

Sense and nonsense of Smart Grids for integration of DG-RES, DR and storages

Harry van Breen
Corporate Strategist



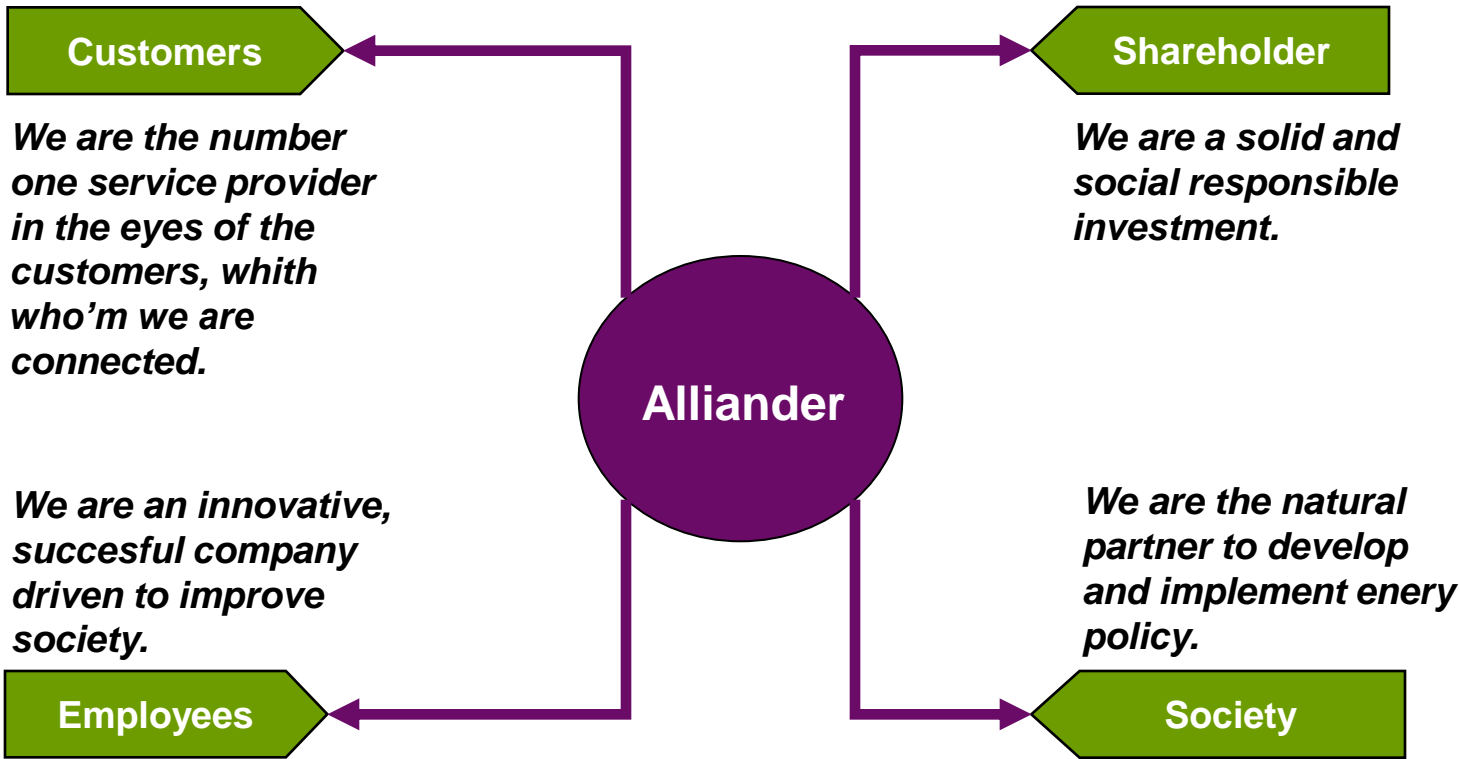
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Our Mission/Vision

“For a better society in the regions with which we are connected”



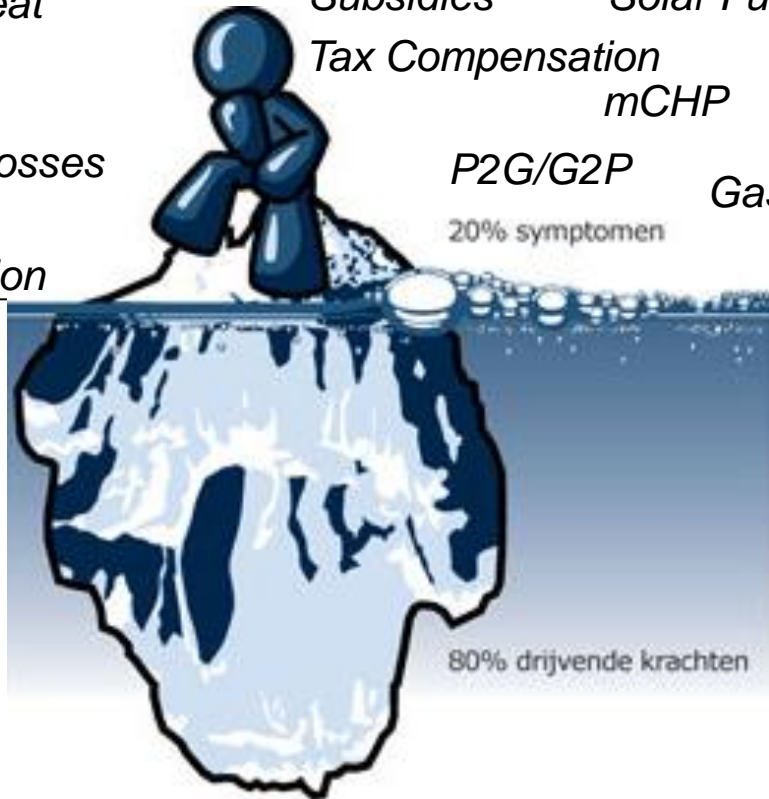
Energy Transition Trends

SMR's *Energy Saving*
Heat Storage *Nuclear Energy*
Energy Performance
Solar Panels *Super Grid* *uCHP*
Climate Covenant *Heat*
Shale gas *Energy Neutral*
Hybride Heat Pump
Municipal Energy Corporation

Storage
Heat Pumps
Local Initiatives
Subsidies
Tax Compensation
P2G/G2P
20% symptomen

Electric Vehicles
CCS
Passive House
UWP
Solar Fuels
mCHP

Smart Grids
Green Gas
Climate Change
Block by Block
CO2 Storage
ETS
Green Deal
Heat Infrastructure
Gas Rounabout
Wind at Sea



Dependancy

Resource shortage

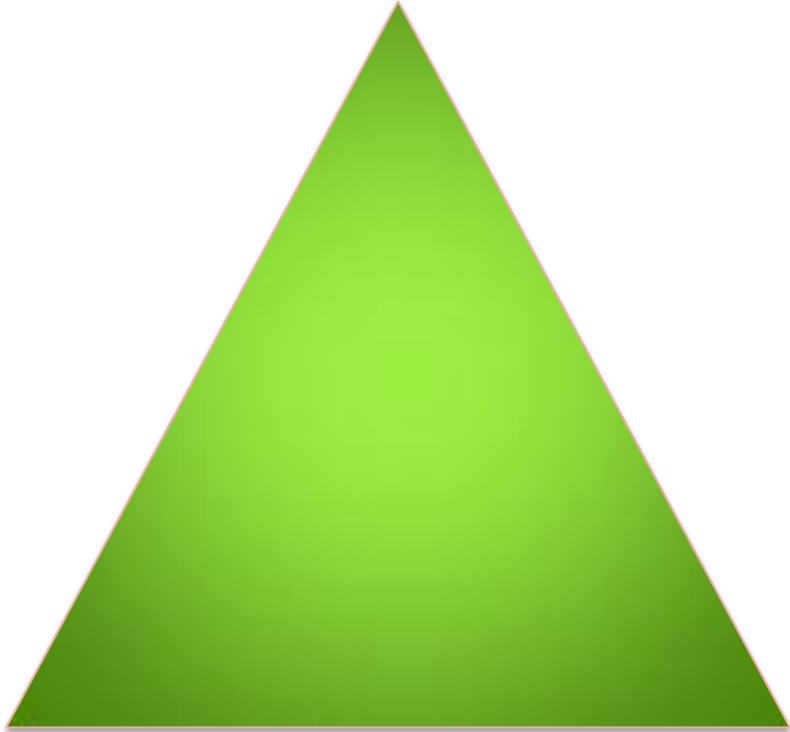
Climate

Economy

Stakeholder model Energy Transition (in a nutshell)



Government

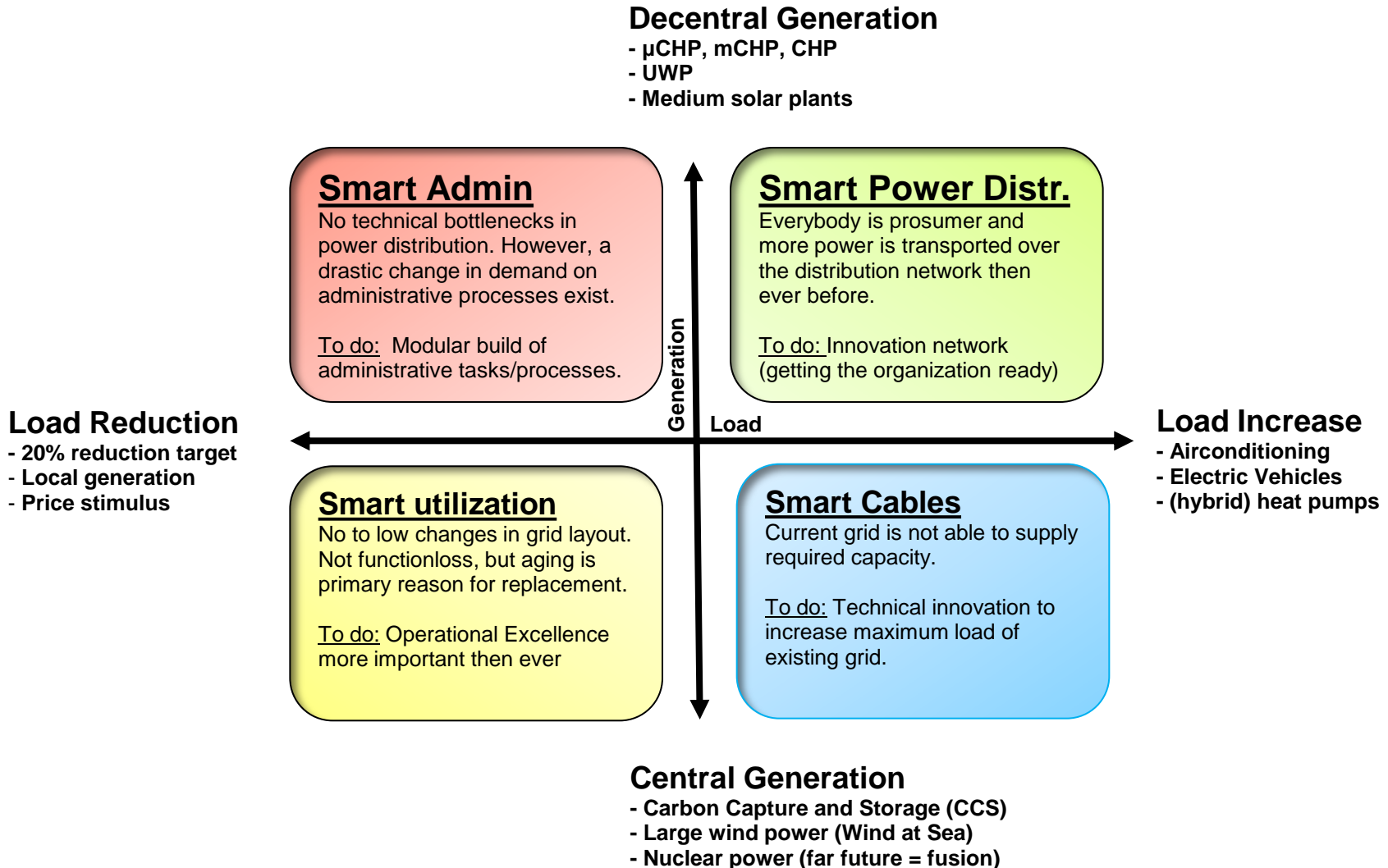


Industry



Customers

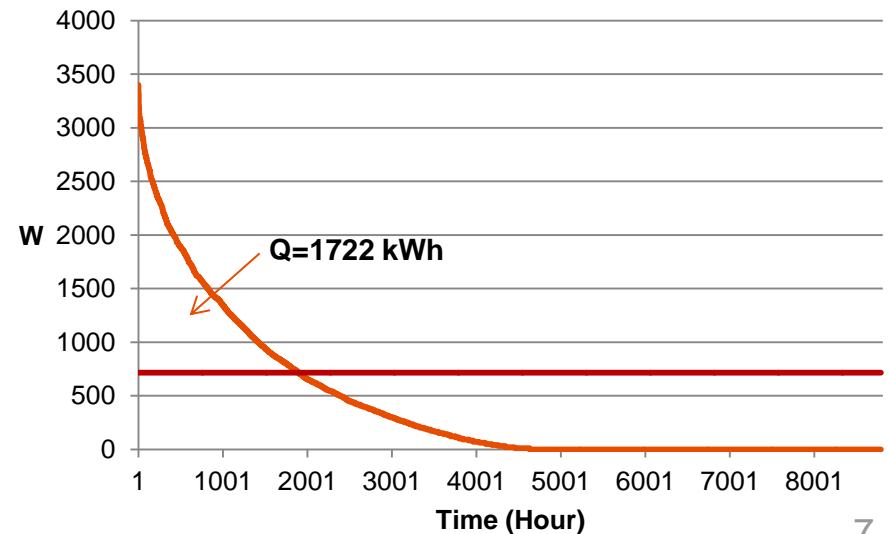
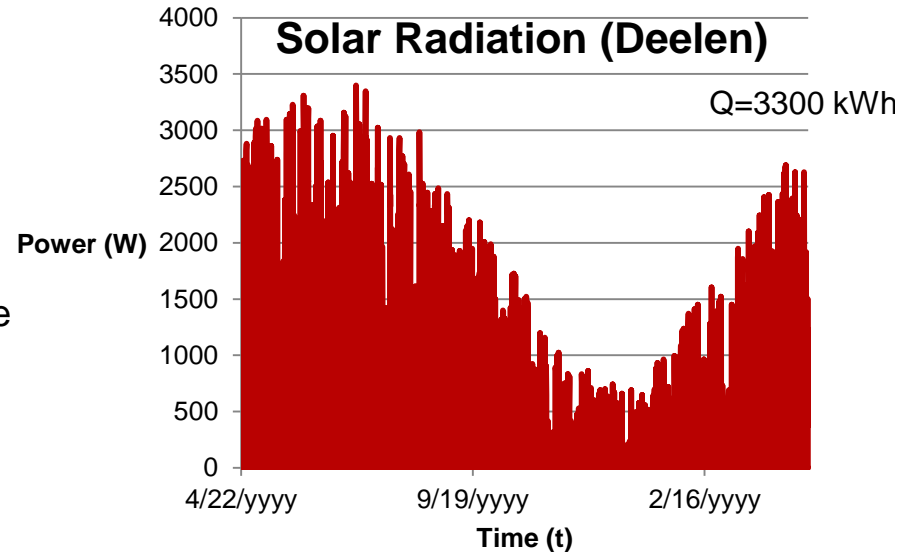
Electricity Grid: Scenario's



Decentralized power integration

Example case

- Design parameters new grids as of 2009:
 - Voltage = 230V +/- 7%
 - Liander "Standard" House = 3300 / -400 kWh
 - Strand Axelsson
 - Peak load 300 houses -> 1 kVA/house
 - Peak generat. 300 houses -> 0,5 kVA/house
- Regulation: 230 +/- 10%
- Worst case: All houses full solar panels
 - Peak generated = 3,5 kW / house
 - Availability loss = 1722 kWh
 - Reliability = 100% !!
- Solution:
 - Storage at prosumer (ca. 20 kWh)
 - More cable
 - Voltage doubling
 - Compounding (at LV)
 - *Load management*
 - *Congestion management*



Challenges of a DSO

Load influence

- Micro CHP
- Electric Vehicles
- Urban Wind Power
- CHP's
- PV panels
- Heat pumps
- Fuel Cells
- Storage
- Solar Fuels
- Desertec
- Energy efficiency
- Storage industry processes
- Drive toward energy neutral (regions)



Smart Solution tools

- Smart mobile grid
- Remote sensing
- Interconnectors
- Storage
- Smart Metering
- Congestion management
- Load management
- Renewable Gas Storage
- Remote control
- Hybrid heat pump
- Virtual power plant
- Demand side management

***Voltage doubling
(smarter) Compounding
More cable***

Questions



- What are the criteria for “best” solution and alternatives? How to define best
- How will the future (decentralized) energy market look like?
- How should a DSO prepare for availability issues in the (far) future?
- How to handle disruptive innovation as an energy incumbent?
- How to monitor/understand development of local vs centralized power production?