

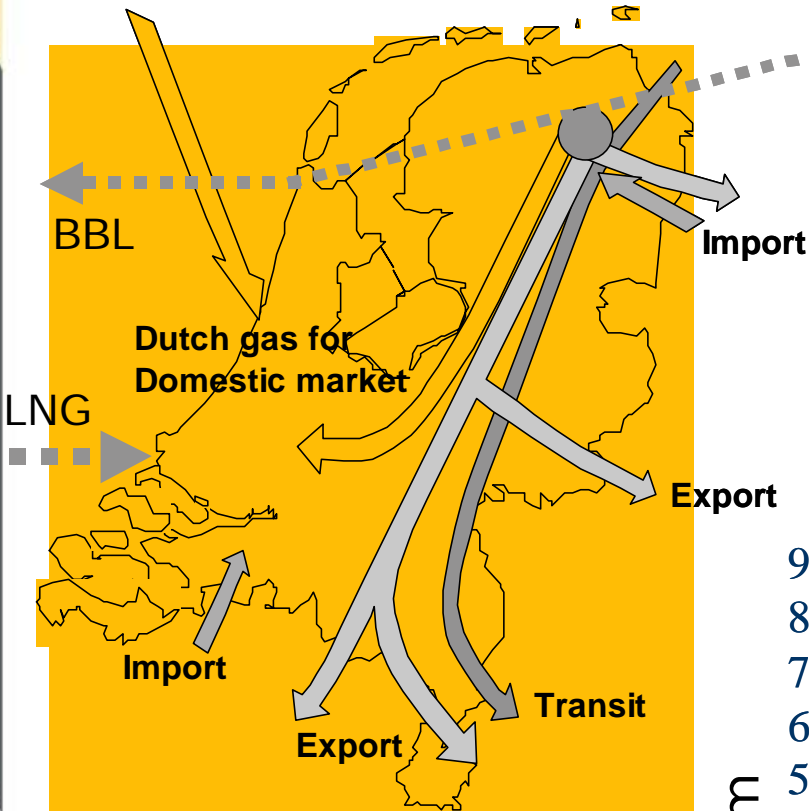


smart power systems

MicroCHEAP meeting
Petten, 6 April 2006

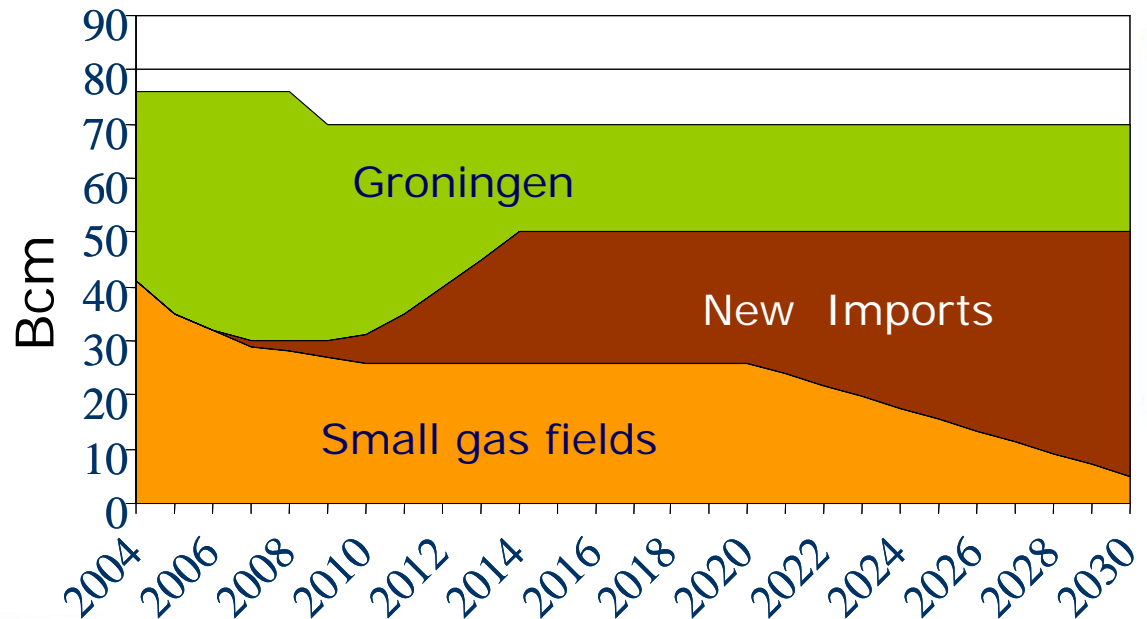
Jan Willem Turkstra
Gasunie engineering&Technology

Gasunie



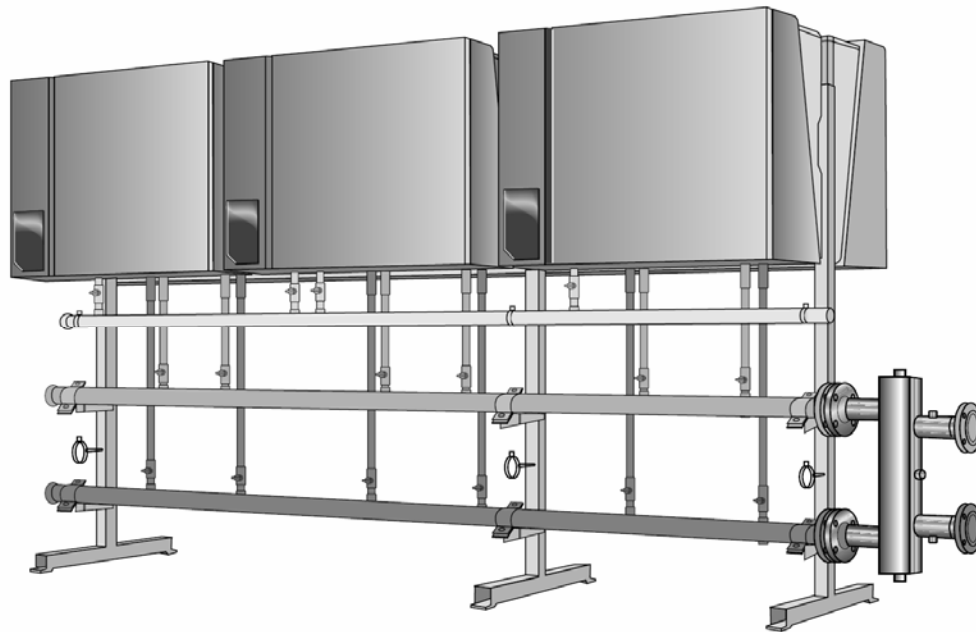
Since Juli 1st 2005:

- Gasunie Trade & Supply B.V.
- N.V. Nederlandse Gasunie
 - Gasunie Engineering & Technology b.v.



Gasunie Engineering & Technology (GET)

- Gas transmission: pipeline integrity, risk analysis, flow measurements.
- Gas utilization: energy conversion, emissions, gas quality.
- Total: ~100 people



Boiler cascade

Pioneering:

- Condensing boiler
- Modulating boiler
- Boiler cascade

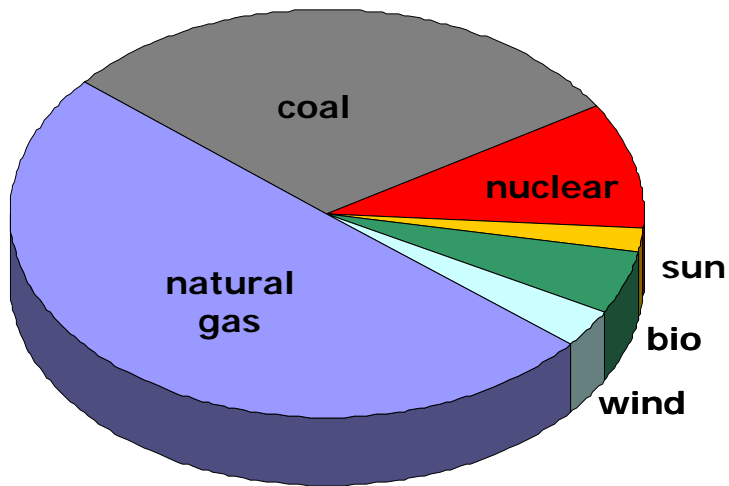
Current focus:

- Micro-CHP

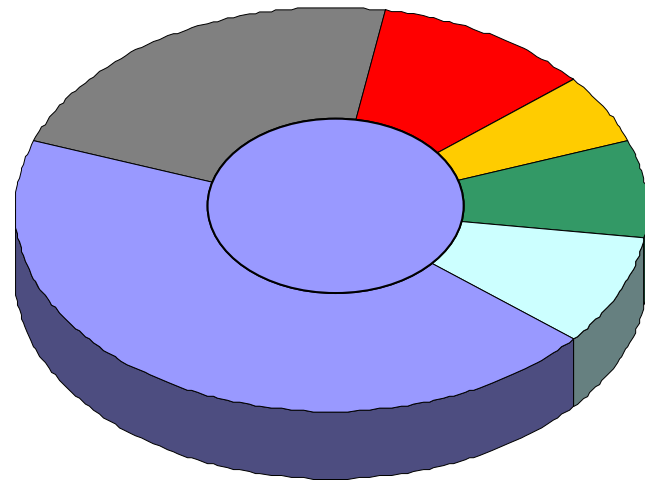
Distributed power

Maximizing the value of natural gas
“gas as a enabling energy carrier in the sustainable society”

- exploit the intrinsic stability of gas grids
- exploit the high power density of gas
- natural gas as a carrier gas for new gasses



gas as primary energy



gas as enabling energy

Micro-CHP: 50 WhisperGen's



- 50 WhisperGen's in Dutch households.
- 0.9 kW el., 6 kW thermal, 120 litre store.
- Gasunie, energy retailers (Essent, Nuon, Eneco,..), COGEN cooperation.
- Sharing of experiences via workgroups and aligning views
- "Energy transition" is a economic and legal challenge!

Next generation micro-CHP development



Microgen-Gasunie Joint combi development

- State-of-the-art free-piston Stirling engine.
- Optimised for the UK market.
- Special combi version for the Dutch market

Market barriers



reliability, noise, size, cost, etc..

➤Manufacturers.

Grid supply fee.

➤Energy retailers

Local power quality.

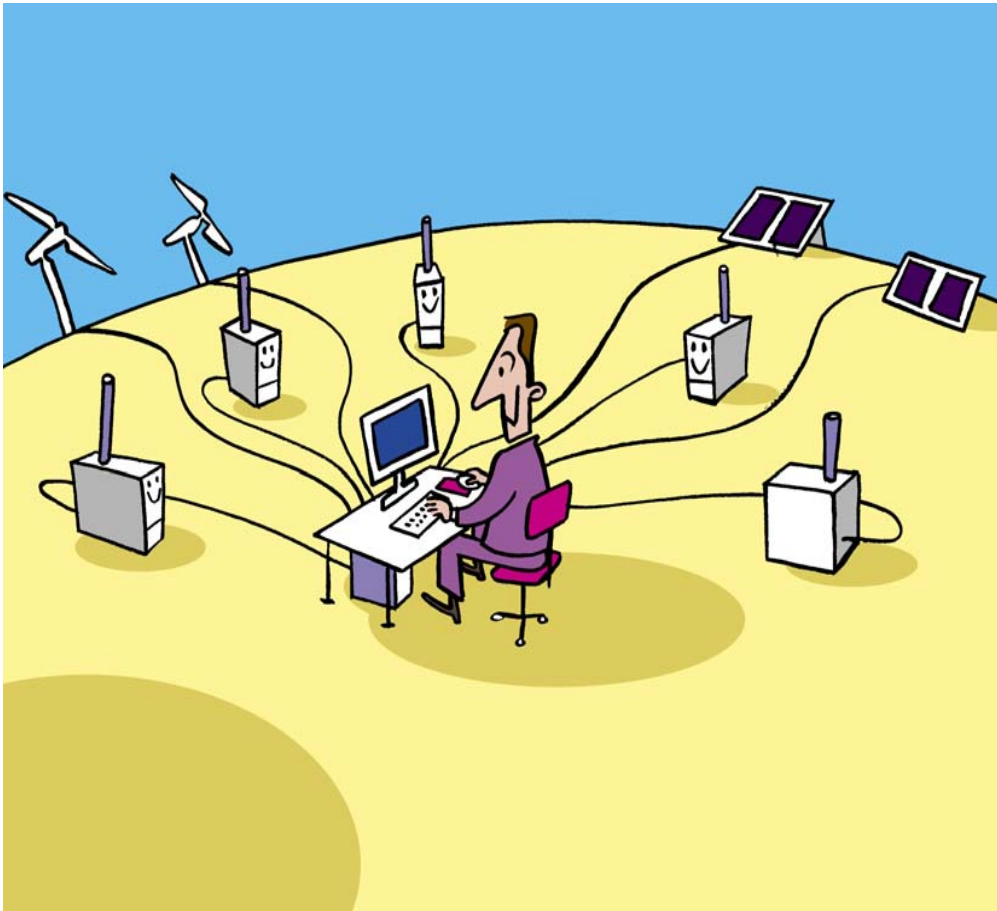
➤grid operators

Gasunie?

➤Speed up process with technical and non-technical solutions.

Smart Power Systems (SPS)

SPS consortium with the entire energy value chain + research institutes, ICT businesses, non-profit organisations.



Pilots:

ECN PowerMatcher VPP

- Smart control of conventional micro-CHP systems.
- First system installed.

HOMA + Essent VPP

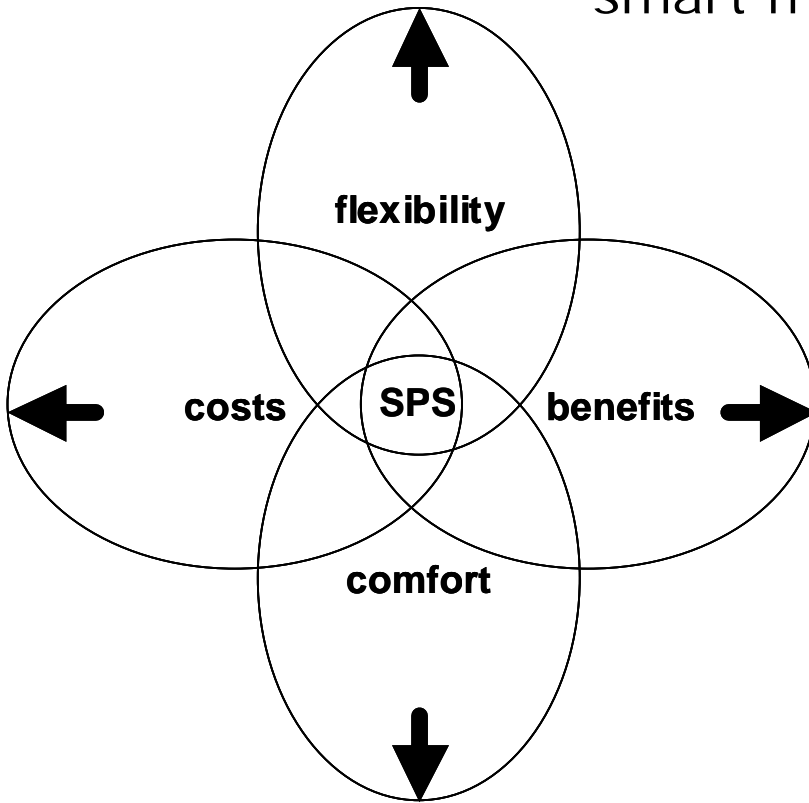
- Smart control of a adapted micro-CHP systems with additional store.
- In preparation.

impact on local grid quality

- Test grid with >25 micro-CHP's With grid operators.
- In preparation.

Smart micro-CHP

Smart power calls for smart micro-CHP systems!



Compact heat storage (ECN).

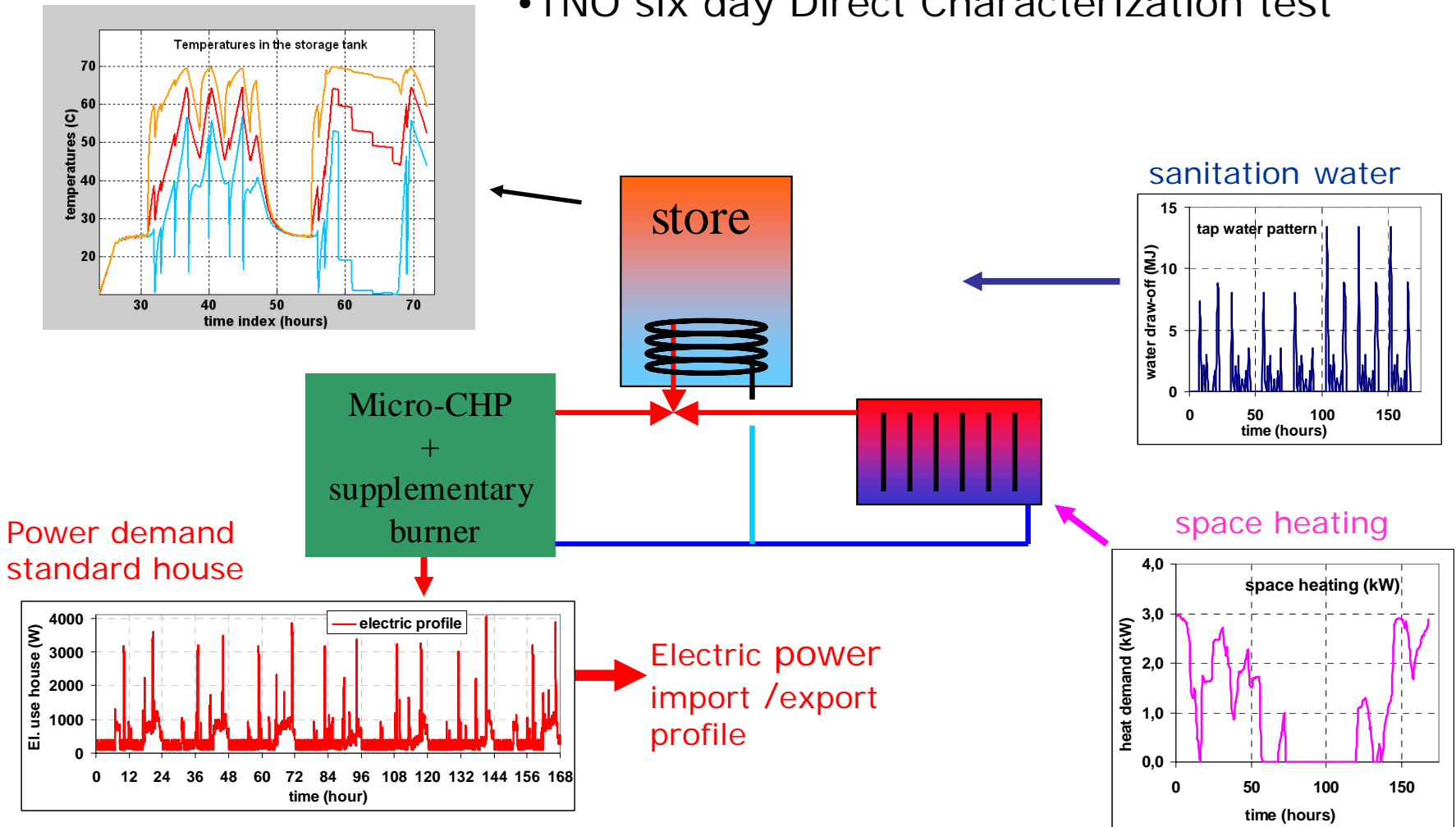
- Optimal use of space.
- Super insulation.

No-compromise user comfort

- "German performance standard from a Dutch sized+priced system"

Development tools

- Dynamic simulations with Matlab Simulink™
- TNO six day Direct Characterization test



summary

- Market deregulation creates complex market environment.
- Distributed power optimizes value of natural gas.
- Pilot with 50 micro-CHP's to create market support.
- Joint-development of next generation micro-CHP.
- Smart power answer to many market barriers.
- Smart micro-CHP requires novel hard- & software solutions.

