ECN

Energy research Centre of the Netherlands

Sustainable Energy in the Netherlands

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Energy research Centre of the Netherlands

ECN's main features

- 600 high-qualified employees
- Annual turnover of 67 million euro
- Approx. 10 international patents granted each year
- (Inter)national co-operation with companies, universities and research institutes
- Approx. 400 reports and publications each year
- 10 spin off/out companies

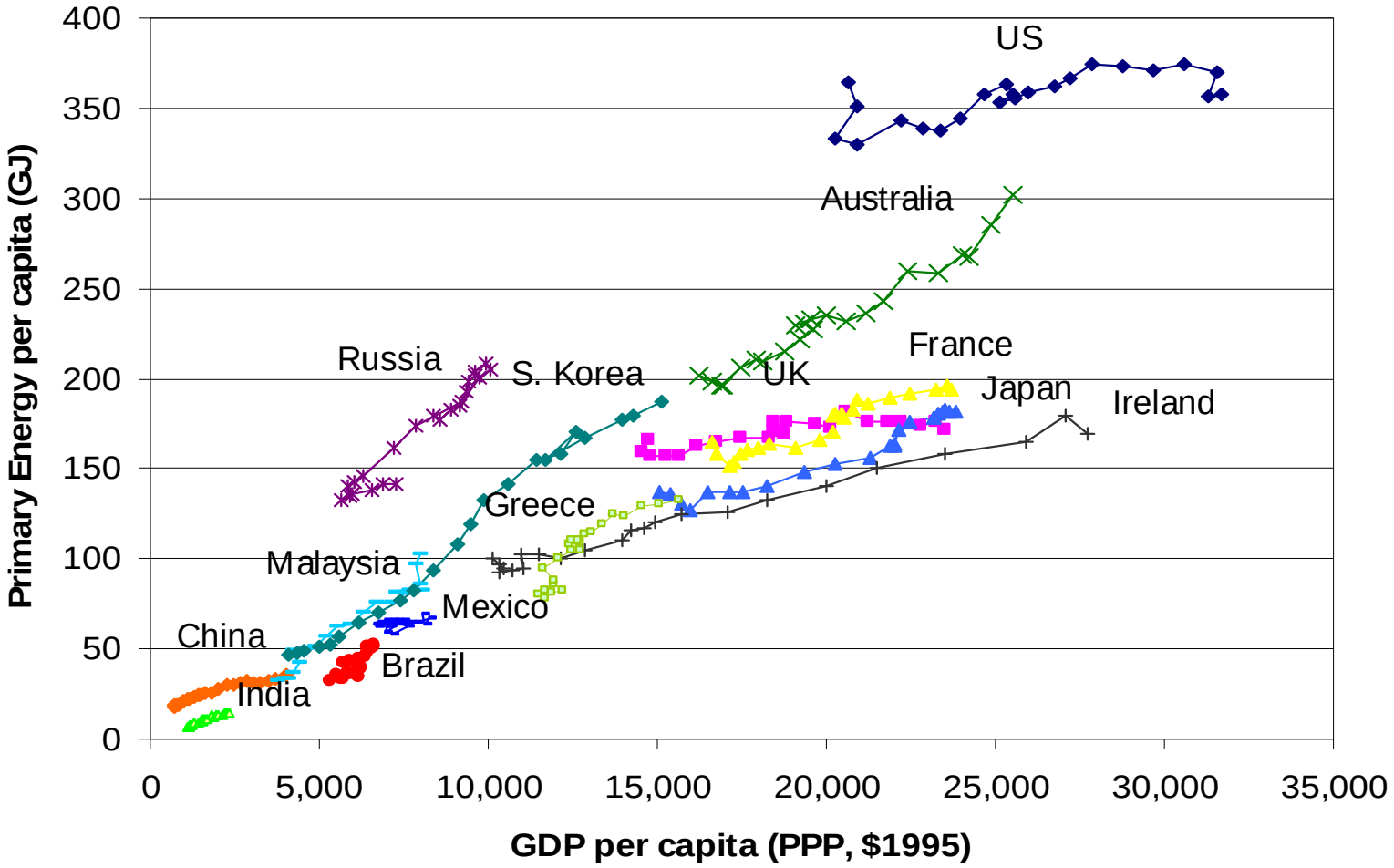
The ECN MISSION

We develop and bring to market

high-level knowledge and technology

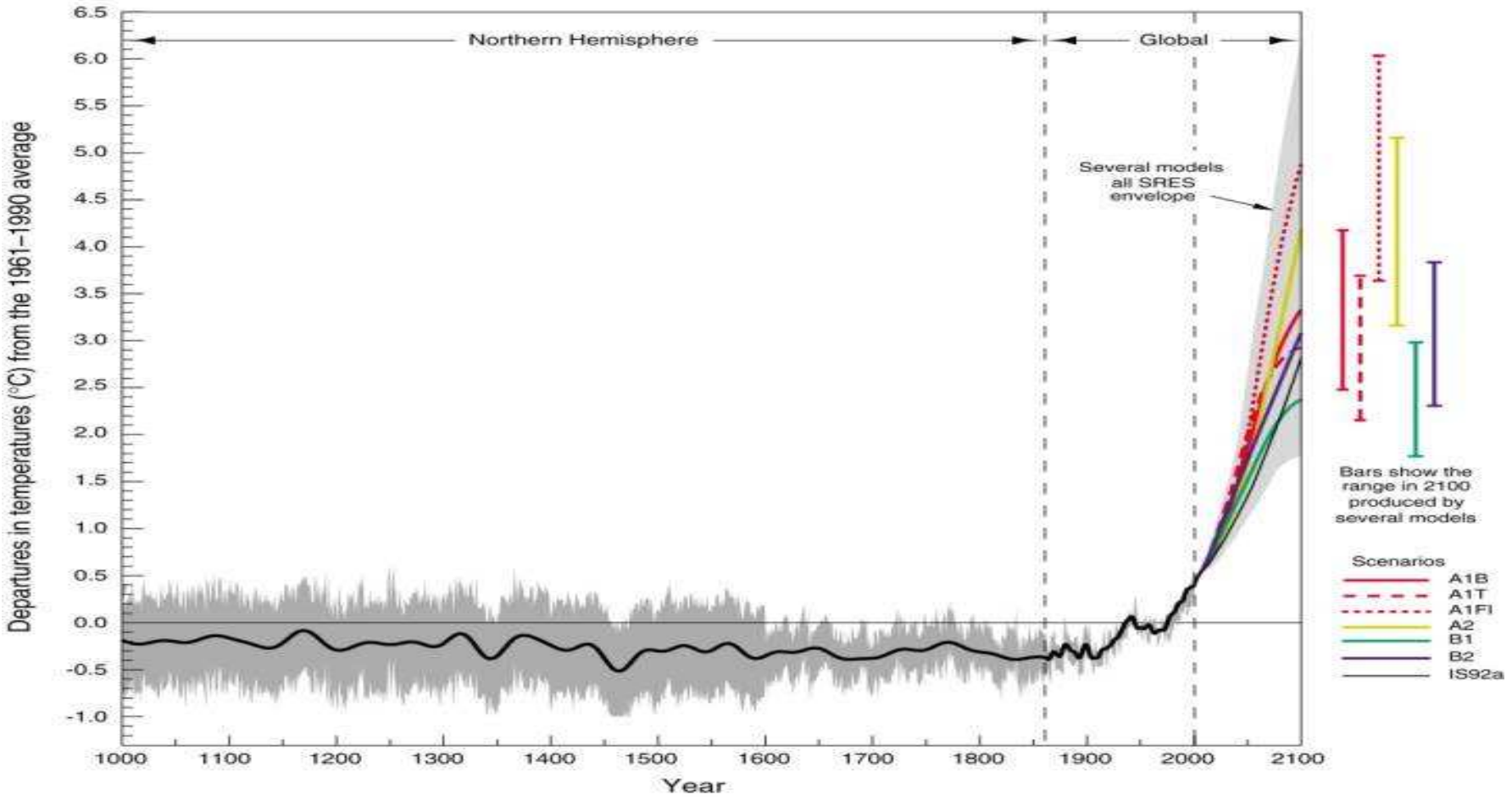
for a sustainable energy supply

Energy consumption per capita versus GDP (1980-2002)



Source: EIA, UN

Temperature variations earth surface



Bron IPCC

…and the effects are obvious….

Source:
NASA

Arctic sea ice, 1979

Arctic sea ice, 2003

…..but also:

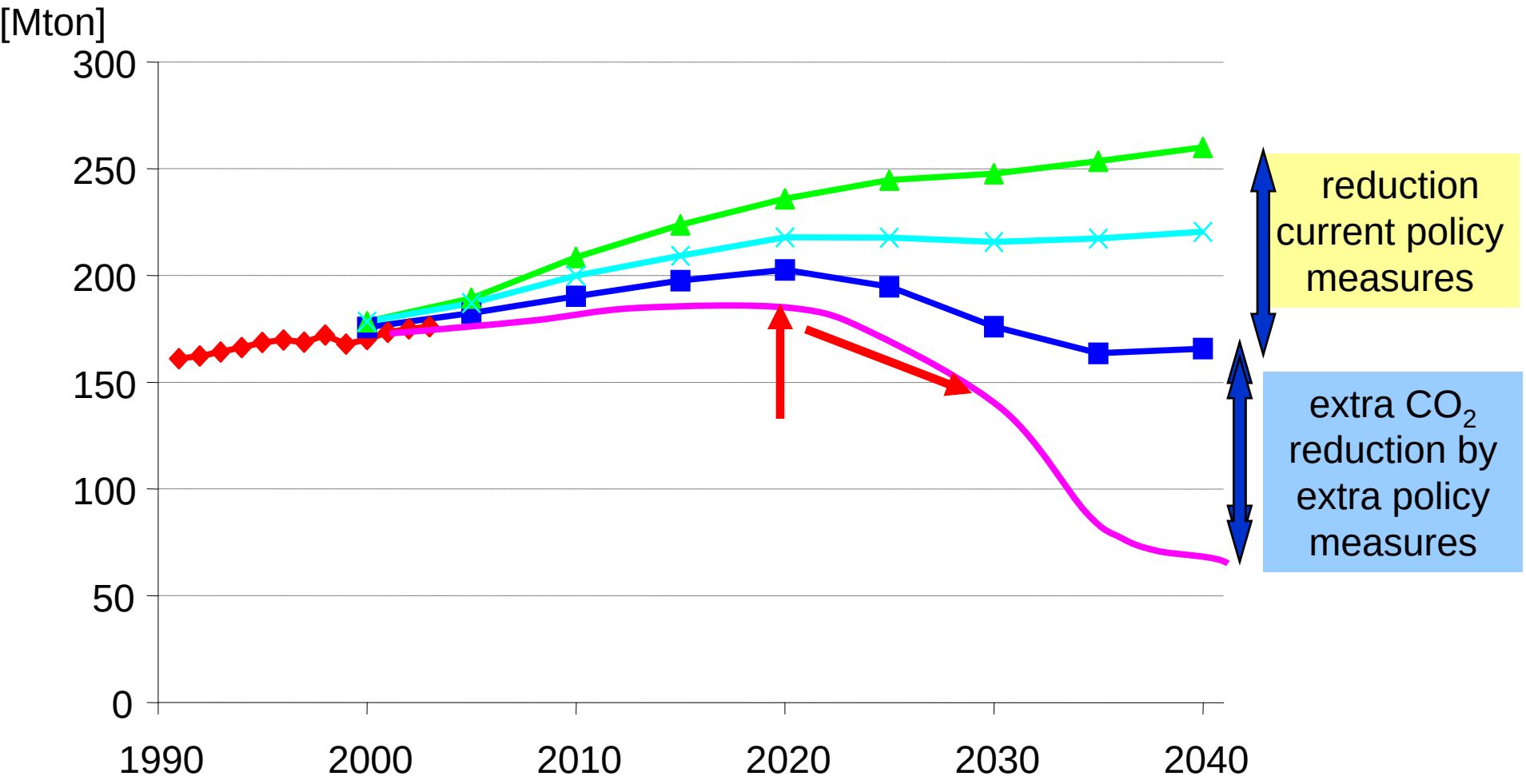
- Decrease of glacier sizes f.e. the Mount Everest
- Drafting in South France
- Increase statistical change on extreme wetherconditions
- Decrease of biodiversity

EU and national targets 2020

	EU agreement	Coalition agreement Balkende IV
Greenhouse gases emission reduction	20 % (Ł 30 %, dependent on commitment U.S, China, India)	30 %[1]
Energy efficiency improvement	20 % in 2020, action plan EE	2 %/ year
Biofuels	10% binding minimum	10%
Renewable energy sources	20 %	20 % (including biofuel)

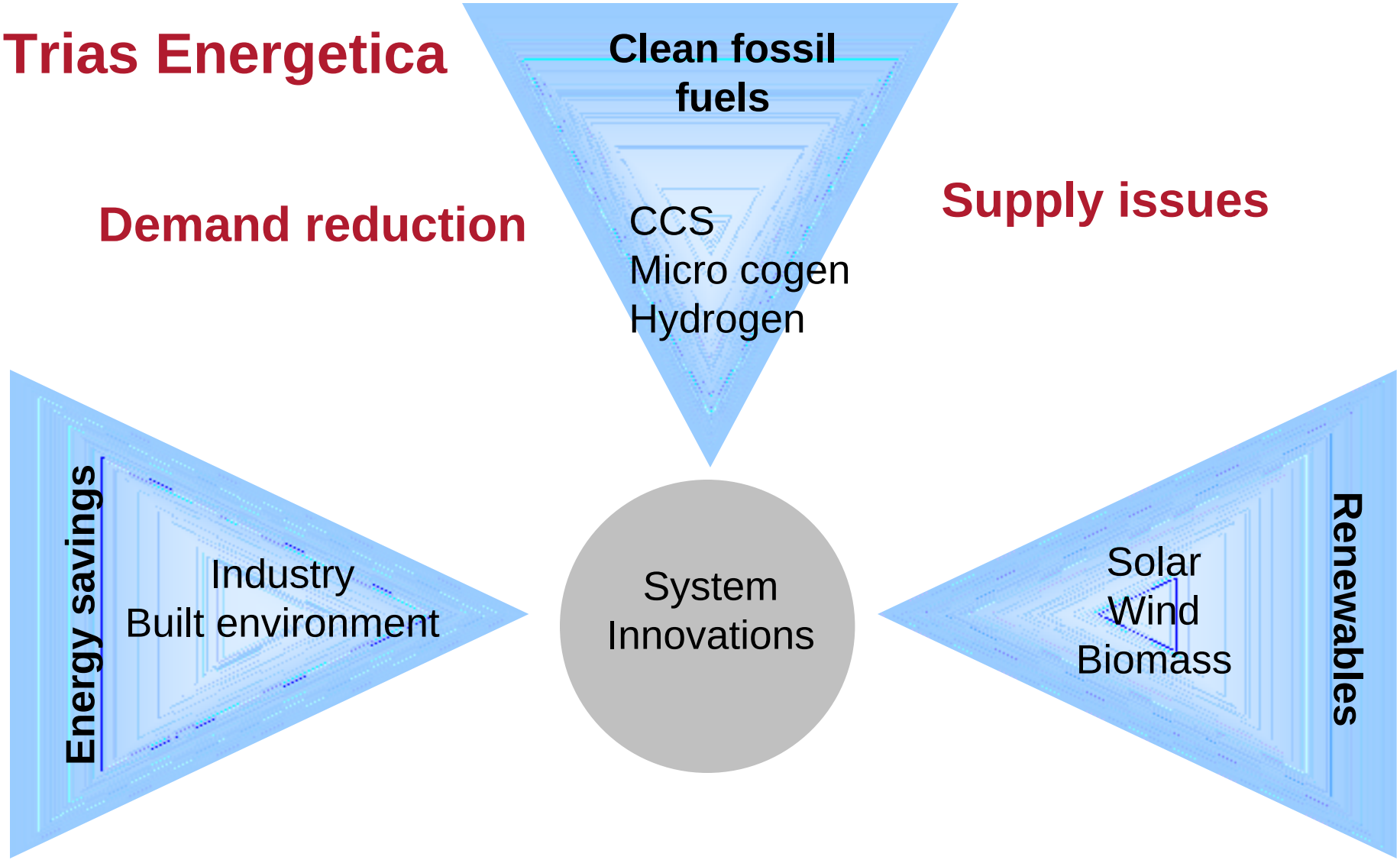
[1] reference year 1990

NL CO_2 emissions



Preliminary results

Trias Energetica

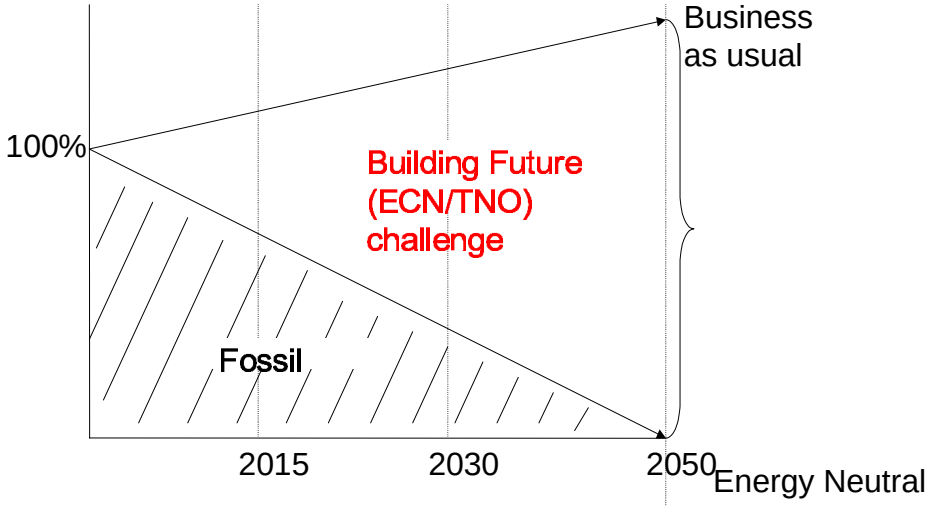


Building Future (ECN/TNO) challenge

- Energy neutral Built Environment around 2050
  - Total Energy
  - Building-related + User-related + Built Environment-related

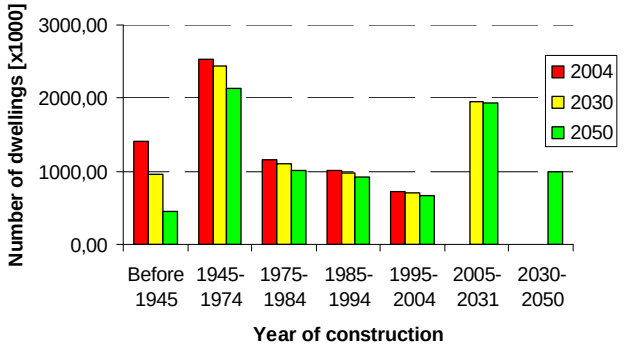
- Net energy neutral

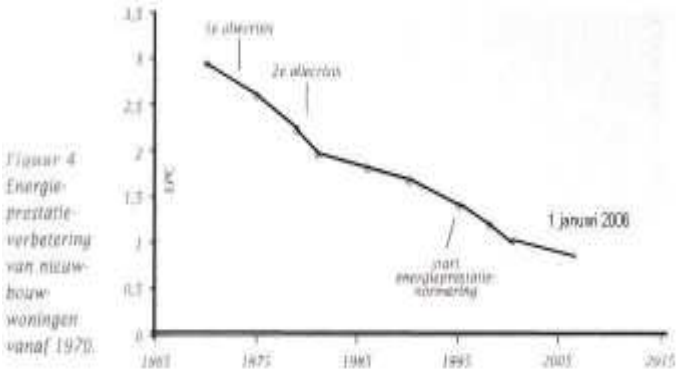
- All buildings
  - Residential
  - Non-residential



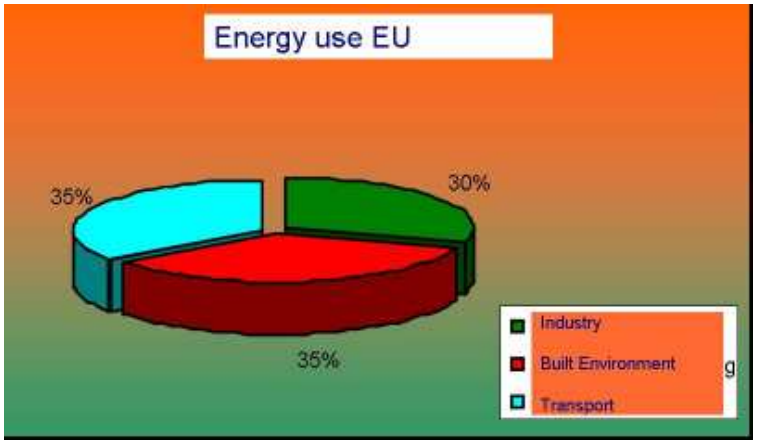
The built environment in numbers

- ± 1000 PJ/year; 2/3 houses, 1/3 offices
- Existing housing stock ≅ 6 million
- Mainly gas and electricity
- About 50% is privately



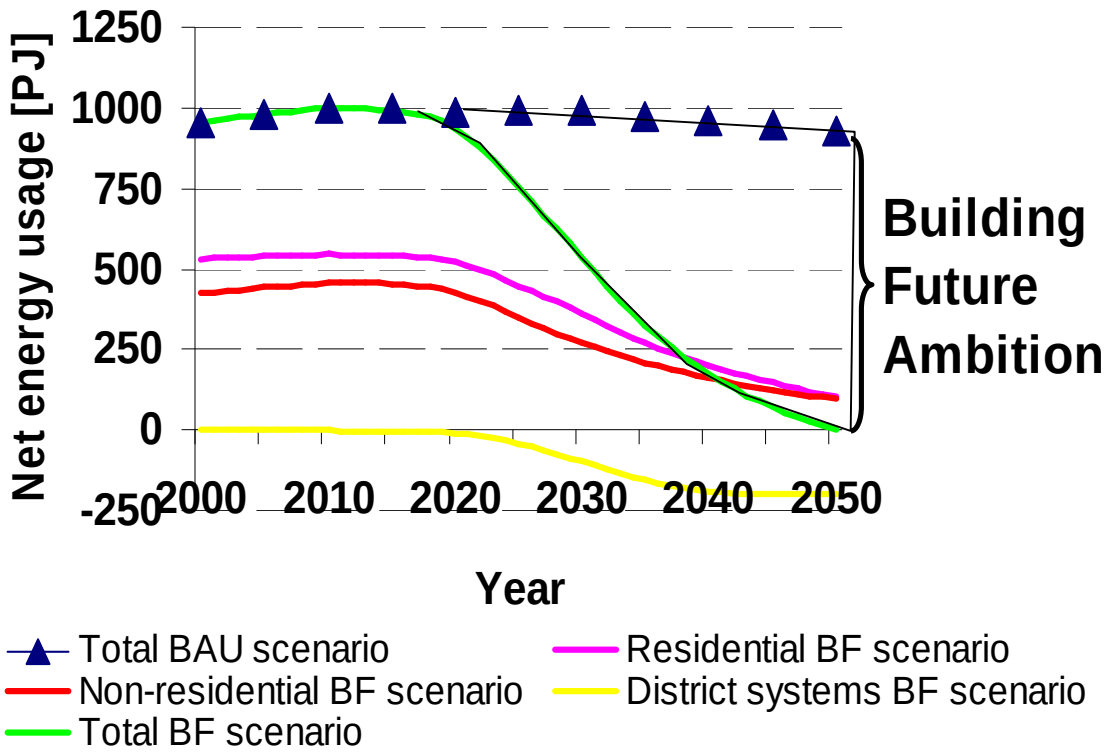


Figuur 4 Energieprestatieverbetering van nieuwbouwwoningen vanaf 1970.



The ambition in numbers

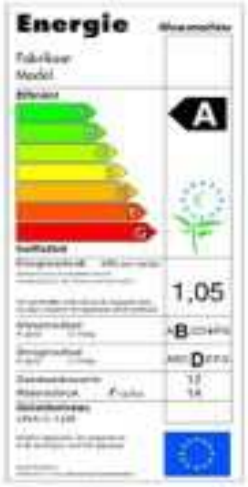
- All measures for residential buildings combined: -385 PJ
- 5% E-reduction / year non-residential buildings: -410 PJ
- All building-related measures combined: -755 PJ
- Ambition for measures at district level: -200 PJ



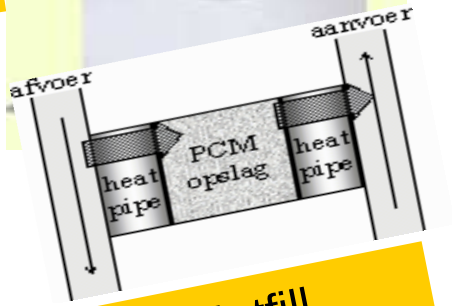
Implications for R&D

- “Break through” technologies and improvements
  - µ-CHP
  - Multifunctional building components for RE-generation (e.g. PVT)
  - Compact (Seasonal) Heat storage
  - Solutions for reduction of HHA-energy demand
- Intelligent integration in complete concepts
  - E+ new buildings
  - Factor 4 (over all!) retrofitting aligned to renovation-motivation
  - Community systems (RE)
- Harvest the full potential of the (designed) concepts
  - Influence of Building Process
  - Influence of End-Users

Energy saving measures

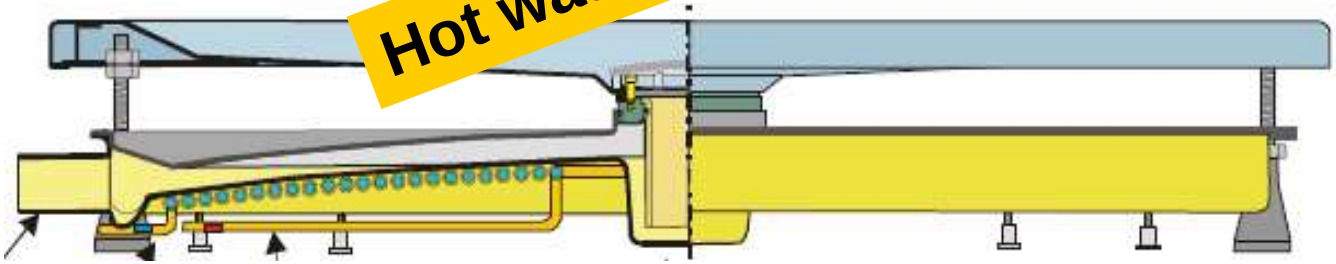


‘Standby killer’

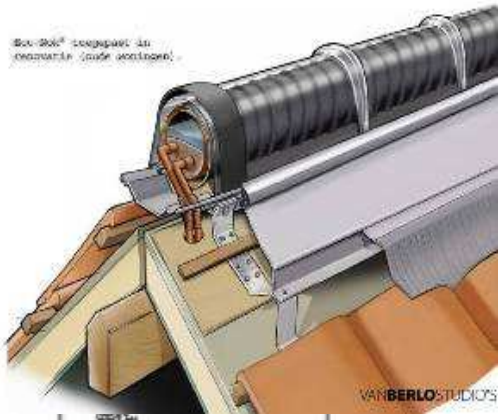


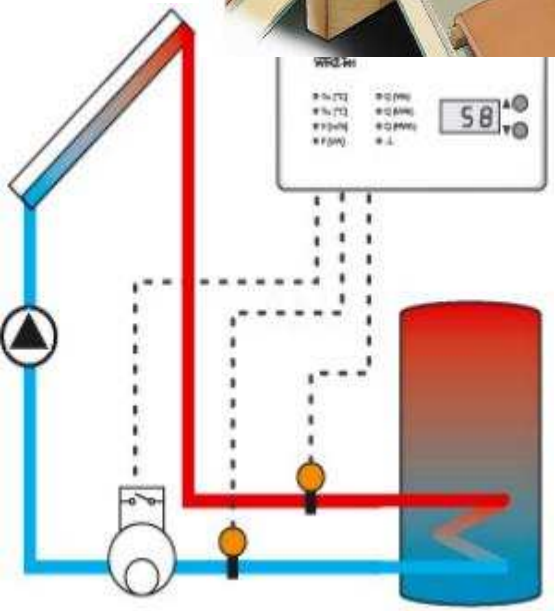
Hotfill

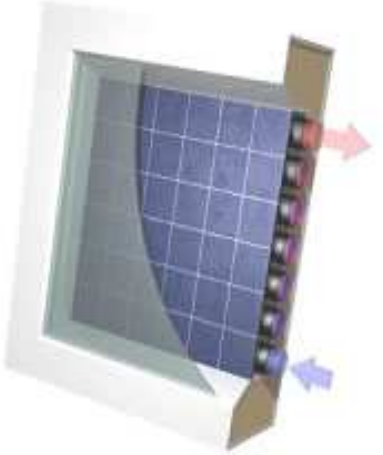
Hot water



Thermal Systems: multifunctional RE Generation



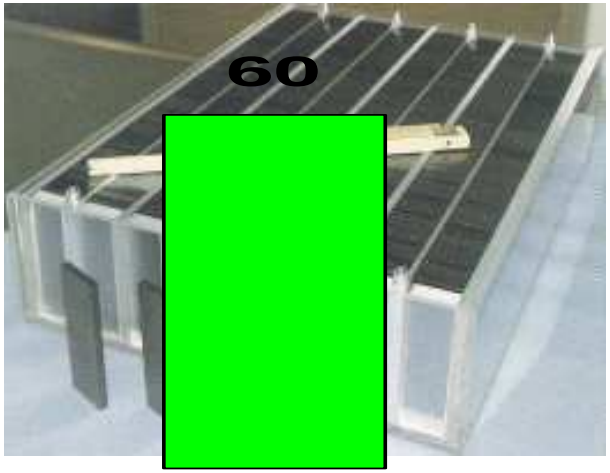


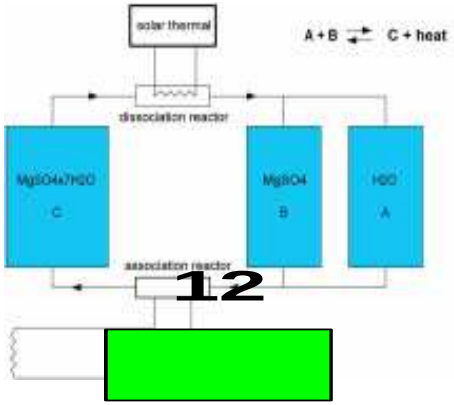


PVT collector

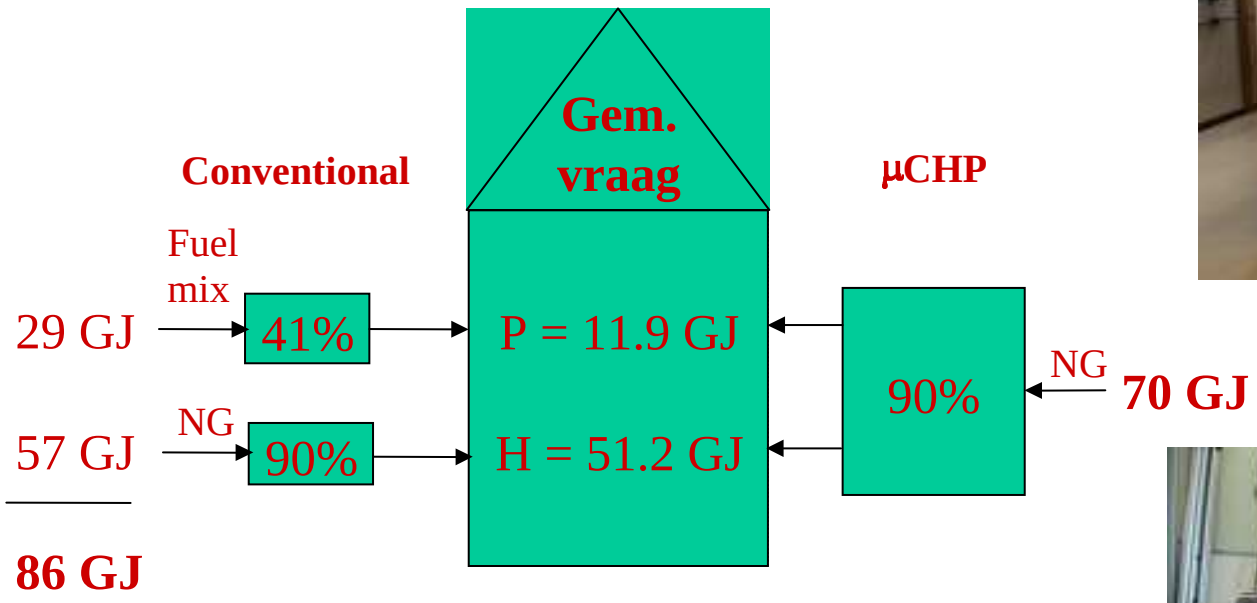
Vacuum tube solar collector (+ µ-ORC)

Thermal systems: heat storage





Combined heat and power



Saving = 16/86 = 19 %

Building energetics: a systems approach

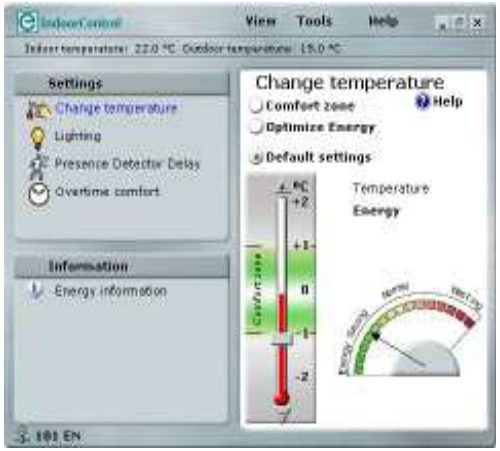
Only technology is not enough

Technological system integration:

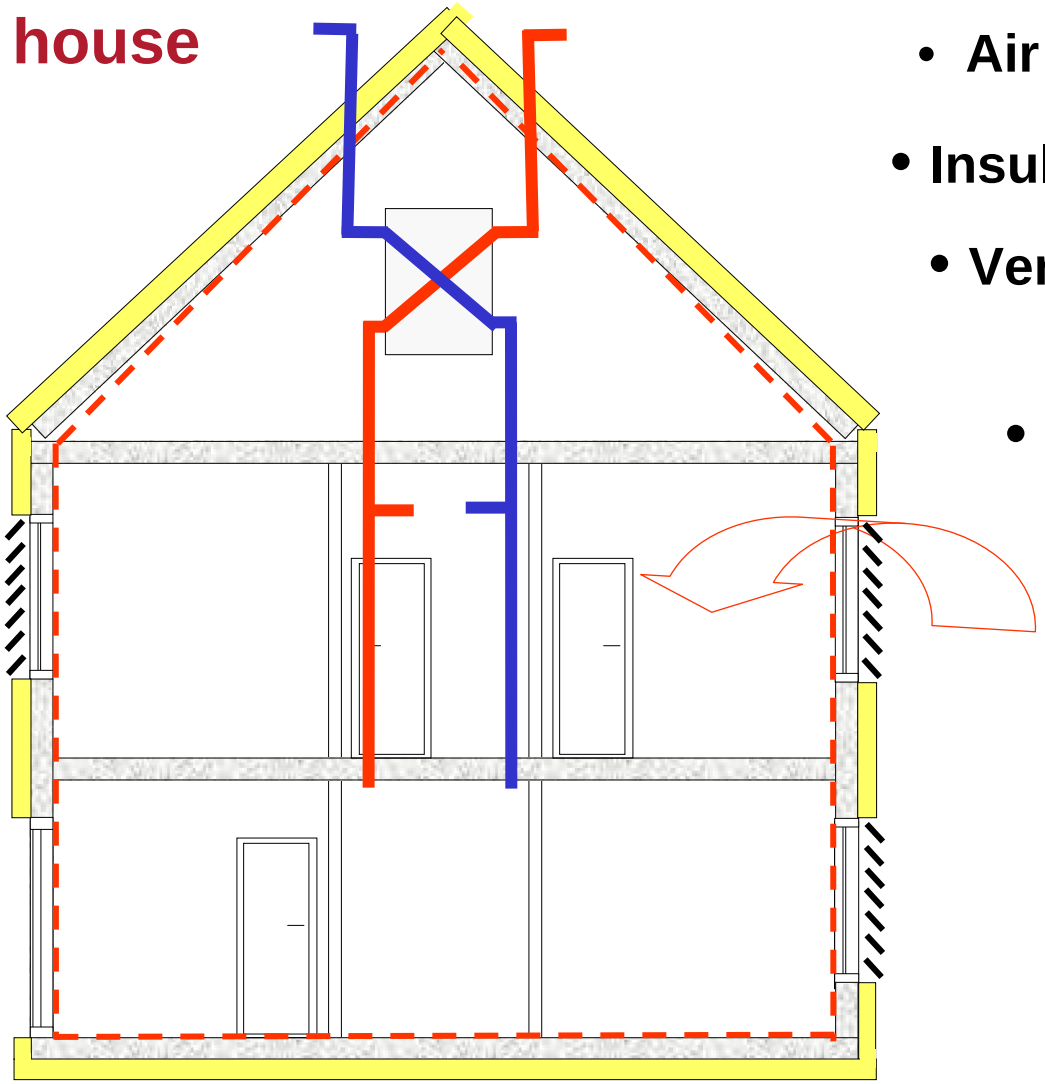
- Integration in buildings
- Connection to the grid
- Matching of demand and supply
- Introduction of storage systems (heat & electricity)

System integration is more:

- New processes
- Social aspects
- New players on the market
- Easy use, comfort

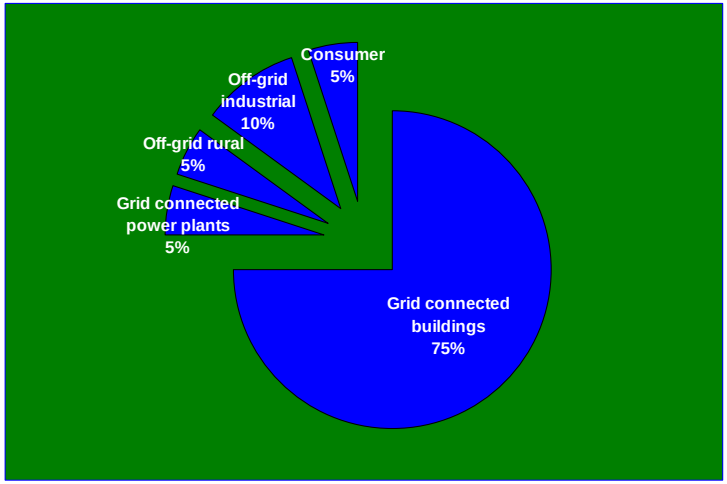


Passive house



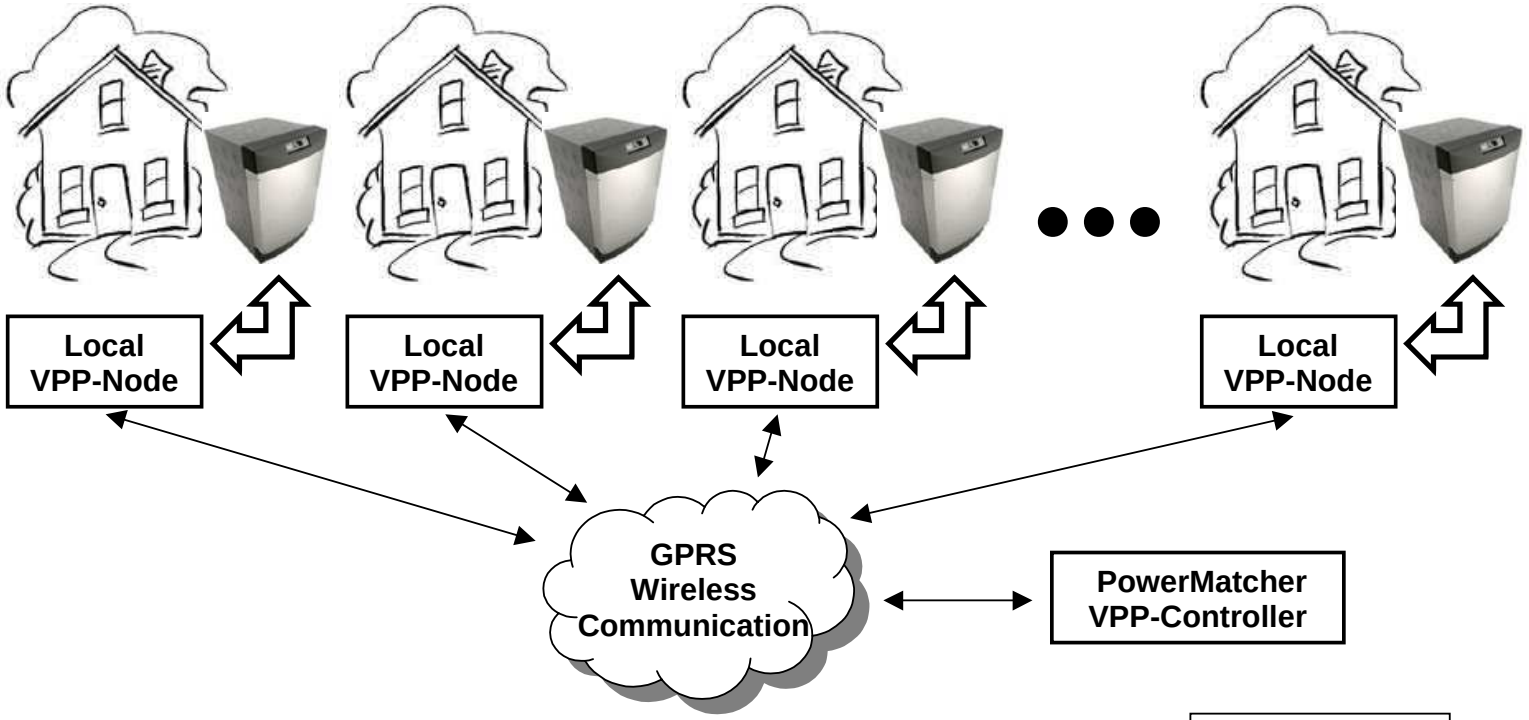
- Air tightness (0,6/h)
- Insulation (Rc>7,5)
- Ventilation (90%)
- Solar shading

Integration of solar



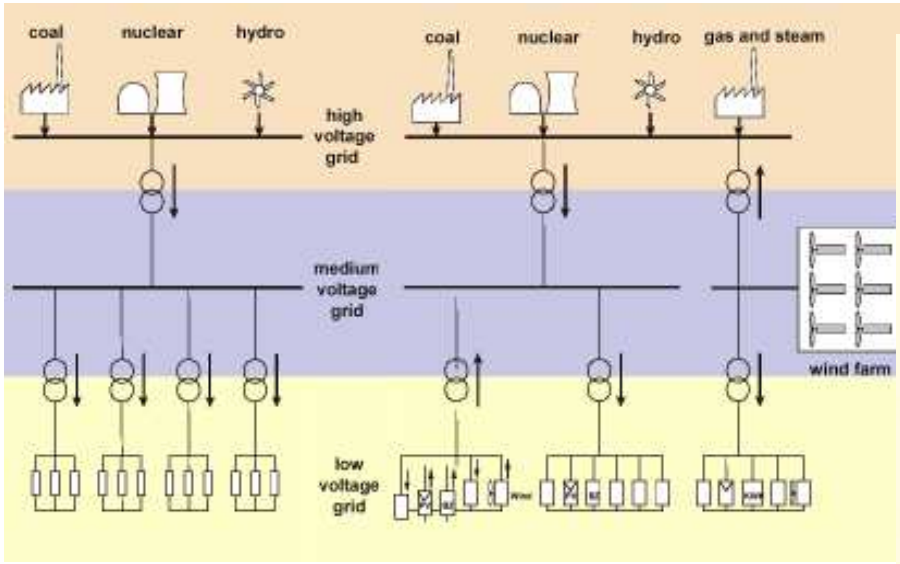
µCHP Virtual Power Plant

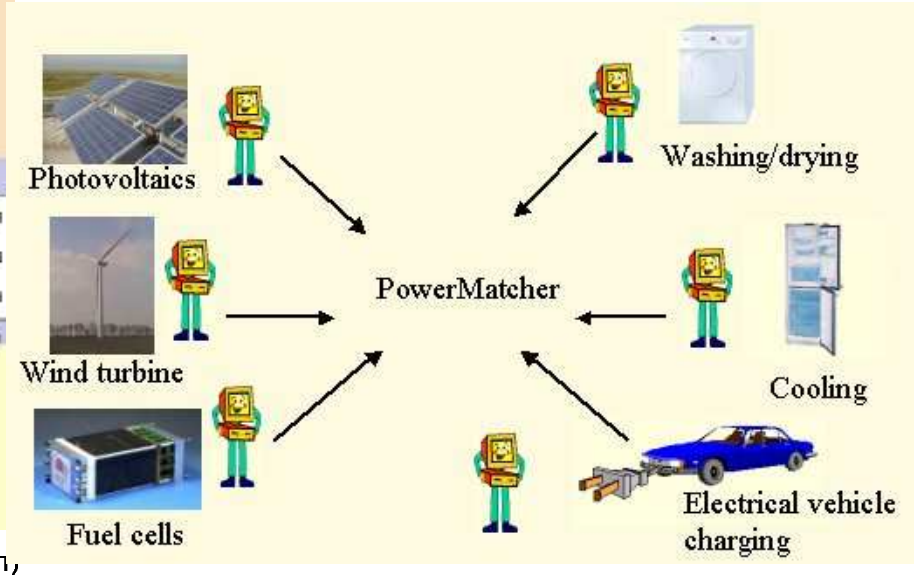
Clustered operation of micro-CHPs for grid-support and trading



GPRS Supplier:

Towards smartgrids

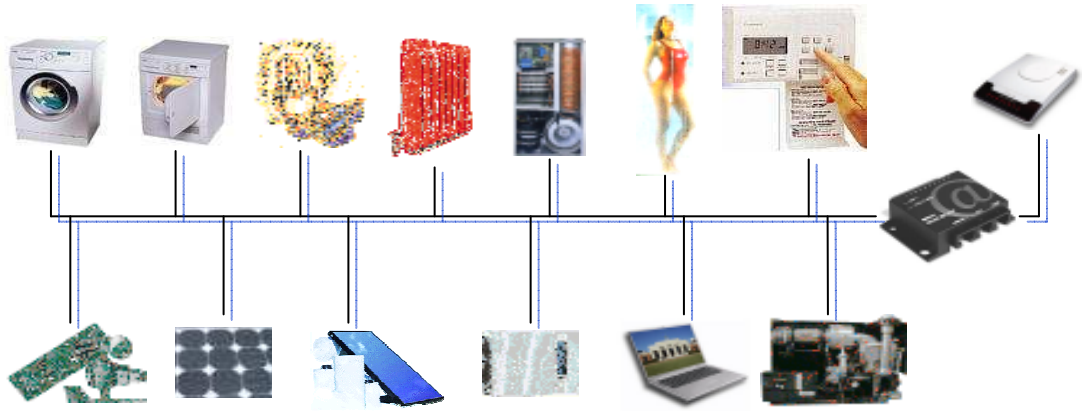




(Drawing courtesy of ISET)

New services with ‘smart metering’

- Monitoring quality of energy supply
- Monitoring the amount of sustainable energy supply
- Variable energy tarifs
- Automatic switching on and of of machines
- Matching of energy demand and supply (PowerMatcher)



Implications for implementation

- National Platform for energy transition in the built environment (1 out of 6 national platforms):
  - More with less in renovation: 300.000, 30% reduction
  - Large scale innovation in newly built & renovation (6000-8000 as a start)
  - More efficient laws and rules for the built environment

Some conclusions

- High ambitions on a national level
- The built environment can contribute considerably via energy savings and the introduction of sustainable energy
- It will be a challenge for many years for all stakeholders to come to large scale implementation
- Its the combination of introducing new technologies and system integration
- It is THE sector to introduce new technologies and create public acceptance…that will also be the challenge for industries