



Innovating in energy efficiency through consumer-sized solutions

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BDR Thermea

mCHP: Our Story So Far

Stirling mCHP Launch: Our Experiences

mCHP in the Smart Grid

Summary and Conclusion

Is a **world leading** manufacturer and distributor of innovative **heating and hot water** systems and services.

We contribute to a **sustainable environment** by leading the development of low to **zero carbon technologies**.

Third manufacturer of heating equipment in Europe

Sales revenue **€ 1,800 million** per annum, of which **> €50 million with mCHP**

Approx. **6.800 people**



mCHP: our story so far



BDR Thermea offers four solutions

- **Dachs:** Internal Combustion Engine
- **eVita/Ecogen:** External Combustion through Stirling Engine
- **Gamma:** Proton Exchange Membrane Fuel Cell (PEM)
- **Ceramis Power:** Solid Oxide Fuel Cell (SOFC)
- Solutions for **single & multi family** homes, & **light commercial** (hotels, hospitals,...)
- **> 30,000 units** installed across Europe, representing **> 150.000 kWe**
- **> 20 years** of experience
- More than **2.8 billion kilowatt hours of electricity** produced



mCHP contributes to saving energy



mCHP a step to optimise the EU-27 boiler park

Some **75 million gas boilers** in residential central heating – over 60 million standard efficiency

mCHP **saves c. 1 tonne of CO₂** compared to HE boiler – up to c. **2 tonnes** compared to SE boiler

Creates a potential for significant savings and contribution to EU goals for sustainability



Sources:

BRG Consult: Study On Eco-related developments in the domestic heating markets in Europe and the USA 2006-2007

The Customer



Customer feedback – a snapshot



*"During the hardest winter for years, we worried about the **cost of keeping warm**, based on the money we spent last year.... It has been a great relief and wonderful surprise to find that, simply by changing our heating, we have made such **huge savings**."*

(Oct-Jan saving of €330; generated 1154kWh)

*"We are now using very little gas and are **practically self-sufficient** for electricity, which is great for our fuel bills, especially during the cold winter months."*

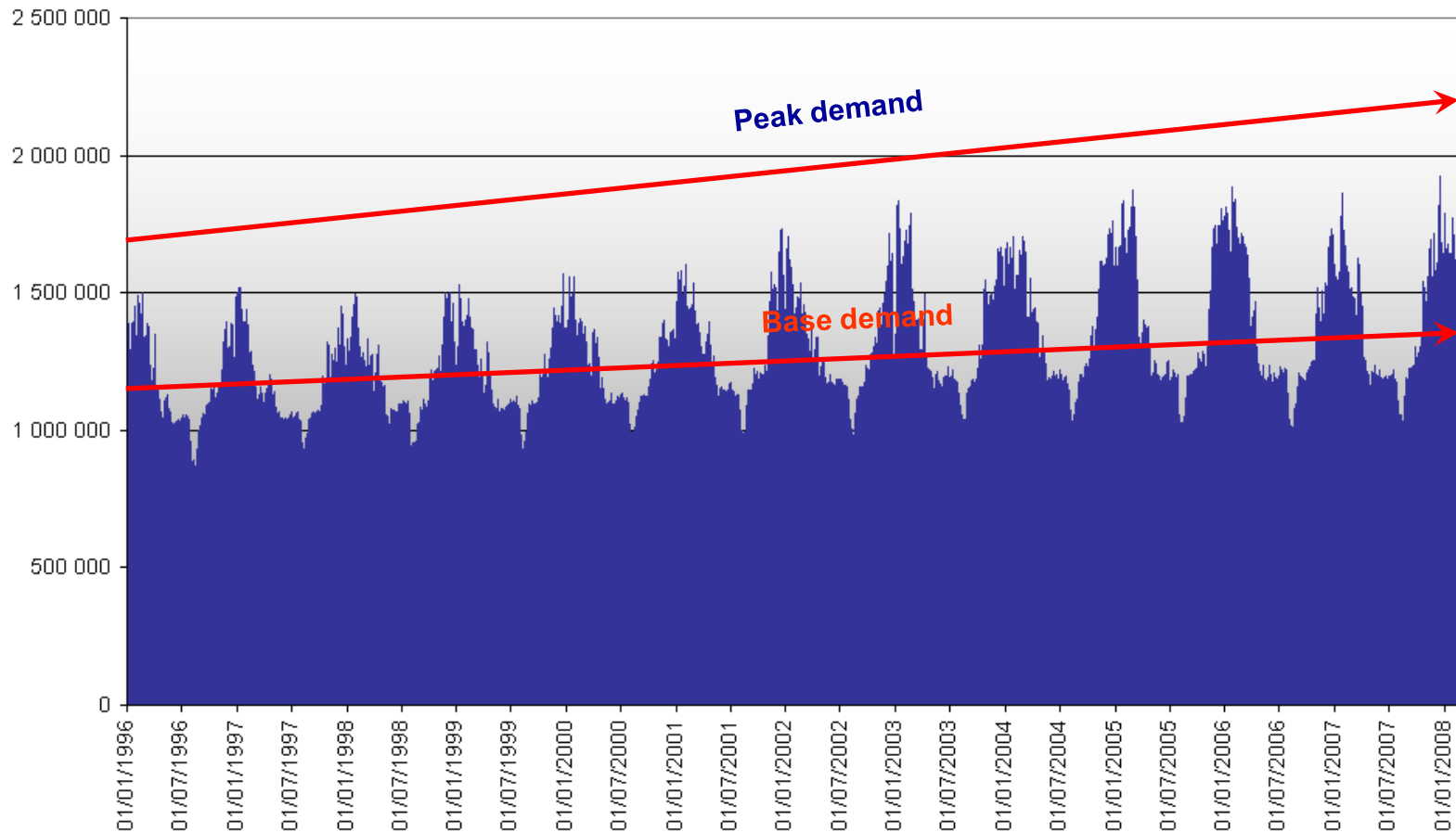
Householder - owner of PV and Prius!)

*I now use a '**green**' tariff that is slightly more expensive than the standard rate. However, because I sell the surplus electricity I generate back into the grid at the same rate I buy it, I have seen dramatic **reductions in my fuel bills**."*

*"At the moment, our **energy provider does not buy back our surplus electricity**, but we are looking around to see about changing to one that does."*

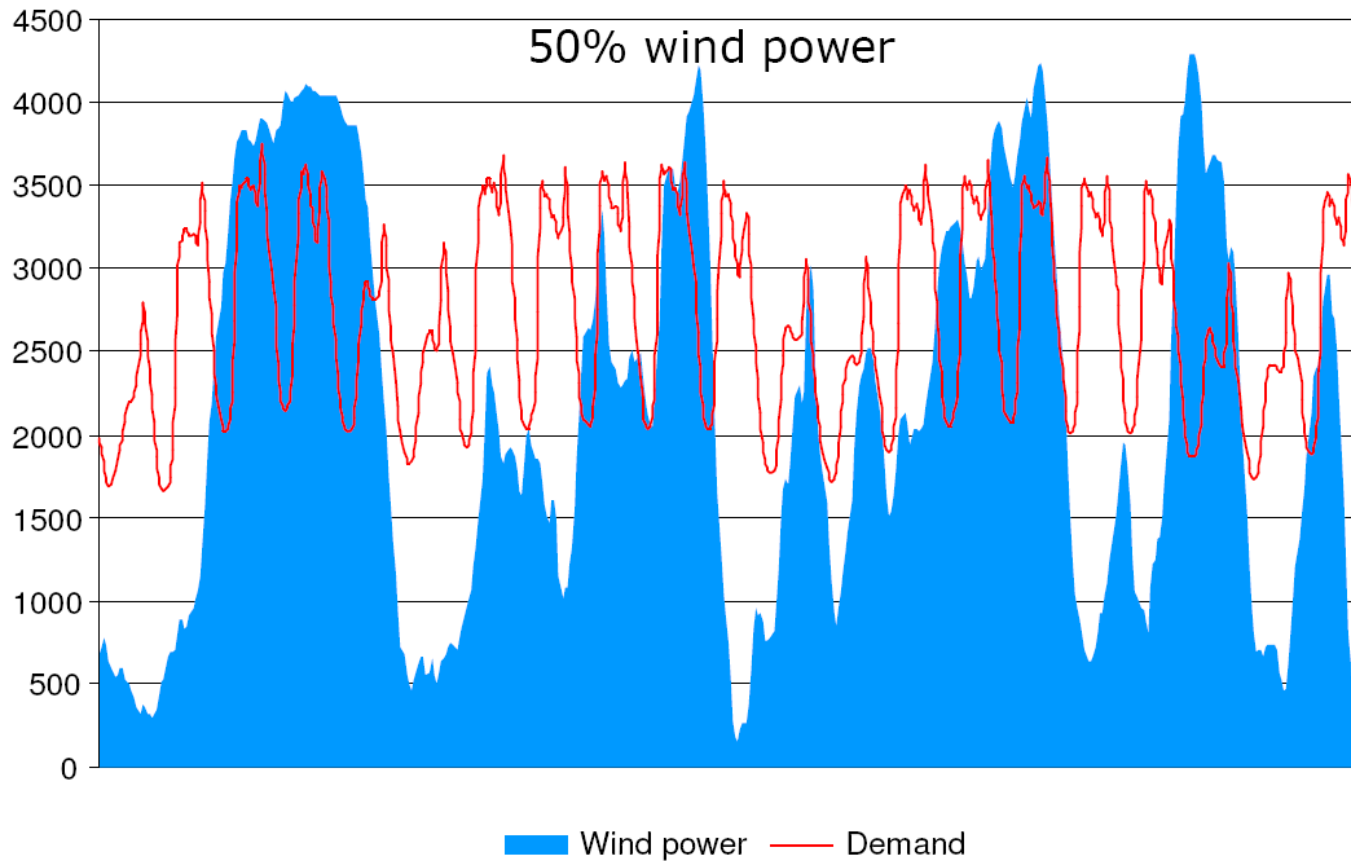
1. Electricity demand is increasing – base load and peak demand

Evolution de la consommation journalière en électricité en France



Source : exploitation des données publiques RTE

2. Renewables will not always meet demand



Challenges for the grid:

3. More complex environment in local grid

- Growing consumption – e.g. electric vehicles, heat pumps
- More sources of distributed generation, such as: PV, Wind, Micro CHP

Therefore need:

- **Effective integration** of renewable energy into power supply: **manage unpredictability**
- **Maintain grid stability and integrity**: balance between power generation and consumption



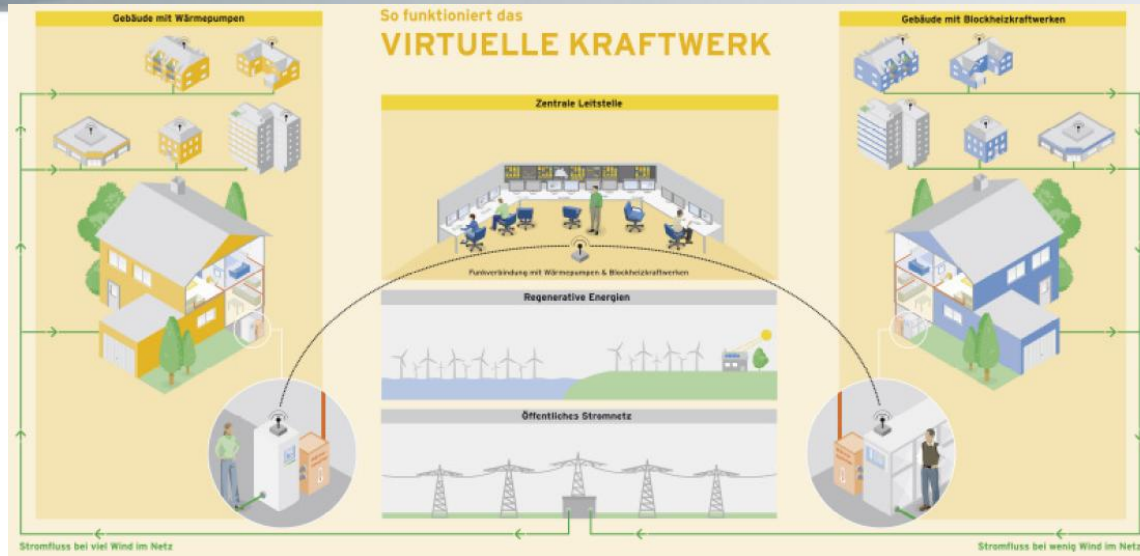
Meeting the challenge of the grid



- Need to remove or offset demand to meet our generation capacity - **Demand Response**
- To do this requires **flexibility**: various technologies and techniques available
- Micro CHP is flexible: it can be switched on when it is needed – to meet the needs of the electricity system

Within a Smart Grid the output of Micro CHP units can be aggregated and used as a single source of flexible generation to supplement traditional and intermittent renewable sources in a Virtual Power Plant - VPP

mCHP and the smart grid



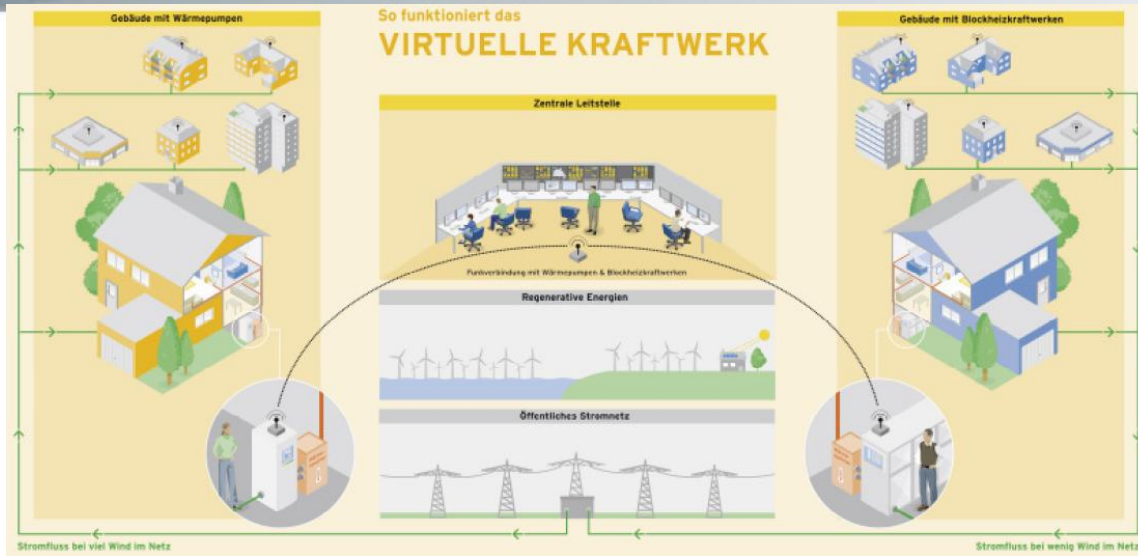
Utilities have been engaging in large-scale projects demonstrating the role of Micro CHP in the Smart Grid

Micro CHP offers a solution when there is a shortfall in renewable energy generation

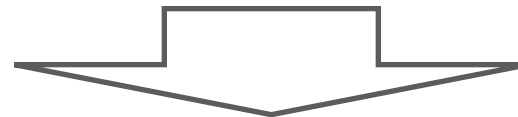
Since 2010 Vattenfall has been operating a Virtual Power Plant involving Micro CHP units to compensate variations in wind energy supply

The Vattenfall VPP incorporates the SenerTec Dachs mCHP, alongside larger-scale CHP and heat pumps

mCHP and the smart grid



- High wind output → Heat pump uses surplus power to generate heat – heat is stored
- Wind shortfall → CHP units operate to generate heat and power for grid – heat is stored



Micro CHP meets the shortfall from wind
Efficient use of surplus wind
Supply and demand is optimised

Summary and Conclusion



Micro CHP makes an important **contribution to resolving Europe's energy** issues and enabling the EU to meet its energy objectives.

Saves energy by supplying both heat and electricity from a single energy source, at the point of use

Enhances **security of supply** by reducing reliance on centralised power production and reducing gas imports

Enables the Smart Grid by:

- facilitating effective **integration** of intermittent renewable energies
- delivering **price stability** by managing the diverse sources of energy
- **reducing costs** by optimising investment in new infrastructure assets

What is needed?



Recognise the role of **Micro CHP** in improving energy efficiency, especially for upgrading the existing heating installed park

Facilitation of **connection** to the grid – simple process of *'Install and Inform'*

Reward of **value** of electricity both generated and exported – € and CO₂

Provide **incentives** based on additional economic benefit of Micro CHP for effective *Demand Response* in the Smart Grid



thank you for your attention