

Smart design for the Smart Grid

Josco C.P. Kester (MSc)

ECN Intelligent Energy Grids (kester@ecn.nl)



Mobile telephone



Smart Meter



Meter + Communication?

NO, instead



Gateway for Smart Grid!

Smart Grid: Why?

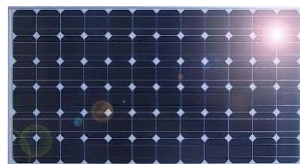


Smart Grid: Why?

Upgrade the Grid



demand



supply



grid

Smart Grid: How?

Users supply flexibility to the grid



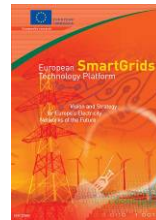
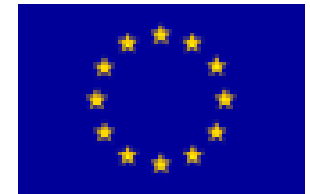
Dynamic pricing



2-way communication
with home appliances

EU Technology Platform SmartGrids

- utilities
- manufacturers
- researchers
- EU & national support

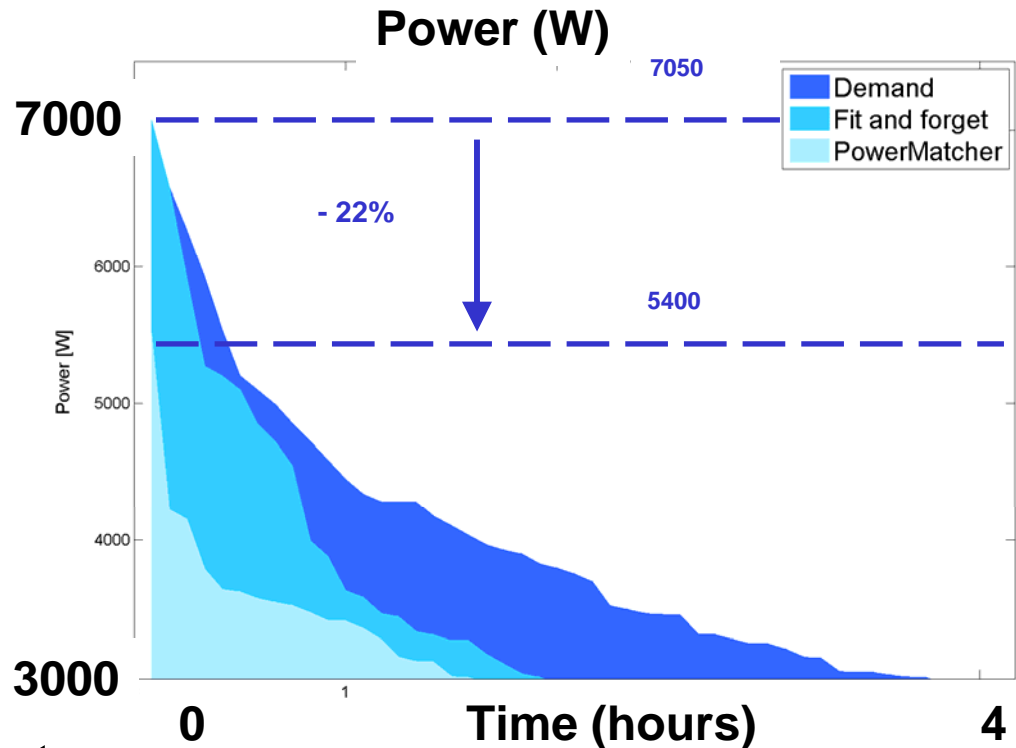


www.smartgrids.eu

Gasunie VPP Field Test

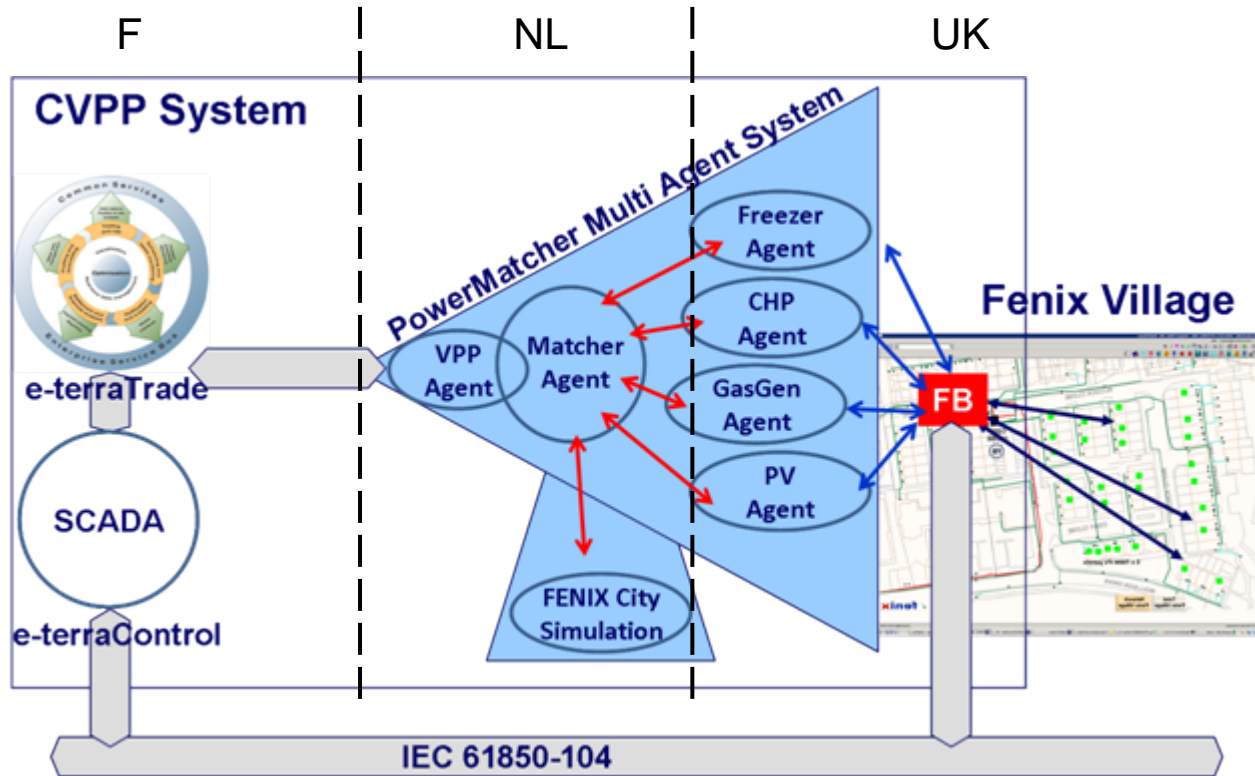
Gasunie virtual power plant field test using PowerMatcher

- 10 households with micro-CHP (1kW)
- Peak load -22%
- Normal user comfort



www.powermatcher.net

Fenix: Virtual Power Plant

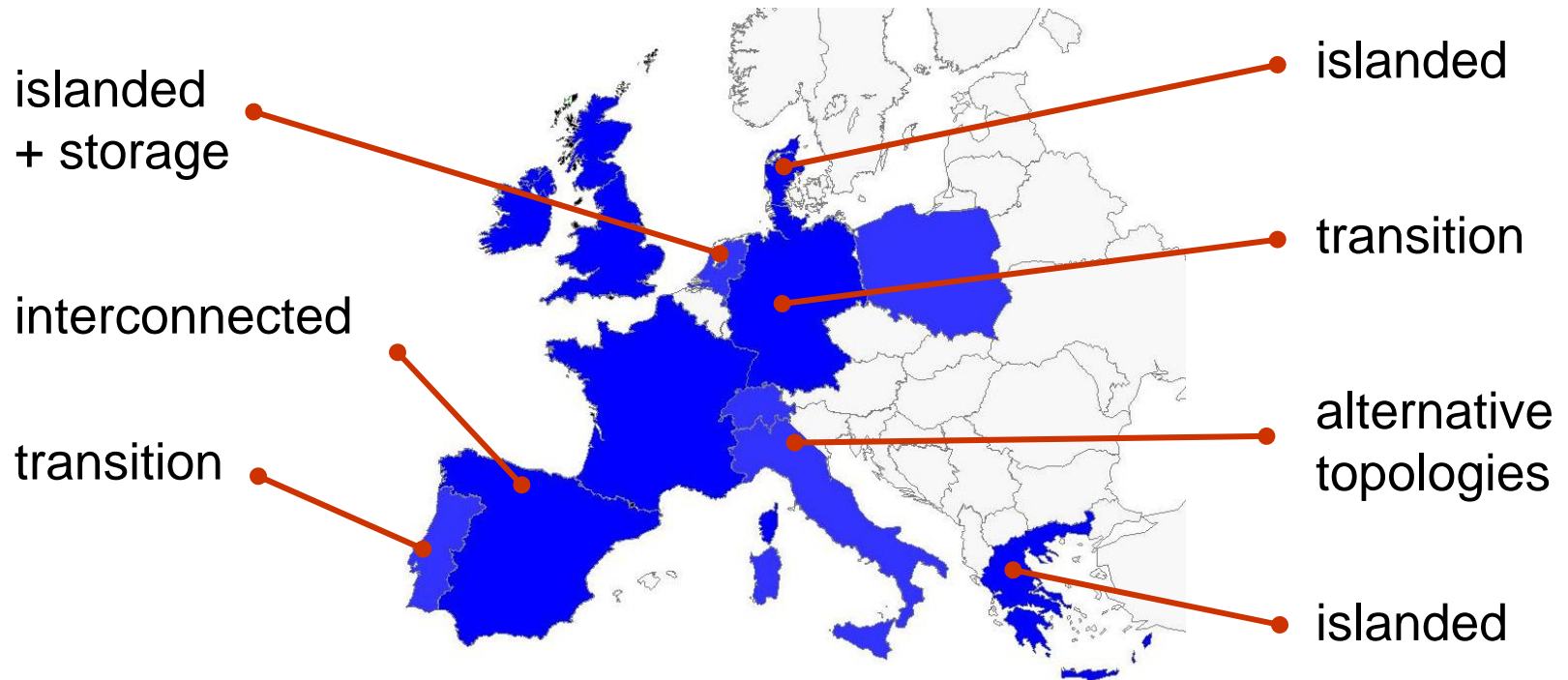


www.fenix-project.org

(More) Microgrids

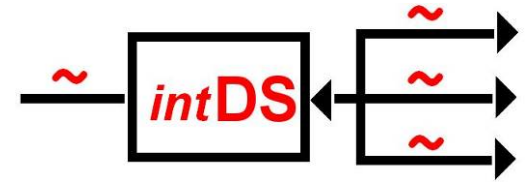


Experimental validation Microgrids

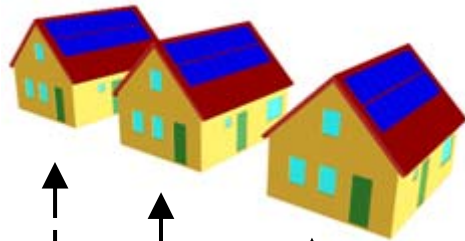


www.microgrids.eu

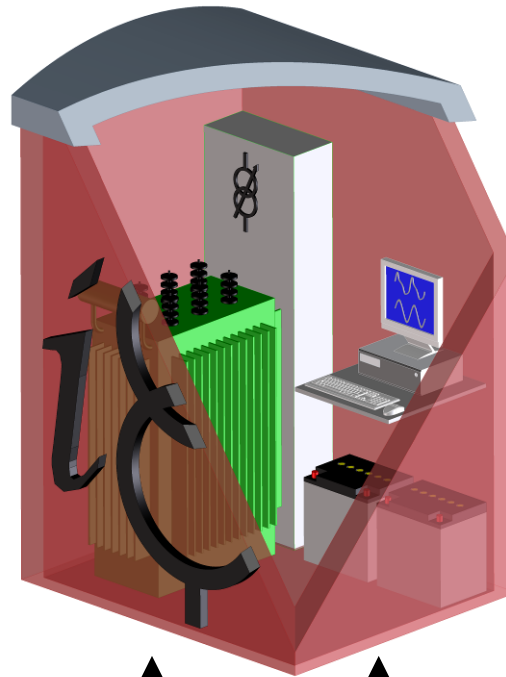
Smart Substation



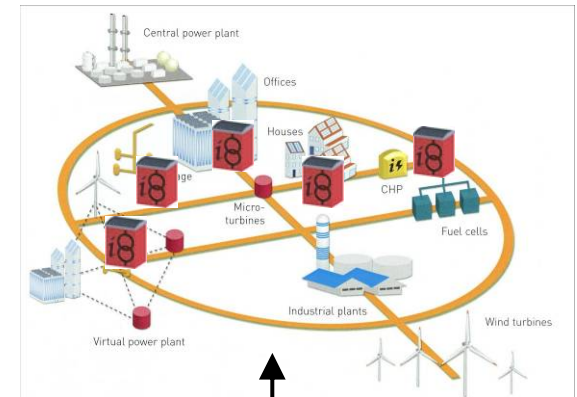
- Supply
- Demand
- Power Quality



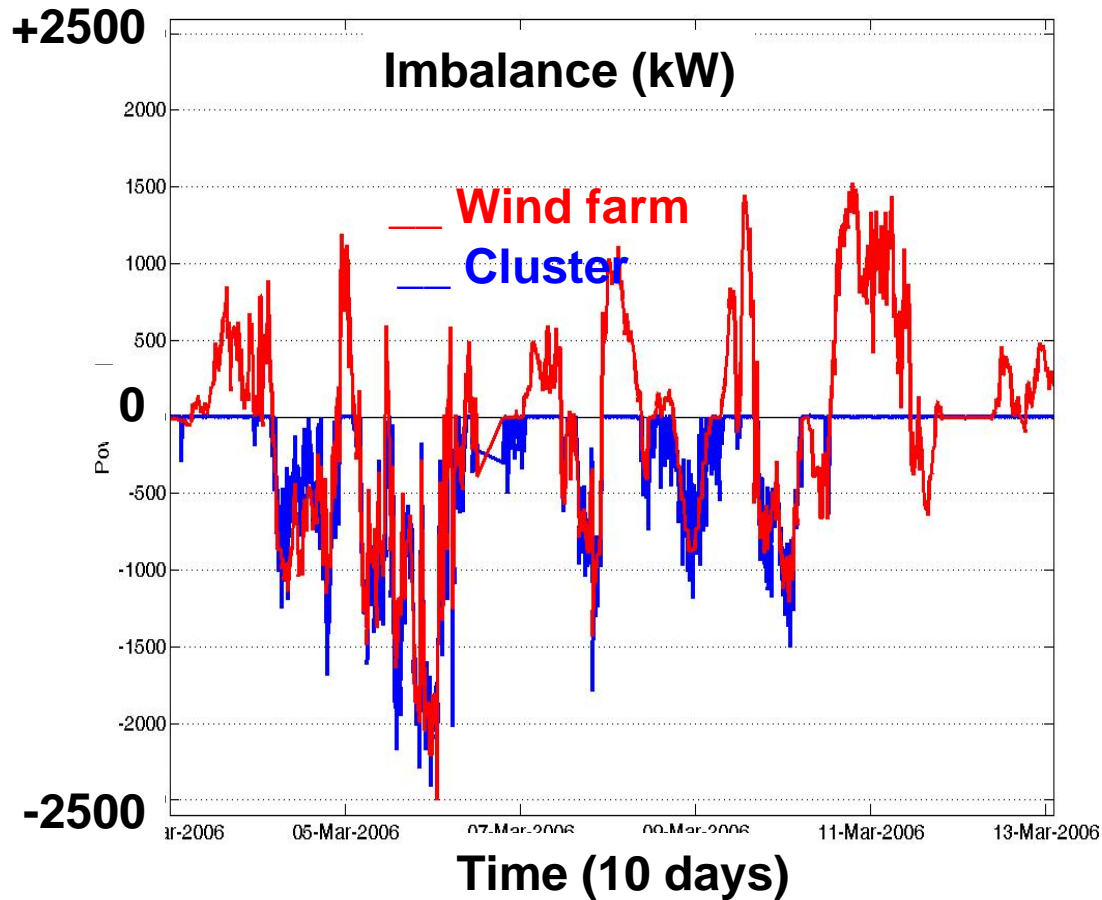
2-way communication



2-way communication



CRISP: Imbalance reduction



- Windfarm
- Flexible demand
- Flexible supply
- PowerMatcher

43% imbalance reduction

www.ecn.nl/crisp

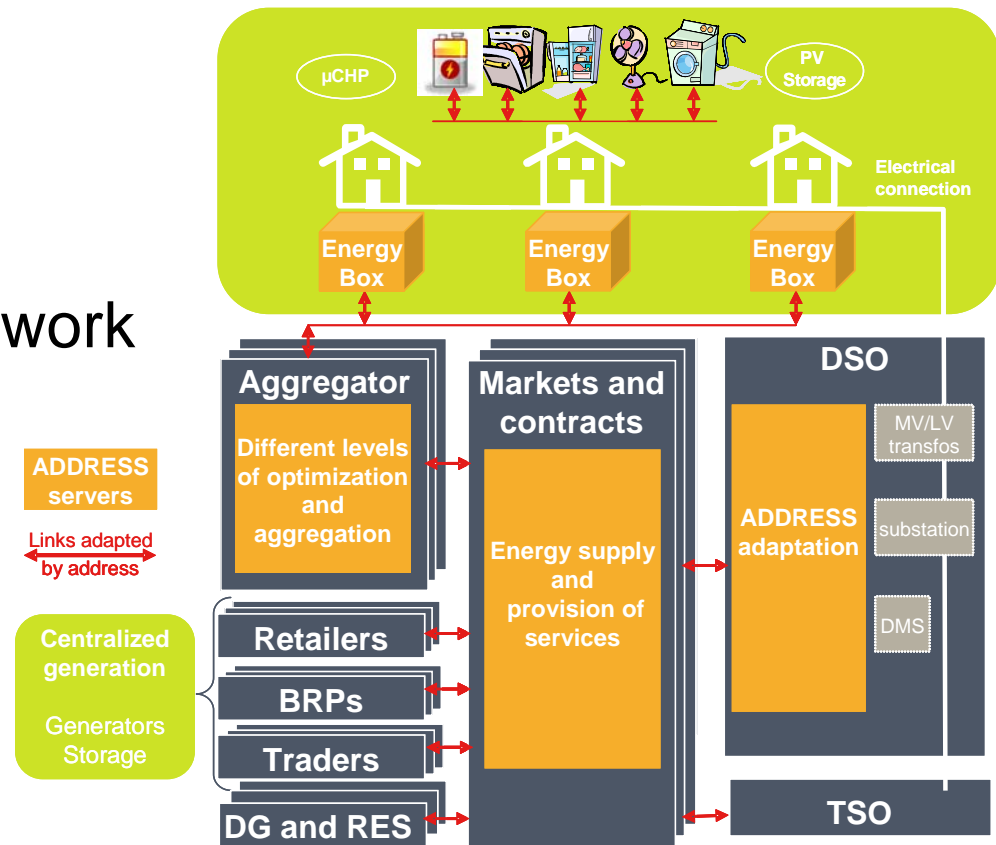
ADDRESS: Active demand

address
interactive energy

active participation of small consumers

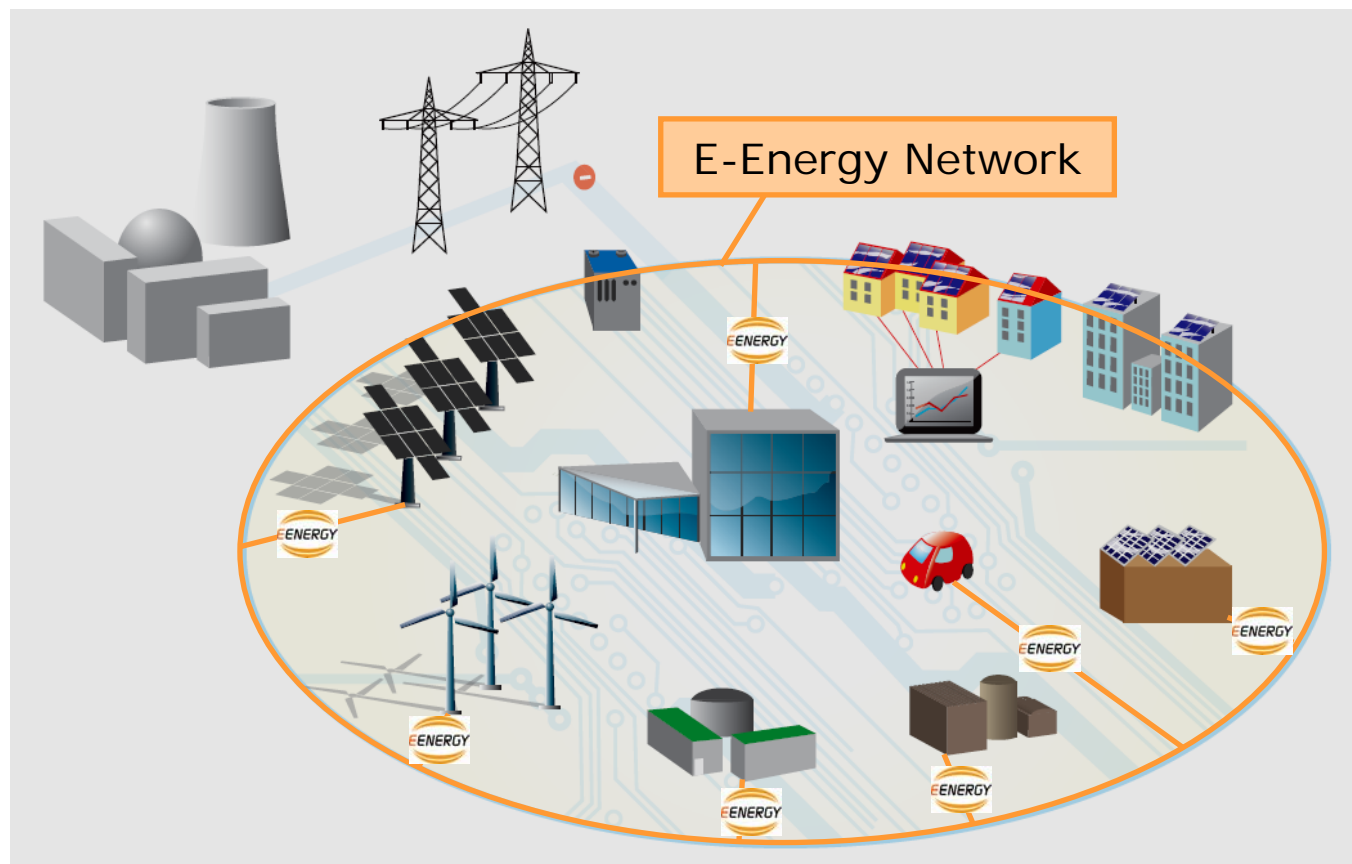
comprehensive framework

- commercial
- technical



www.addressfp7.org

E-Energy: 'Internet of Energy'



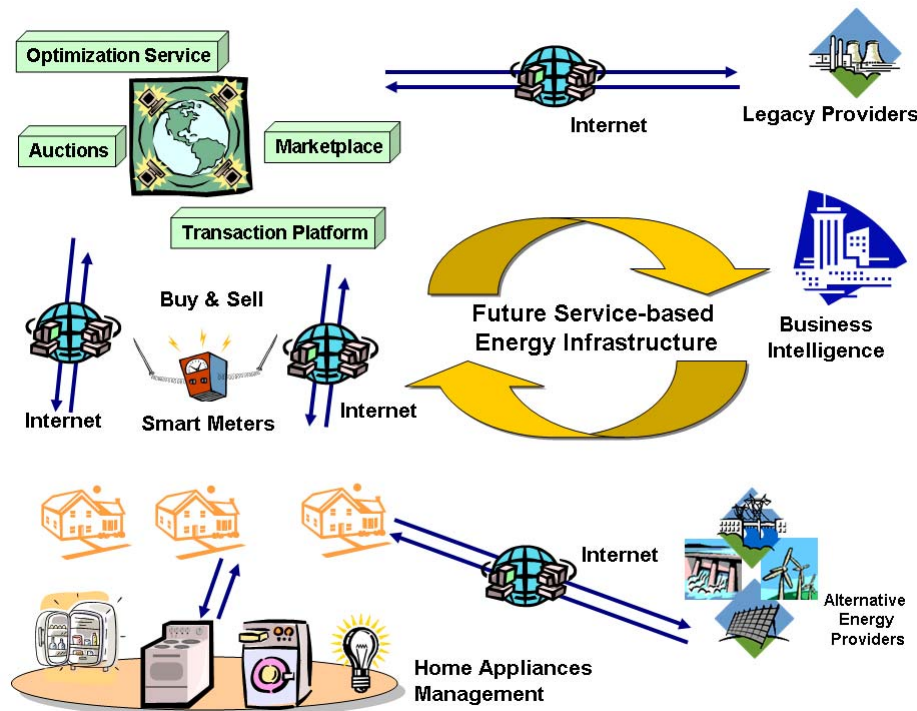
- Germany
- 6 projects
- 140 M€

www.e-energy.info

SmartHouse-SmartGrid



SmartHouse/SmartGrid



Interaction

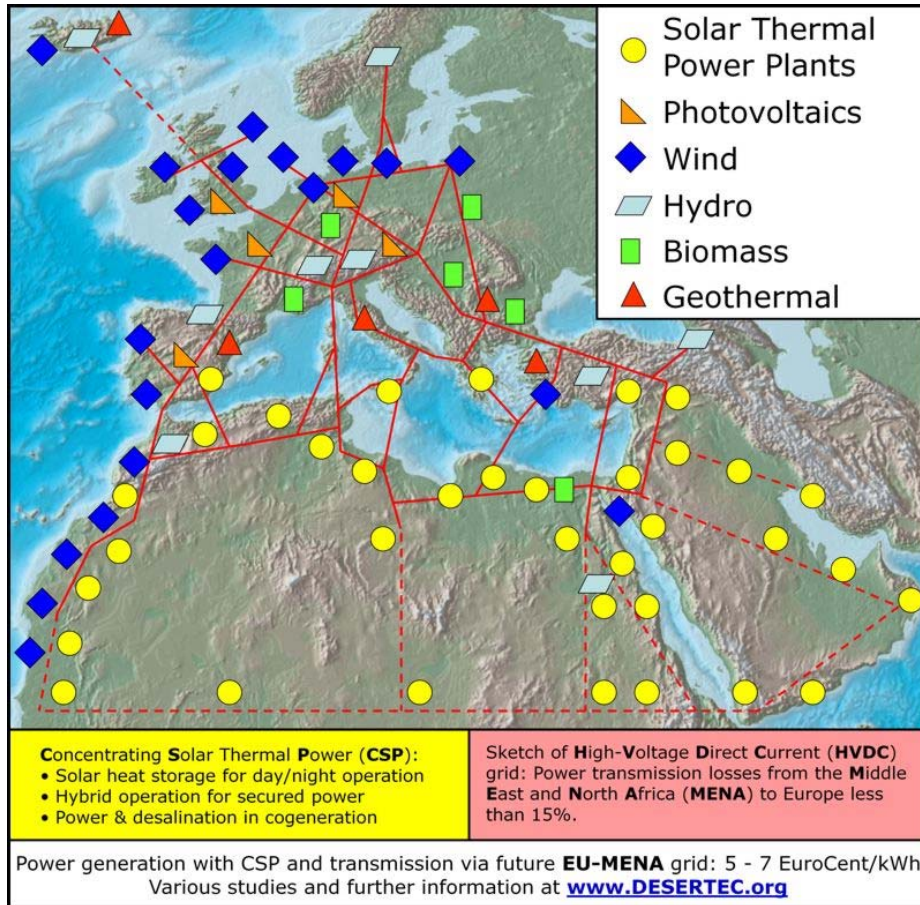
- Smart Houses
- Smart Grids

Integration

- Smart Metering
- Enterprise Systems

www.smarthouse-smartgrid.eu

Proposed Super-Grid



Trans-mediterranean Grid:

- Balance supply variations RES

Local flexibility still needed

www.desertec.org

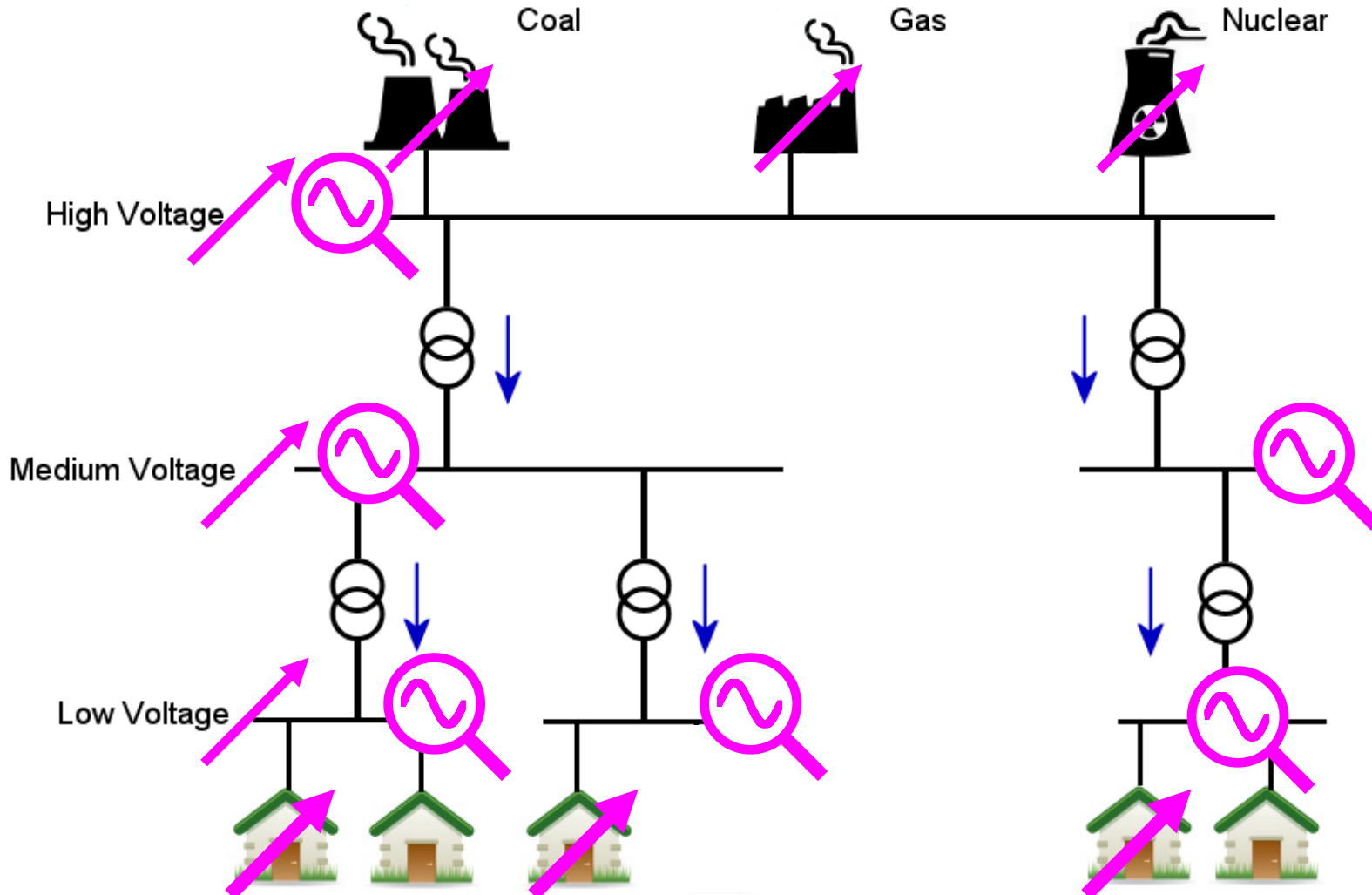
Smart Meter: Smart Grid Gateway

Smart Grid Services

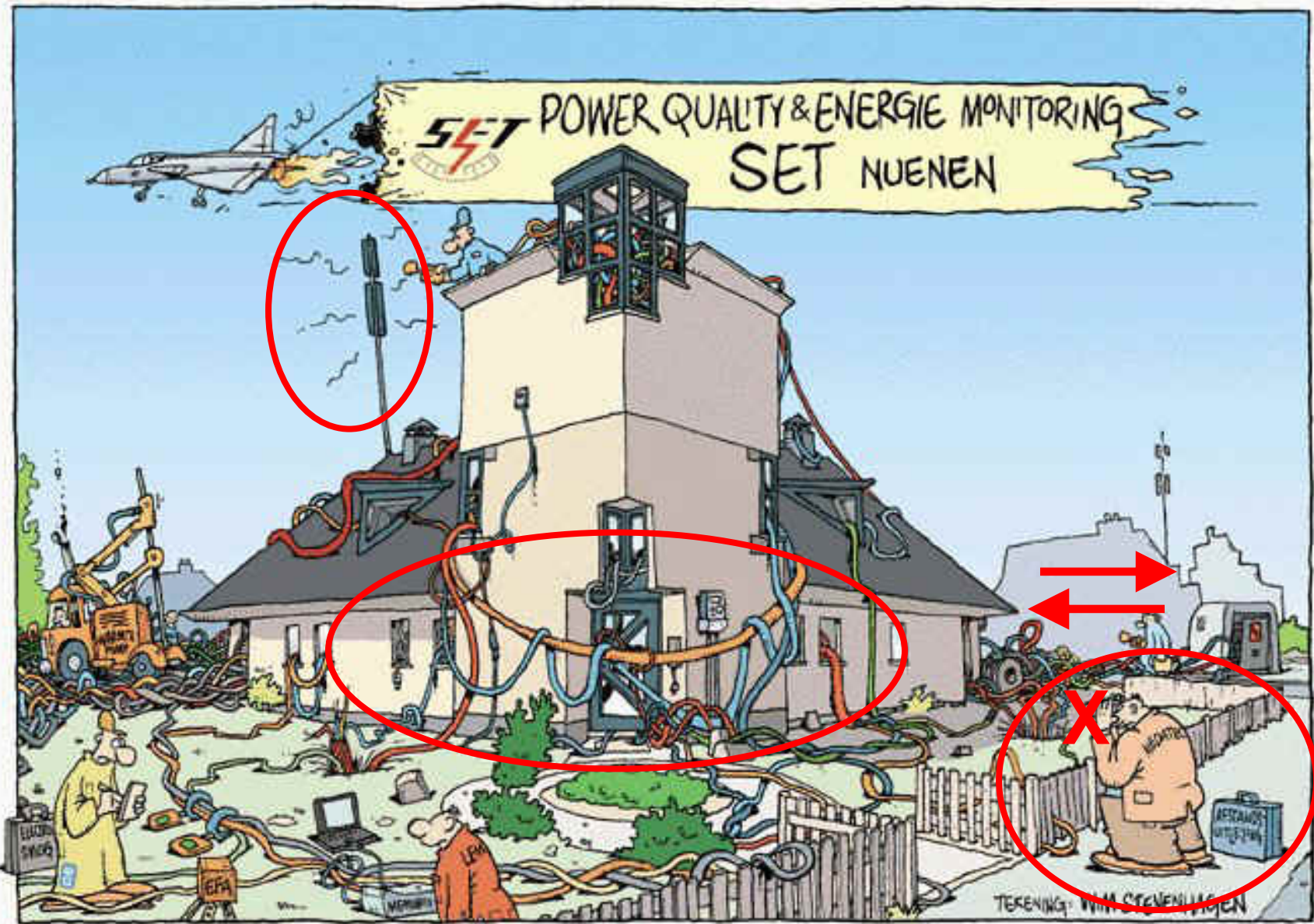
- Dynamic pricing
- 2-way communication with home appliances



Why Smart Grids?



Bart Roossien



LEM POWER QUALITY REGISTRATIE
 HP CONSULT NETBEZKERENINGEN
 SCHUETZ TRAFU NESTECHNIJK

MANDEL & GOLTJERMANN ELECTRO SWOG
 LEDAN ENERGIE MONITORING
 MEDATEC LASTPROFIEL & KOSTENANALYSE

EMH kWh-METERS
 CSIR CORONA METING
 SET: info@set.nl

www.set.nl