Demonstration of µCHP based on Danish fuel cell stacks

Presentation at European Workshop –
Best available technologies & future fast progress of Micro-CHP in conjunction with Renewable Energy
At ECN, Petten, Netherlands

Per Balslev
April 6th 2006

The project is partly funded by Energinet.dk, the national Danish entity controlling the main energy grids, electricity and natural gas.

National demonstration project: µCHP based on Danish fuel cell stacks

The Danfoss Group

- A family-owned, global company
- Net sales 2005: EUR 2 200 mill.
- Employees: 18 000 worldwide
- Production of 250 000 items per day
- Components for refrigeration and air-condition, heating and motion control

Danfoss Refrigeration and A/C Controls

Danfoss Commercial Compressors

Danfoss Household Compressors

Danfoss Industrial & Appliance Controls

Danfoss Industrial & Appliance Controls

Danfoss Drives

Danfoss Comfort Controls

Danfoss District Heating

Danfoss Burner Components

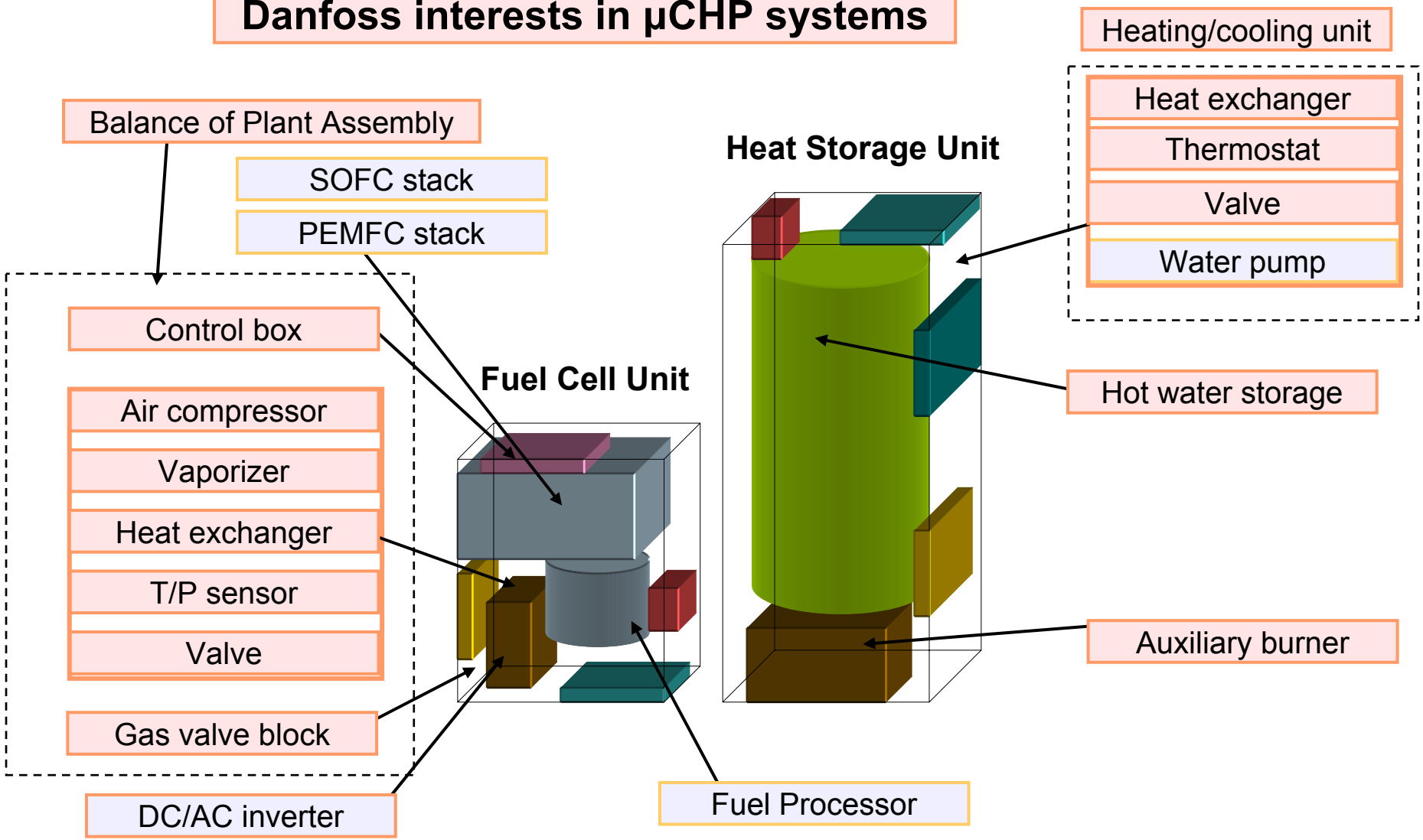
Danfoss Floor Heating

Danfoss Water Controls

Danfoss Gearmotors

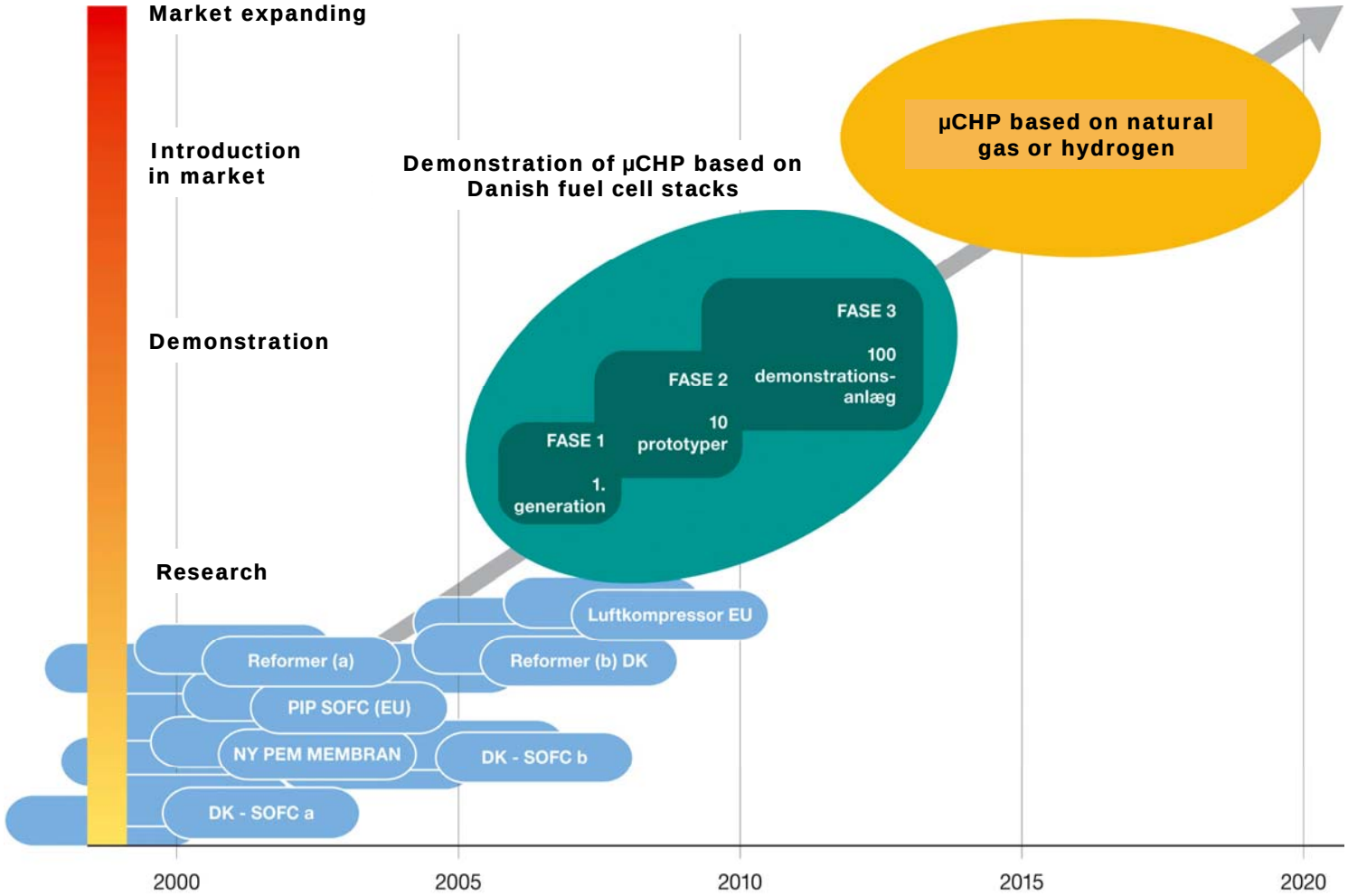
National demonstration project: µCHP based on Danish fuel cell stacks

Danfoss interests in µCHP systems

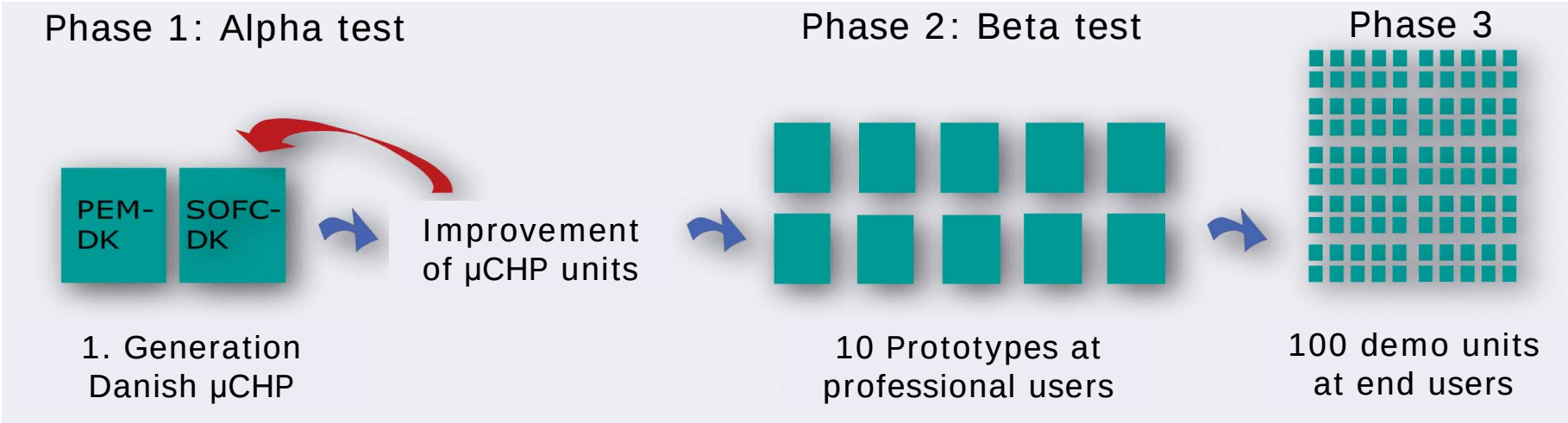


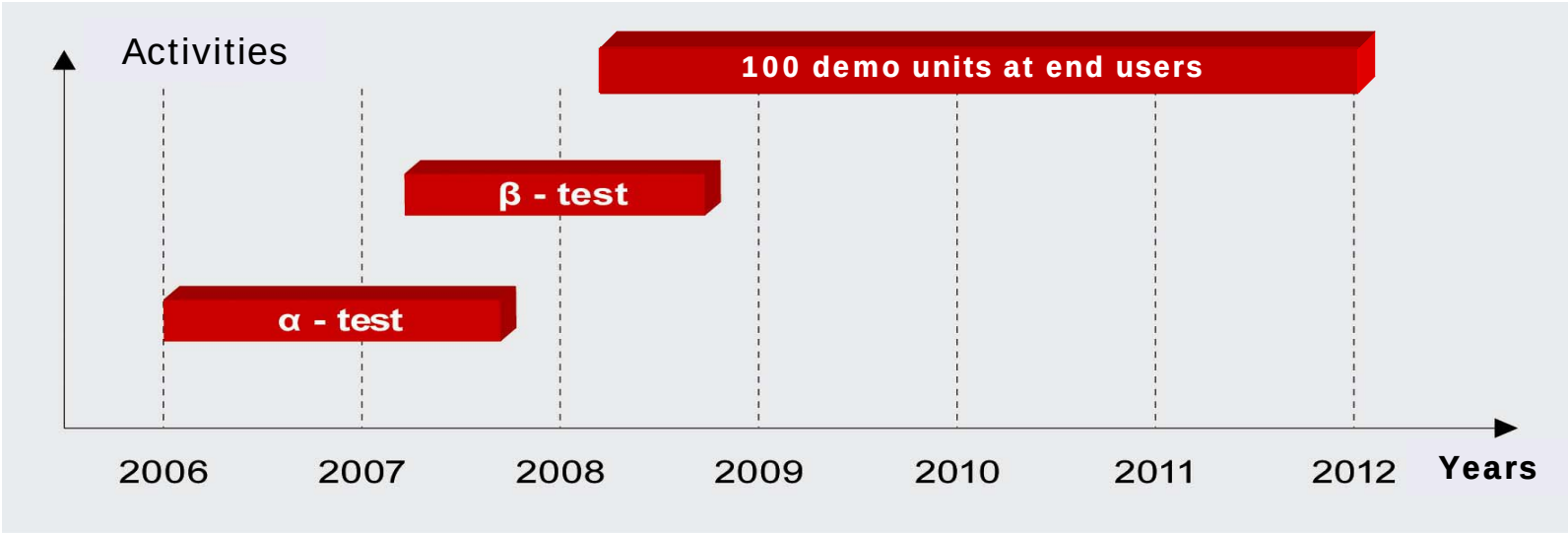
National demonstration project: µCHP based on Danish fuel cell stacks

The demonstration project is a step to commercializing the fuel cell technology



National demonstration project: µCHP based on Danish fuel cell stacks

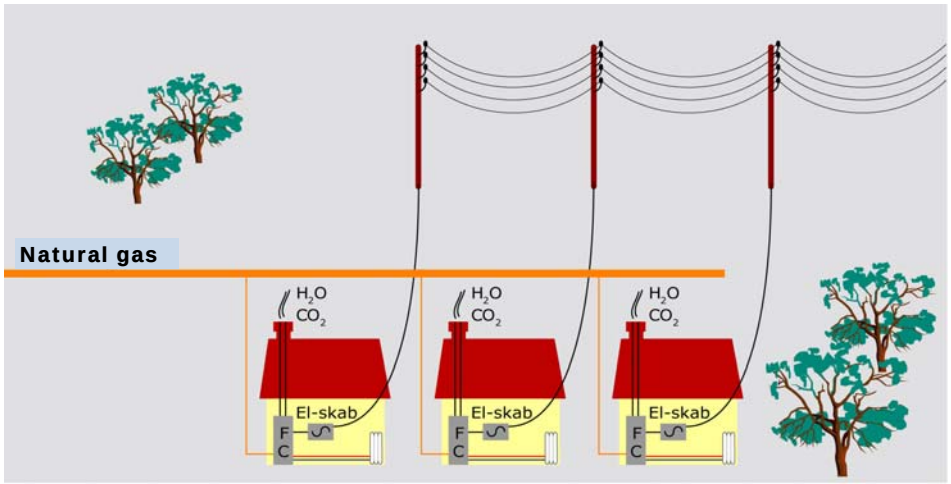




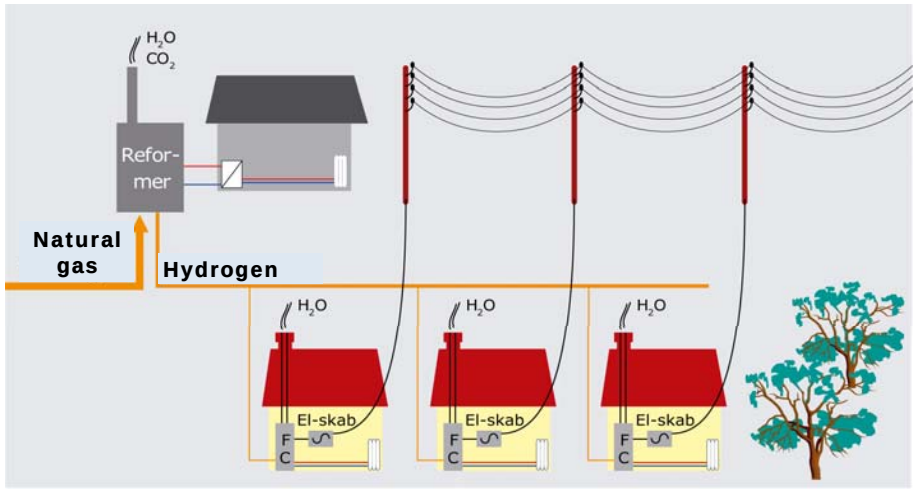
National demonstration project: µCHP based on Danish fuel cell stacks

Two models to be tested in the demonstration project

Micro combined heat and power based on natural gas for existing houses



Micro combined heat and power based on hydrogen converted from natural gas



- The project includes testing of practical micro combined heat and power units powered from a small hydrogen grid.
- A local reformer converting natural gas to hydrogen can later be substituted by some form of renewable energy based entity.

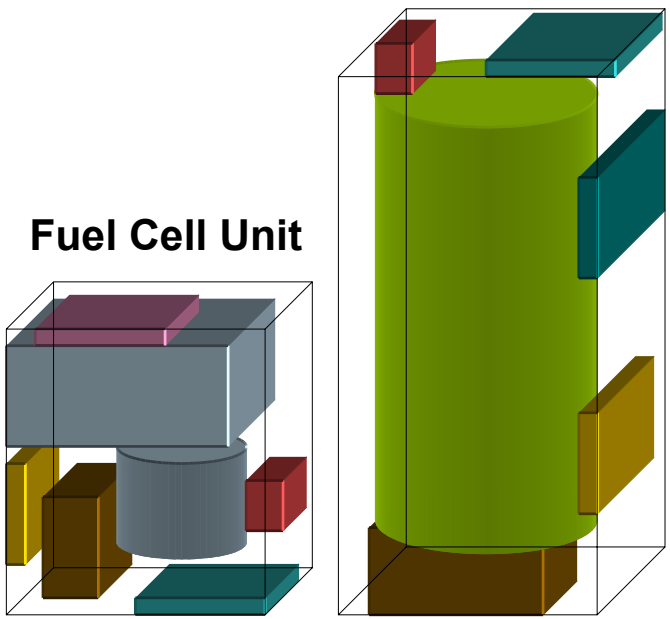
National demonstration project: µCHP based on Danish fuel cell stacks

Idea: to demonstrate 100 fuel cell based micro combined heat and power units, operated as a virtual power plant in a local region around Sonderborg, in the southern part of Denmark

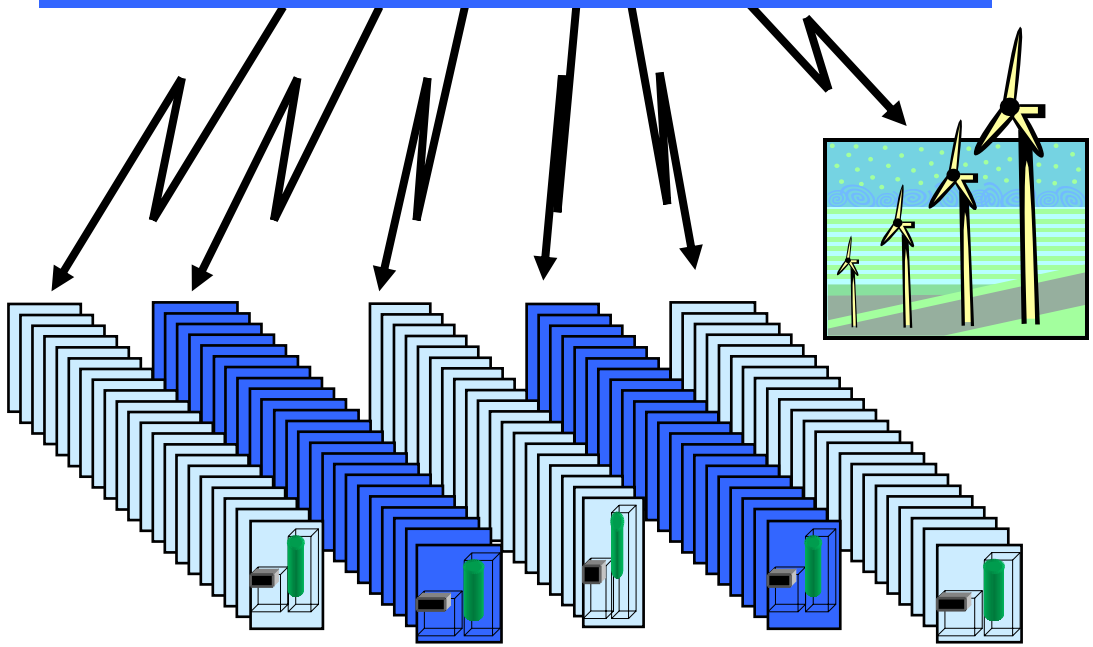
Fuel cell µCHP unit

Heat Storage Unit

Fuel Cell Unit



Control center for virtual power plant



National demonstration project: µCHP based on Danish fuel cell stacks

TOPSOE FUEL CELL
clean, efficient and reliable

SOFC stack company

PowerLynx

DC/AC converter company

IRD Fuel Cell Technology

PEMFC and DMFC stack and FC system company

Dantherm

Company producing Air handling and UPS units

Danfoss

BoP control component company

DONG energi til mere

Gas and electricity utility company

DGC

(Dansk Gasteknisk Center)

Test center for gas units

COWI

Engineering consulting company

National demonstration project: µCHP based on Danish fuel cell stacks

8 complementary partners in the consortium

TOPSOE FUEL CELL
clean, efficient and reliable

Development and supply of SOFC stacks

PowerLynx

Development and supply of DC/AC converters

IRD Fuel Cell Technology

Development and supply of PEMFC stacks

Dantherm

System integrator, based on components from the partners

Danfoss

Project management
Development and supply of BoP components.
Contact to local authorities and grid company

DONG energi til mere

Installation, grid integration, operation, maintenance and supply of natural gas

DGC

(Dansk Gasteknisk Center)

Test of alfa series and security analysis of systems and approvals of the units

COWI

Gas and Hydrogen grid layout, planning of integration and security.

END