

EcoGrid EU

A Prototype for European Smart Grids

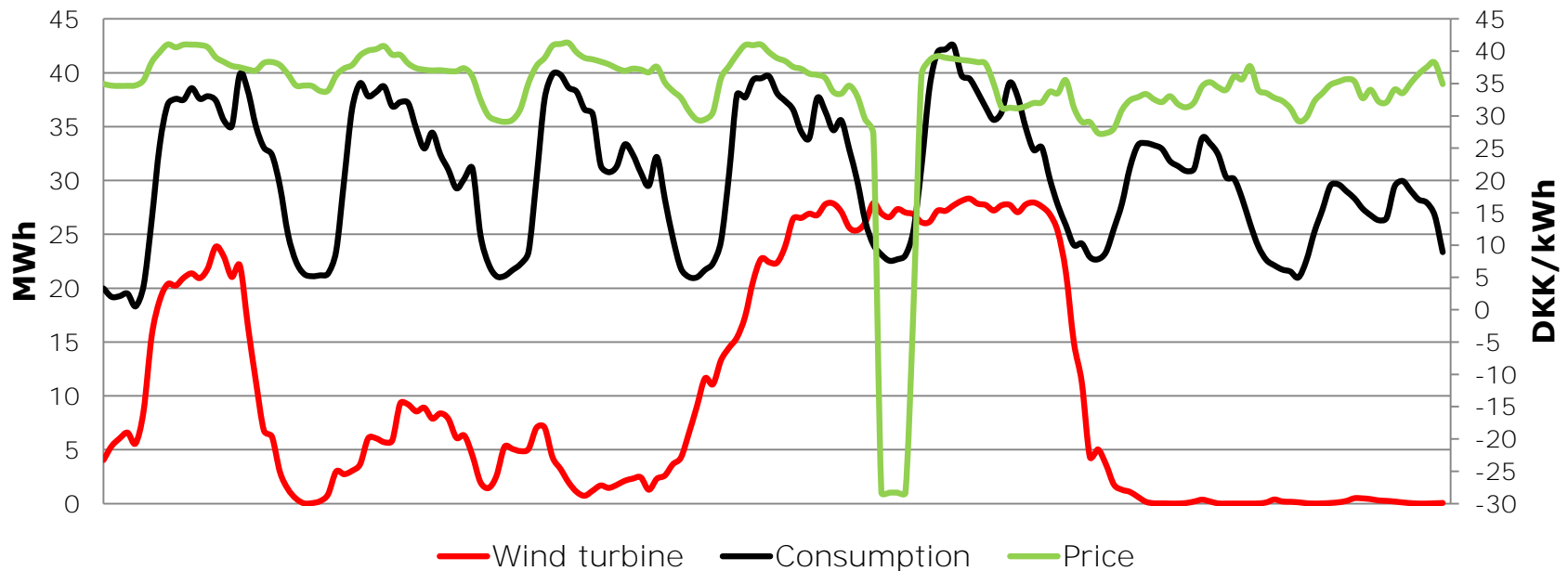


Presentation at:
Smart Grids Week, Bregenz 2012
Presentation by:
Maja Felicia Bendtsen

Becoming free of fossil fuel in Denmark

- Wind will be the primary power source, up to 70 % of the annual power production
- Power consumption will increase, but overall energy consumption is reduced
- For example exchanging boilers with heat pumps and traditional cars with electric vehicles increase energy efficiency

Power surfeit becomes more common



What is Bornholm?

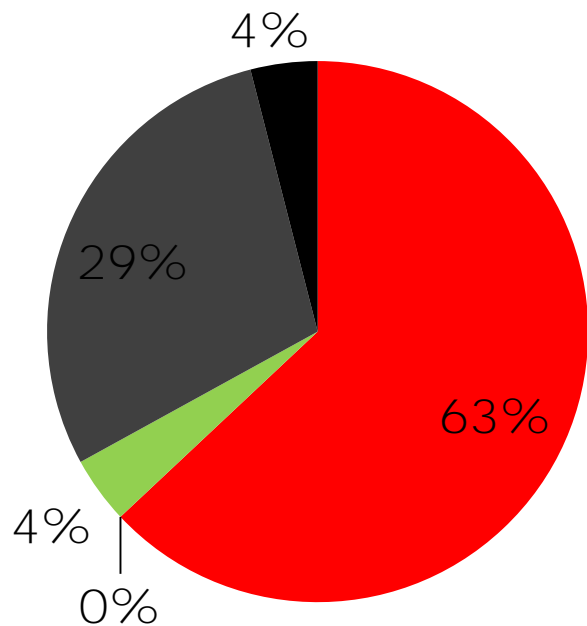


- 30.000 customers
- Connected to Nordic power grid via 60 kV 70 MW AC sea cable
- Peak consumption 55 MW
- Annual consumption ~260 GWh
- Wind turbines installed capacity ~30 MW (34 wind turbines)
- Photo voltaic installed capacity 2 MW by spring 2012
- 2 MW biogas plant
- 16 MW CHP plant
- 35 MW diesel and oil engines for reserve



Bornholm power generation

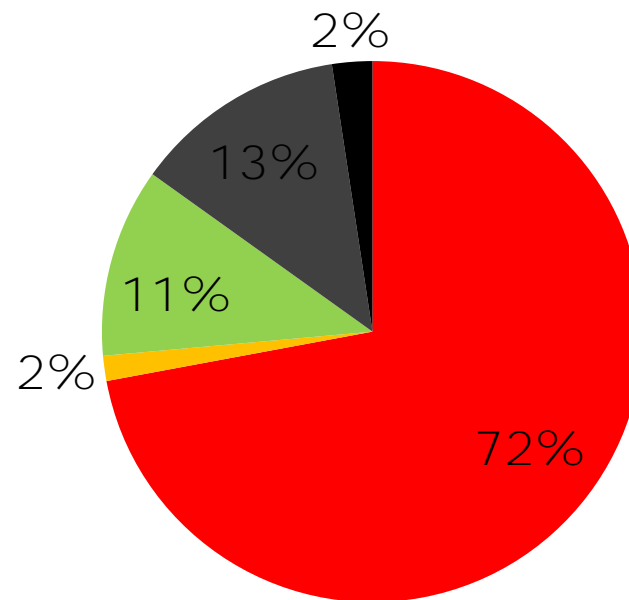
2008



■ Wind ■ Sun ■ Biomass ■ Coal ■ Oil

Import ~50%

2015



■ Wind ■ Sun ■ Biomass ■ Coal ■ Oil

Import ~25%

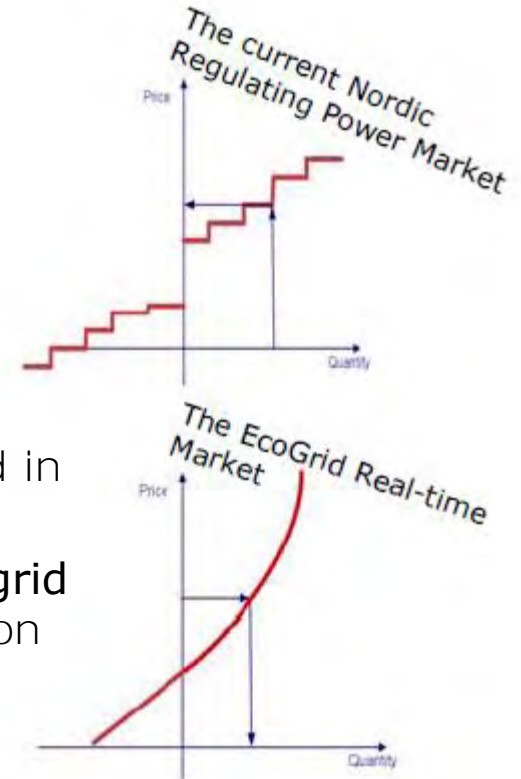
The EcoGrid EU project

- Smart Grid demonstration project partly funded by EU
- 16 partners from all over Europe
- 20,5 mio. € budget
 - Equipment budget 3,35 mio. €
- Project period march 2011-march 2015
 - Demonstration begins autumn 2012
- 2000 Bornholm participants
 - 360 signed up within one month after recruitment begun



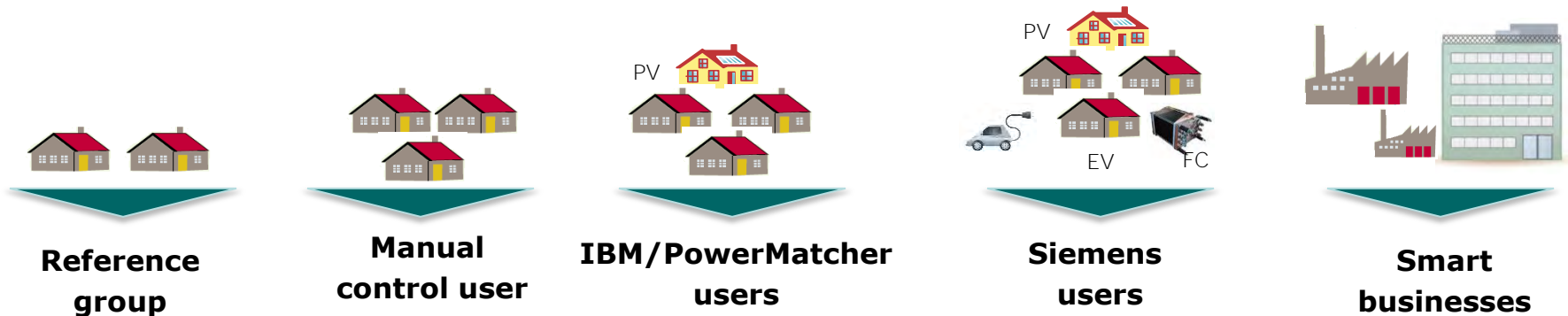
The EcoGrid EU market

- New power market, only 15 minutes ahead
- Price regulated every 5 minutes
- Many small units can participate directly in the market
→ **smaller steps in regulation**
- The price signal is a combination of the spot price and adjustment from the real time market
- The grid tariff becomes dynamic and follows current load in the grid
- **In principal two feeders ("streets") could have different grid tariffs dependent on actual load on the feeders in question**



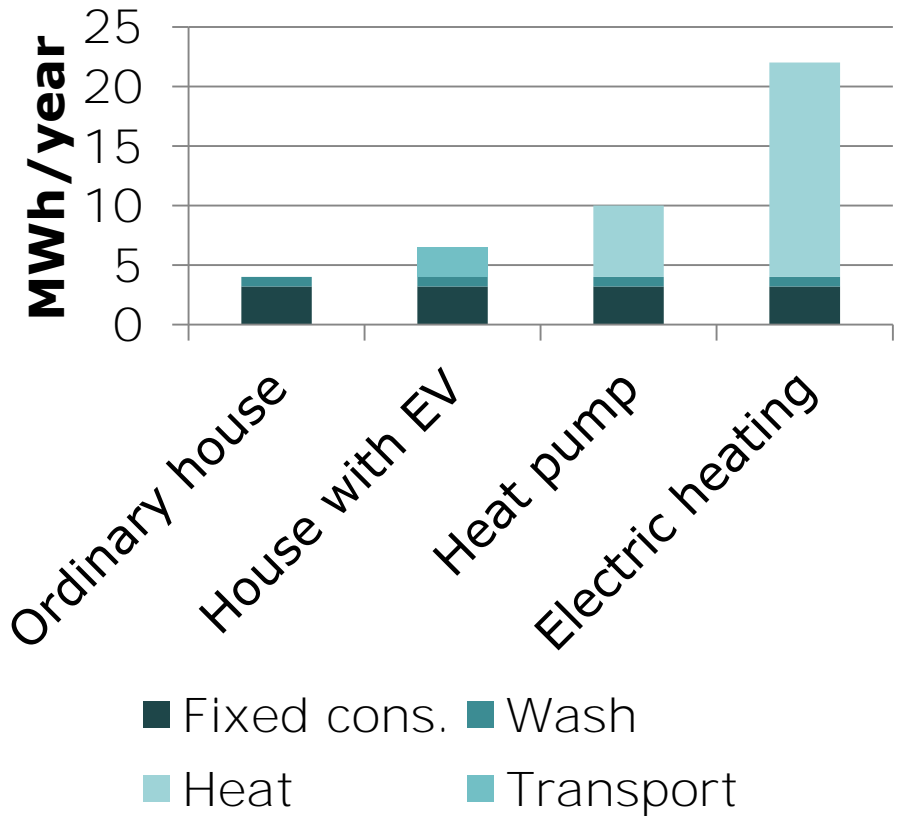
EcoGrid EU participants

- 200 customers in the reference group
- 500 ordinary households. Will be equipped with smart meter. Price prognosis send daily. Price warnings when price exceed certain levels
- 700 IBM/PowerMatcher households. Get smart meter and home automation system. Primarily electric heated or heat pump households
- 500 Siemens households. Get smart meter and home automation system. Primarily electric heated or heat pump households
- 100 businesses with smart meter and energy management system



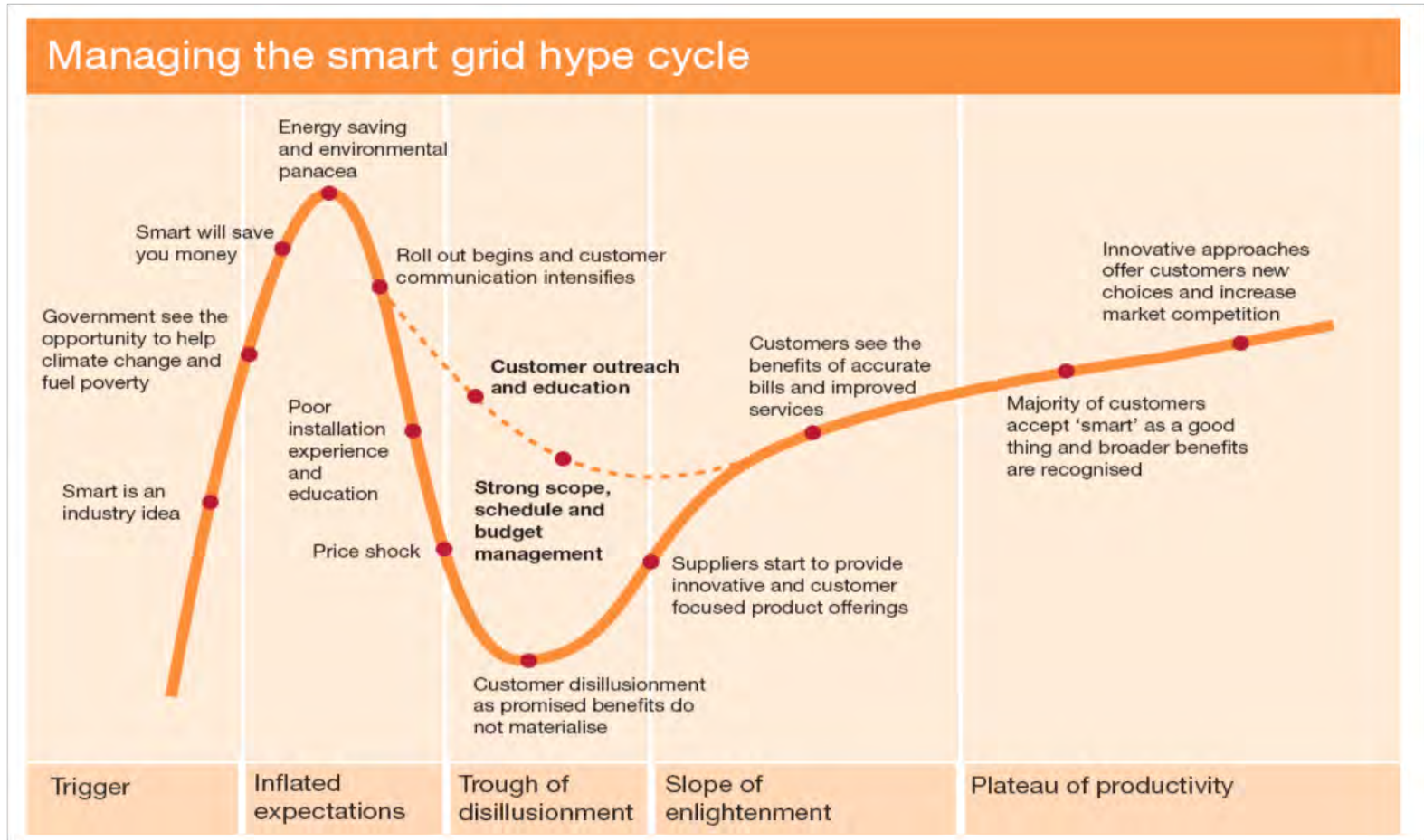
Flexibility in the household

Appliances	Load in kW
Television	0,15
Stereo	0,25
PC + printer	0,10
Refrigeator	0,09
Freezer	0,09
Dish washer	1,50
Stove	7,00
Oven	2,60
Small appliances*	0,01-2,00
Washing machine	1,50
Heat pump	2,30
Electric vehicle	3,00
Total	>18,6



* Consuming on demand. Example coffee machine, vacuumer, cell phone

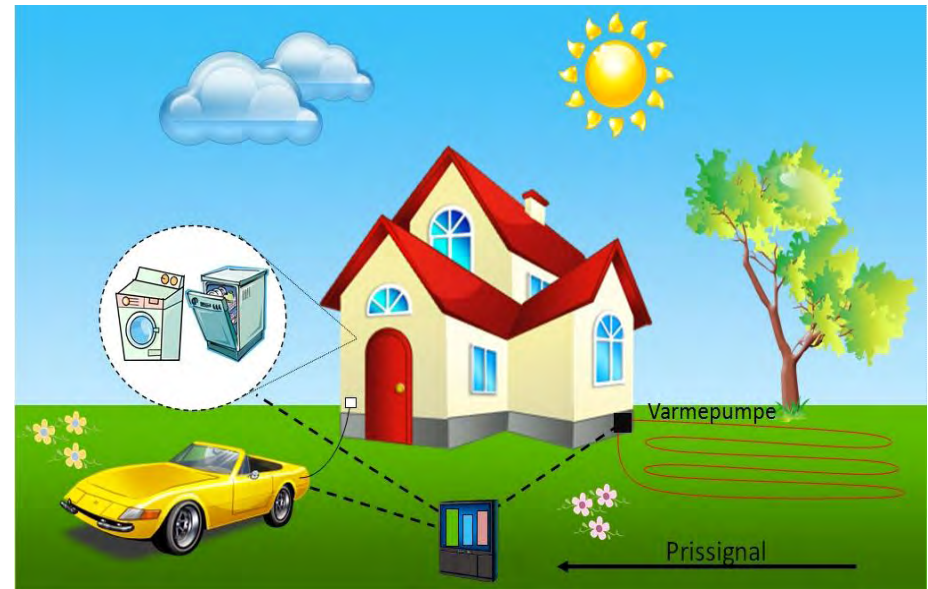
Involving end consumers



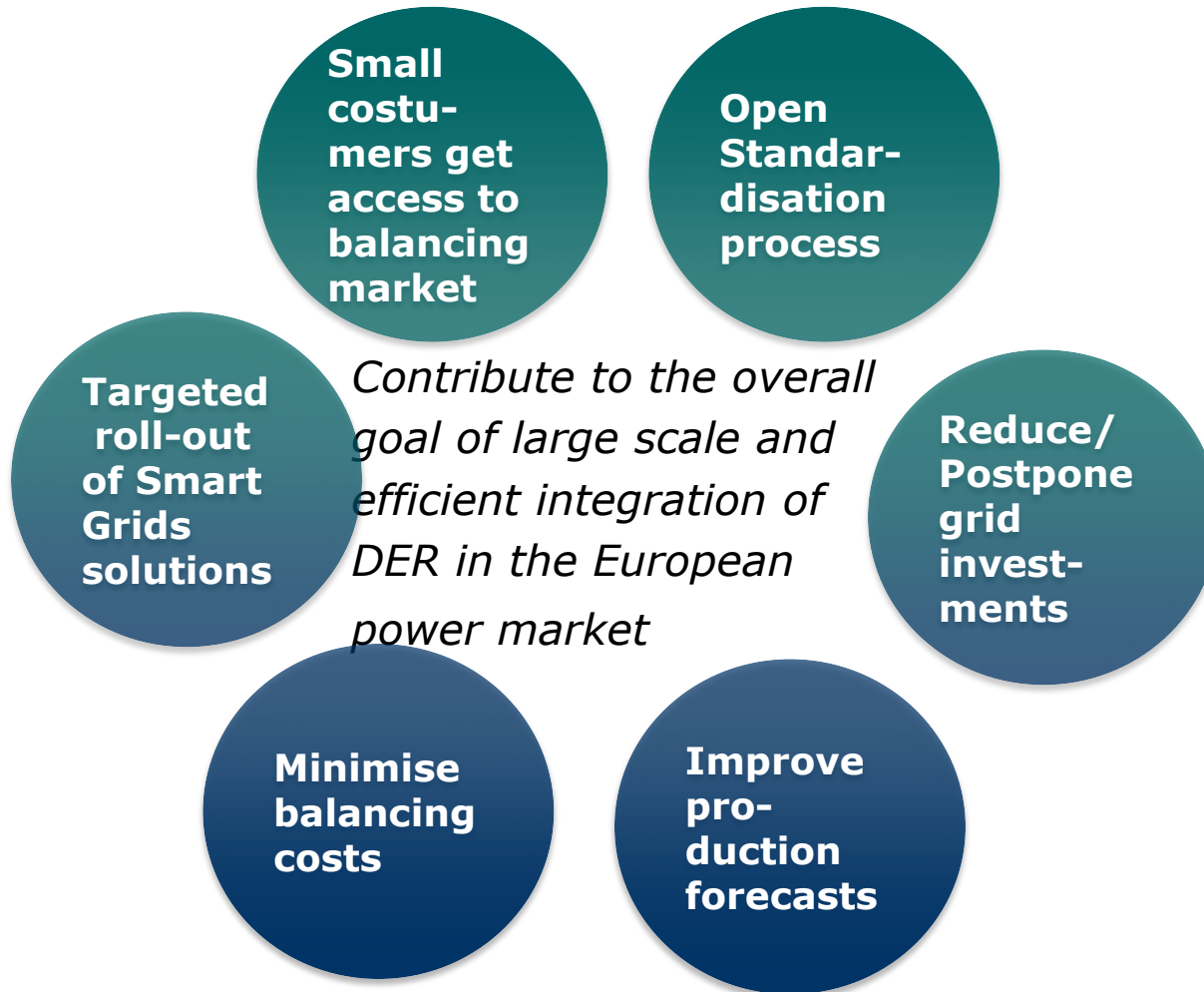
Source: "Smart from the Start – Managing Smart Grid Programmes", PwC, 2010

Information and education of future power consumers

- Danish project focusing on information and education
- Partners: Østkraft, MDT Analyse, Danish Consumer Council, Bornholm upper secondary school and vocational college
- Guidance of participants
 - 2 hours per household with automation equipment
 - ½ hour per manual control household
 - 2 days per industrial and commercial customer
- Demonstration house
- Blog and forum
- Education of youth
- Training of electricians



Overall Impact of EcoGrid EU



Bornholm activities add value to EcoGrid EU

PowerLab DK	Full implemented test facility for Smart Grids R&D with Bornholm as test grid	EDISON	EV project in Denmark with demonstration on Bornholm in 2011
PVIB	Photo Voltaic units on Bornholm starting with 2 MWp PV	PowerFlex	250 Private households with full automatic control of all appliances
DFR	200 participants with automatic frequency control of appliances	Smart Grids Information	Project to ensure/increase Smart Grids awareness/ acceptance on Bornholm (take place in parallel with EcoGrid EU)
Cell Controller	Ongoing R&D project in Denmark. A replicate will be installed on Bornholm as part of the EcoGrid EU project	More Microgrids	Ongoing FP6 project with island operation – will be used for stress test of EcoGrid EU when local balancing is needed
Heat Pumps	150 Private homes changing oil boilers to heat pumps with remote control. Each house gets 2,700 € from national 54 m€ scheme	EV on Bornholm	EV deployment on Bornholm with support from the Energy Authority
μCHP	Upcoming project with 5 Fuel Cell μCHP units in private homes	NextGen	R&D project about Ancillary services from local CHP units

Thank you
for your Attention

