP2 in a screening process to select one main scenario for further investigation.

WP 2 will identify potential RES transportation technologies and make BAU projections of transport demands. The expected conclusion is that BAU demands cannot possible be met by biofuels in ICE. Scenarios given priority to BEV and demand side management will be identified and discussed in relation to transport demands and biomass resources leading a proposal which can be implemented within a limited use of biomass.

WP5 will make LCAs of the three scenarios with a focus on residual biomass resources versus biomass resources which will influence the amounts of potential food production.

3. Important deadlines up till next consortium meeting

By 1 March 2009:

- WP2 will present a new (final) version of the transportation scenario already presented at the consortium meeting at Avernæs
- WP5 will finish a consensus process identifying 1) the potential of residual biomass resources, 2) the biomass potential of "food-neutral" changes in choice of crops including consequences for residual resources, and 3) the same in case of implementing organic farming.

..and hand over to WP1 in order to include the results in a new version of the three scenarios for presentation at the next consortium meeting.