INFORSE-Europe Sustainable Energy
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http://www.inforse.org/europe/seminar_2011_Hamburg.htm
Good Practice for transition to sustainable energy: Examples across EU

Gunnar Boye Olesen
International Network for Sustainable Energy

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Many levels of Good Practices Needed

1. Technologies that work and are appealing
2. Sufficiently good user economy and social economy
3. Framework for wide replication of successes (national legislation, support etc.)
4. Integration in energy systems & use (small, large)
Solar technologies

Heating:
- Vacuum tubes from China are taking over
- More space heating
- More district heating
- New ground-breaking installations for solar cooling, industrial heat

Electricity:
- Thin-film is back
- High efficiency PV, concentrated PV
- Solar thermal electric, Spain

La Florida, Spain

CTC Solar China
Solar district heating > 50%

• Marstal, DK increases its district heating solar supply
• It will have 23,000 m² solar heating and 100,000 m³ storage tanks in 2012
• Solar will then cover about 55% of the heating demand for the 7,500 people in Marstal + tourists
• organised as cooperative,
• municipal guarantees & cheap loans
• EU support

1. Technologies
Windpower

New technology is big windmills for offshore
And optimisation of smaller turbines

Enercon 7.5 MW
Vestas 7 MW
Biomass

1. Technologies

Heating:

>100% efficiency for large, condensing boilers, very clean

Cleaner combustion, less particles for wood stoves & boilers

CHP: 20-50 MW plants with >100% total efficiency, Sweden

Wood gasifiers slowly coming for higher electric efficiency for small-scale (no breakthrough)

Aduro, Denmark
Costs Continue Downwards

PV is reaching grid-parity, below 20 €-cent/kWh

Solar heating is getting cheaper with Chinese vacuum tubes

Windpower costs has come down after boom, and with new Chinese competition

Windfarm, China, picture by Chris Lim
Ups and Downs for RE 2010

New record PV installation in Germany and EU in 2010

Solar thermal slowly decreasing

Windpower boom from Germany & Spain to new EU countries, small overall decline. Windpower protests increase, local ownership in some countries

Biomass use increasing, mainly wood

Biogas, geothermal on slow raise
Europe Leads

(so does China, Brazil etc. in other fields)
Danish /Swedish Windpower

- In Sweden pool price + min. 0.25 SEK/kWh
- In Denmark pool price + 0.25 DKK/kWh in 7 years and tax free income of 300£/person
- In both countries: mixed investments: power companies, single privat investors, cooperatives.
- In Denmark 20% share must be offered to local population

Slow development, some momentum in 2010
Example: Windpower in Germany

- In June 2009, 3 new windturbines were added by Windwärts Energie GmbH to an existing German windpark
- Windwärts investment fund sell shares with 7% interest and binding until 2015 (interest can vary)
- Minimum investment 1000 €
German Windpower

Vergütung von Windstrom nach der EEG Novelle 2004

- '04: 5.5 Cent/kWh, Stufe 1
- '05: 5.5 Cent/kWh, Stufe 1
- '06: 5.5 Cent/kWh, Stufe 1
- '07: 5.5 Cent/kWh, Stufe 1
- '08: 5.5 Cent/kWh, Stufe 1, 9.2 c
- '09: 5.5 Cent/kWh, Stufe 1, 9.2 c, 9.1 c
- '10: 5.5 Cent/kWh, Stufe 1, 9.2 c, 9.1 c

Zeitachse (Jahr)

Cent/kWh

Stufe1  Stufe2
Austrian Renewable Energy Village
Güssing – a prime example

- Biomass District Heating 1995
- Mayor (and city council) set target of 100% RE
- Local wood CHP (steam and gasifiers, 2 plants)
- Biogas from silage and others
- Experimental production of gas /fuel from wood
- Actions to save energy, use RE in houses, etc.
- Made European Centre for Renewable Energy
Güssing – a RE Laboratory
## Ecovillage: low energy, solar, bio

<table>
<thead>
<tr>
<th>Wood Chip Consumption per Person</th>
<th>Energy</th>
<th>Wood chip</th>
<th>Land</th>
<th>Part of Denmark</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Heat</strong></td>
<td>3500 kW</td>
<td>1010 kg dry</td>
<td>610 m²</td>
<td>7%</td>
</tr>
<tr>
<td><strong>Electricity</strong></td>
<td>800 kW</td>
<td>160 kg dry</td>
<td>100 m²</td>
<td>1%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>4300 kW</td>
<td>880 kg dry</td>
<td>700 m²</td>
<td>9%</td>
</tr>
</tbody>
</table>

*If all Danes would live like this*

Andelssamfundet I Hjortshøj, Denmark
The virtual power plant (VPP)

Make Distributed Energy Resources visible

fenix: EDF, Siemens, Hiderdrola Areva, Gamesa, and many others

E-Energy RegModHarz: Fraunhofer Institute IWES in Kassel, BMU, etc.

RegenerativKraftwerk 2050: Fraunhofer Institute IWES in Kassel, BMU
The cellular Power Grid, DK

In Denmark a intelligent “cell” of the power grid can run independently with 28,000 customers, 47 wind power plants and 4 smaller CHP plants, tested with success 11/11-2010 at Holsted – Billund (Legoland) – Bramminge area in Southern Jutland, in total 76 MW capacity by Energinet.dk; Danish Transmission system operator (TSO).