Dissemination strategy on Electricity balancing

DESIRE

large Scale Integration of Renewable Energy

Reporting on dissemination activities carried out within the frame of the DESIRE project (WP8)

Name, Affiliation	Henrik Lund, Aalborg University
E-mail	lund@plan.aau.dk
Title of dissemination	The Desire project
Type of activity	Presentation at conference
Title of forum	CHP units in the context of power markets
Language	English
Date of dissemination	May 10 2007
Place of dissemination	ISET, Kassel, Germany
Brief abstract / description of dissemination activity	Today big power plants are used to balance most aspects of electricity supply and demand. The DESIRE project will disseminate cutting edge software tools and systems that will enable small and medium sized CHP-plants to combine or 'co-produce' their electricity allowing them to partly balance the fluctuating output of wind turbines thus ensuring that most wind power can be used locally, thereby relieving the pressure on system operators to offload surplus wind. In turn this will relieve pressure on international inter-connectors and allow international trade in electricity to be come more competitive. This will allow consumer electricity prices to be lower and the quality of electricity supplied to become higher. CHP can work with wind power to produce a balanced, more predictable, supply of electricity because of techniques disseminated in this project. CHP plant need accumulators (heat storage) to act in this way. When there is excessive wind power production, the CHP unit decreases production and relies on its heat store in the accumulator to satisfy its heat demand. When wind production is low, the CHP plant operates in order to build up heat stores and make up for a lack of wind power electricity production. This is the theory of the co-production system being demonstrated in this project. The techniques of coordinating CHP and wind power plant mean that these plants can help maintain reliability for electricity supplies rather than make a problem for the electricity system that can jeopardise international trade in electricity.
Audience impact assessment	Information was given to highly relevant persons within German CHP operation.
Dissemination	Included after this form

DESIRE

Dissemination strategy on Electricity balancing for large Scale Integration of Renewable Energy

A project funded by
the Sixth Framework Programme
of the European Commission

Project partners

Aalborg University, Denmark
EMD International A/S, Denmark
PlanEnergi S/I, Denmark
University of Birmingham, United Kingdom
Institut für Solare Energieversorgungstechnik e.V, Germany
Universität Kassel, Germany
EMD Deutschland, Chun und andere GBR, Germany
Fundación Labein, Spain
Warzaw University of Technology, Poland
Talinn University of Technology, Estonia

Program

- Background (EU policies)
- The problem (based on the Danish case)
- DESIRE: Main objectives and activities
- Expected results

Background

Promoting electricity produced on Renewable Energy Sources within the internal electricity market

DIRECTIVE 2001/77/EC:

By 2010, 22,1% of the total electricity consumption in the EU shall be supplied by Renewable Energy Sources.

Background

Developing competitive electricity markets, specifically in the field of decentralised energy supplies

COMMON POSITION (EC) No 52/2003

On the promotion of co-generation based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC

Background

Developing Pan-European Electricity Markets

DIRECTIVE 2003/54/EC:

In order to ensure effective market access for all market players, including new entrants, non discriminatory and cost-reflective balancing mechanisms are necessary.

As soon as the electricity market is sufficiently liquid, this should be achieved through the setting up of transparent market-based mechanisms for the supply and purchase of electricity needed in the framework of balancing requirements.

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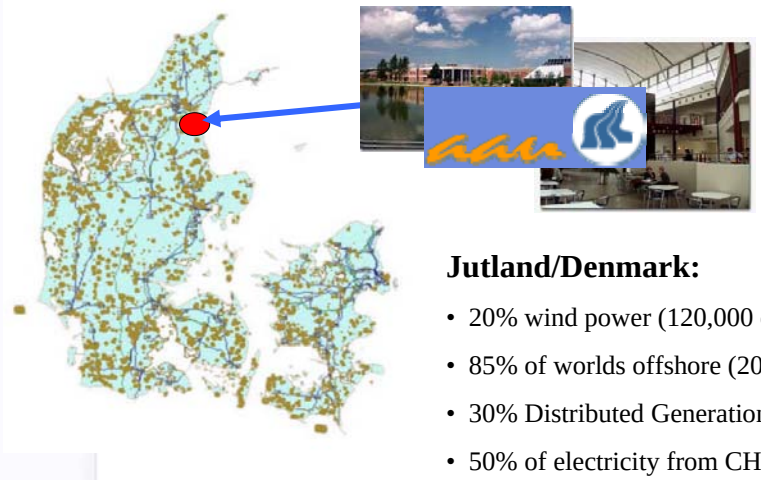
Aalborg University, Denmark



Jutland/Denmark:

- 20% wind power (120,000 owners)
- 85% of worlds offshore (2003)
- 30% Distributed Generation
- 50% of electricity from CHP

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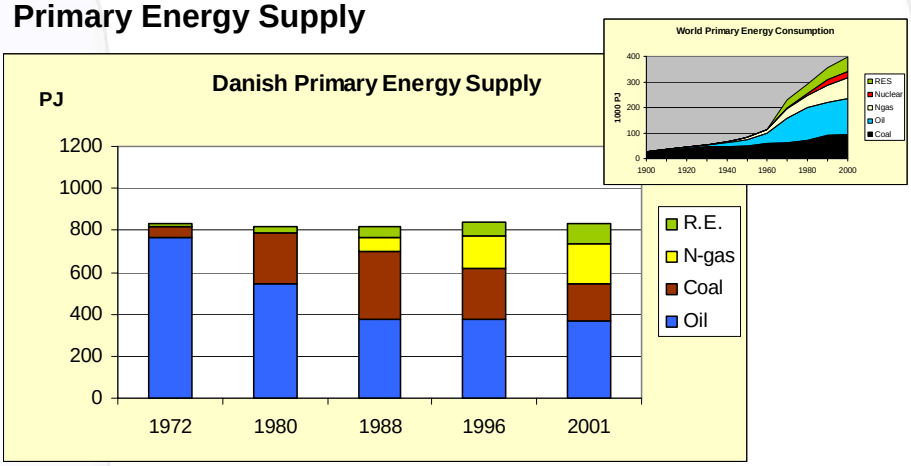
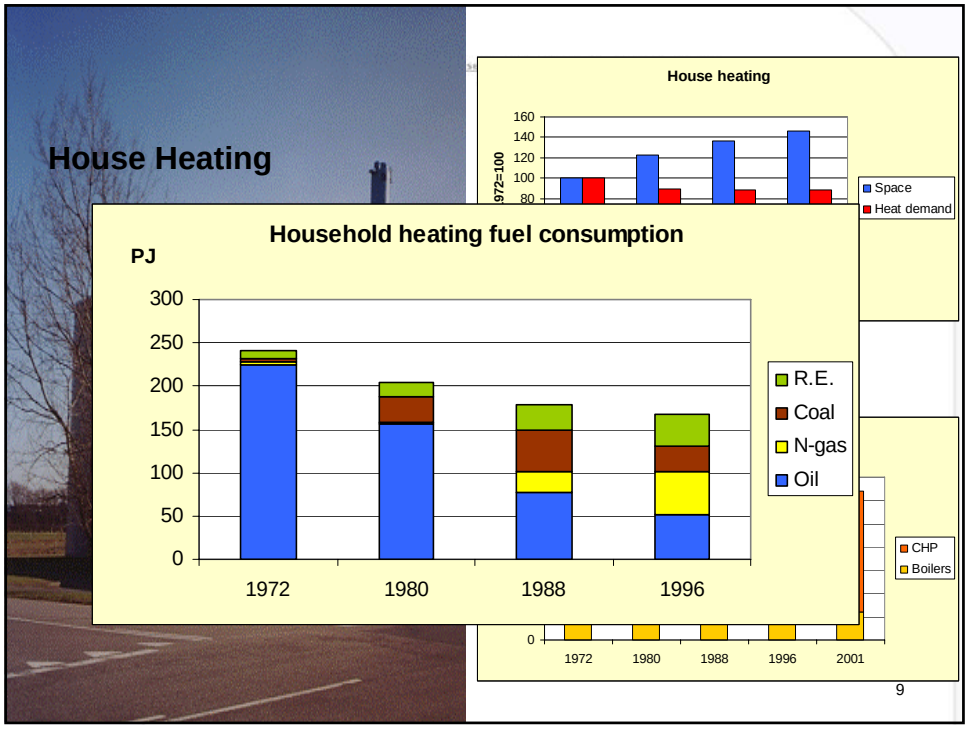
30 years of Danish Primary Energy Supply




House Heating
House heating
160
140
120
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1972=100
Space
Heat demand
Household heating fuel consumption
PJ
300
250
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50
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1972
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Oil
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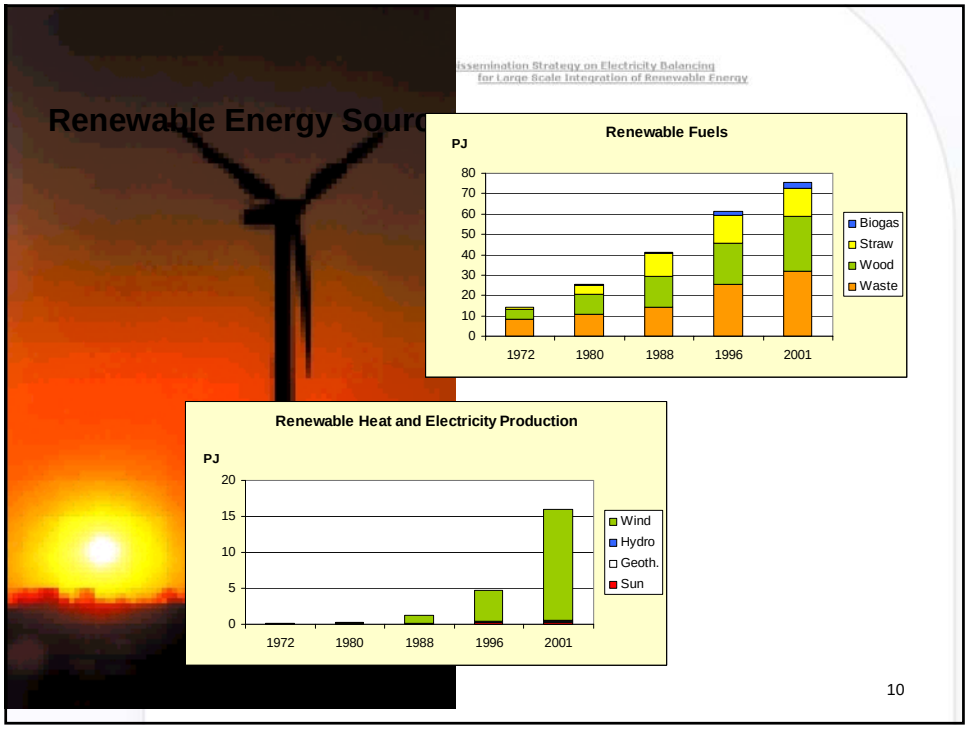
9


Renewable Energy Sourc
Renewable Fuels
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50
40
30
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1972
1980
1988
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Straw
Wood
Waste
Renewable Heat and Electricity Production
PJ
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15
10
5
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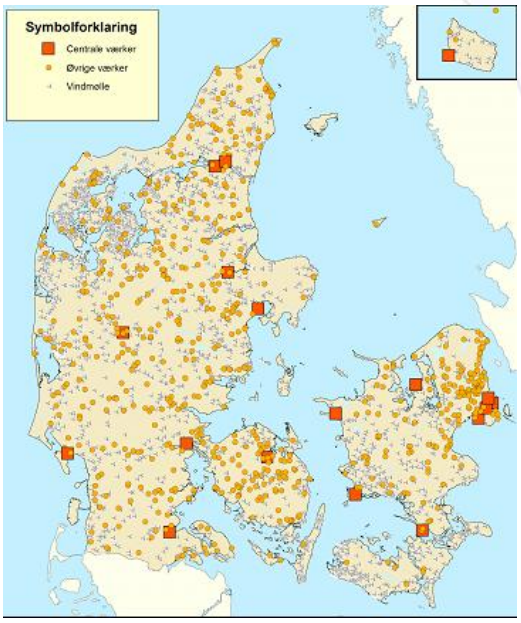
1972
1980
1988
1996
2001
Wind
Hydro
Geoth.
Sun
10

Danish electricity production

Big power stations

Small CHP plants

Wind turbines



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ENERGISTYRELSEN

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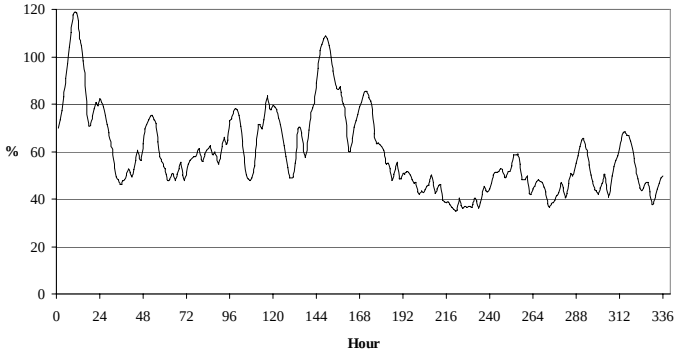
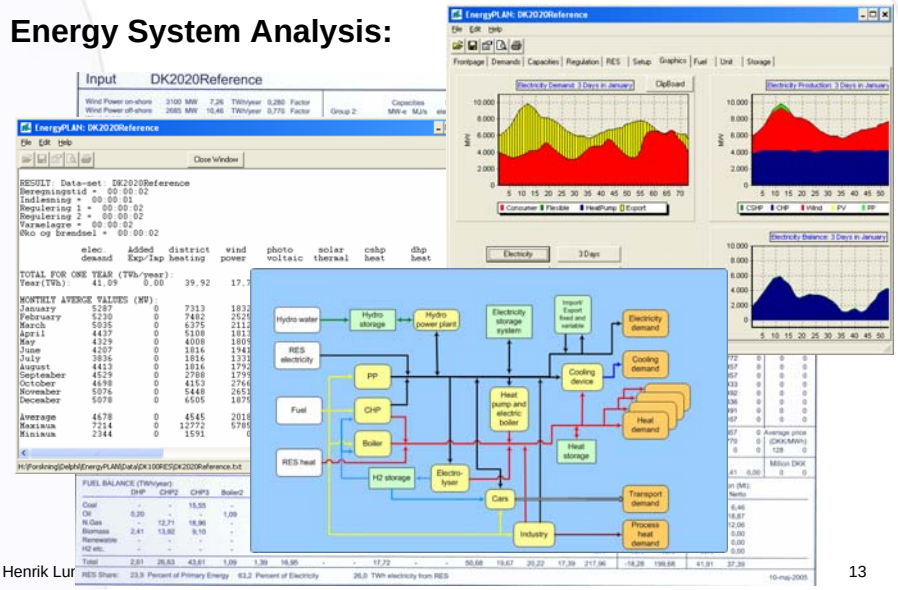
Wind and CHP share of electricity demand in Eltra 2001 (jan-mar)



From Poul Østergaard based on data from eltra

Henrik Lund, Aalborg University, Denmark 12

Energy System Analysis:

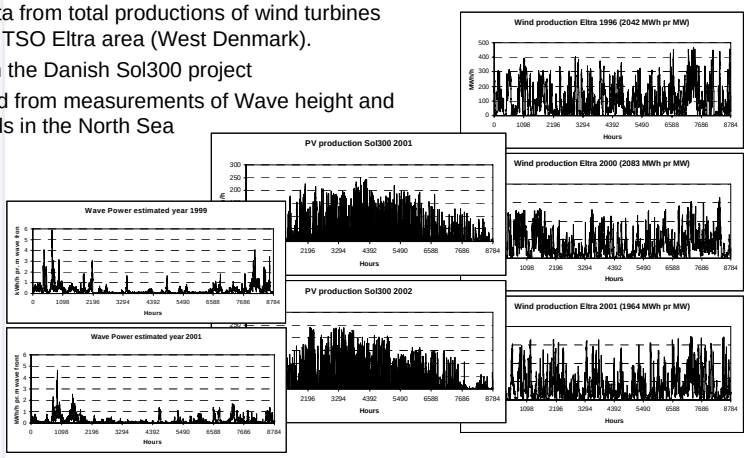


Data: Wind, PV and Wave Power

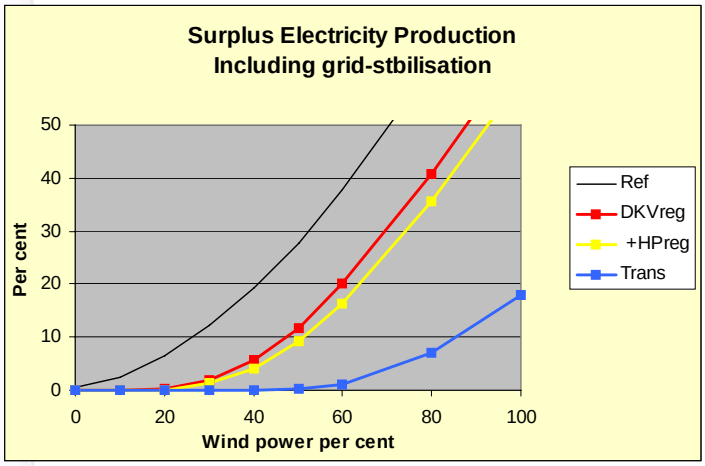
Wind: Data from total productions of wind turbines in the TSO Eltra area (West Denmark).

Data from the Danish Sol300 project

Calculated from measurements of Wave height and periods in the North Sea



Principle results of technical analyses



Modelling of NordPool

- Standard system price hour by hour distribution (based on recent years)
- Construction of “Wet” “Dry” and “Normal” years (Hydro in Norway)
- Modelling of influence for DK trade and splitting in price areas due to bottle-neck in transmission
- Modelling of influence from Trade on the German Boarder.

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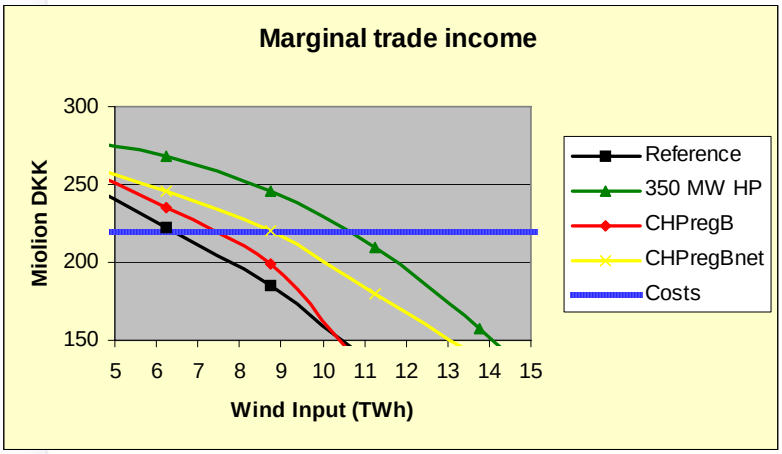
Feasibility of Alternative Regulation Systems



Dissemination Strategy on Electricity Balancing for Large Scale Integration of Renewable Energy

Main objectives:

To promote the integration of fluctuating renewable energy supplies, primarily wind power, into local and regional electricity systems.

To disseminate ways in which CHP plants can help to achieve a balance between supply and demand in an electricity system with fluctuating power.

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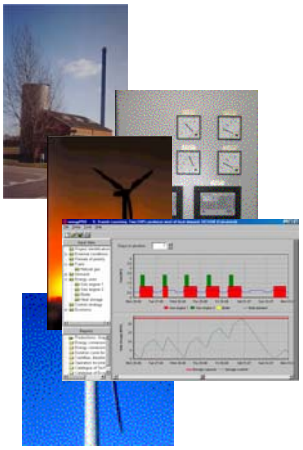
In short:

The DESIRE project wants

to show how

small CHP plants can be part of the solution instead of being part of the problem



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Means – in the short term

Co-production of CHP and wind power

Small and medium-sized CHP plants can co-produce electricity to balance the fluctuating output of wind power plants

At excessive wind power production, the CHP unit decreases its production and relies on its heat store to satisfy the heat demand

At low wind power production, the CHP unit builds up the heat store and counterbalances the low electricity production of the wind power plants

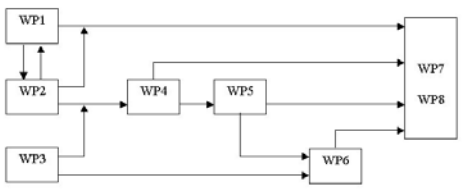
Means – in the long term

The use of heat pumps for balancing electricity supply and demand

At excessive wind power production, electricity is converted by the heat pump to supply local heat demand or to recharge the accumulator heat store to meet the future heat demand.

Content: Work Packages

WP1: The balancing problem
WP2: Short-term solutions and long-term perspectives
WP3: Barriers and opportunities for demonstrating projects in participant countries
WP4: Developing organisational set-ups, optimising tools and IT for demonstration projects
WP5: Demonstration projects
WP6: Evaluation and recommendations
WP7: Project home page
WP8: Participation at meetings and conferences



Expected results

- Provide guidelines for the future development of CHP plants
- Present schemes which ensure the promotion of the balancing techniques
- Demonstrate the financial and organisational techniques as well as the software needed to implement the balancing techniques.
- Create a broad knowledge among CHP and wind turbine operators and market operators of the use of CHP for the integration of more renewable electricity production.
- Secure a rapid and effective proliferation of the knowledge created.

Dissemination Strategy on Electricity Balancing
for Large Scale Integration of Renewable Energy

WP 1: The balancing problem

WP Leader: Ebbe Münster, PlanEnergi A/S

Objectives:

To identify key operation tasks for medium and small-sized CHP plants if they are to participate in balancing the electricity production and consumption.

To quantify the problems which rising proportions of electricity generation from renewable sources will cause in Europe.

To identify the least cost solutions in the regions involved.

WP 2: Short-term solutions and long-term perspectives

WP Leader: John Sievers, Universität Kassel

Objectives:

To disseminate knowledge about appropriate technical solutions to overcome the problems caused by large-scale integration of renewable energy and CHP.

To identify the differences between CHP designs in the countries involved.

To find out how future CHP plants must be designed in order to contribute to the balancing of the electricity production and consumption.

WP 3: Barriers and opportunities for demonstrating projects

WP Leader: Carlos Madina, Fundación Labein

Objectives:

To identify the regulatory and trading conditions that will affect the implementation of the project in the countries involved.

Suggest ways of disseminating knowledge according to these conditions.

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WP 4: Developing organisational set-ups, optimising tools and IT

WP Leader: Anders N. Andersen, EMD International A/S

Objectives:

To design and develop particular organisational set-ups, optimising tools and information technology for the demonstration of the balancing system.

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WP 5: Demonstration projects

WP Leader: Peter Ritter, EMD Deutschland

Objectives:

To operate and demonstrate the organisational set-ups, the optimising tools and the information technology developed in WP 4.

WP 6: Evaluation and recommendations

WP Leader: David Toke, University of Birmingham

Objectives:

To review the operation of the demonstration part in WP 5.

To make recommendations concerning the best way of promoting the balancing techniques.

WP 7: Project home page

WP Leader: Florian Schlögl,
Institut für Solare Energieversorgungstechnik

Objectives:

To set up the project home page which provides information, disseminates results and serves as a communication tool – between the project partners, between the EC and the project partners, and between the project and the public.

WP 8: Participation at meetings and conferences

WP Leader: Poul Alberg Østergaard, Aalborg University

Objective:

To disseminate the knowledge created, including the operating and organisational experiences to a broad number of operators and authorities.