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

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IEA DSM Agreement, Task XVII
Integration of DSM, DG, RES and Storages

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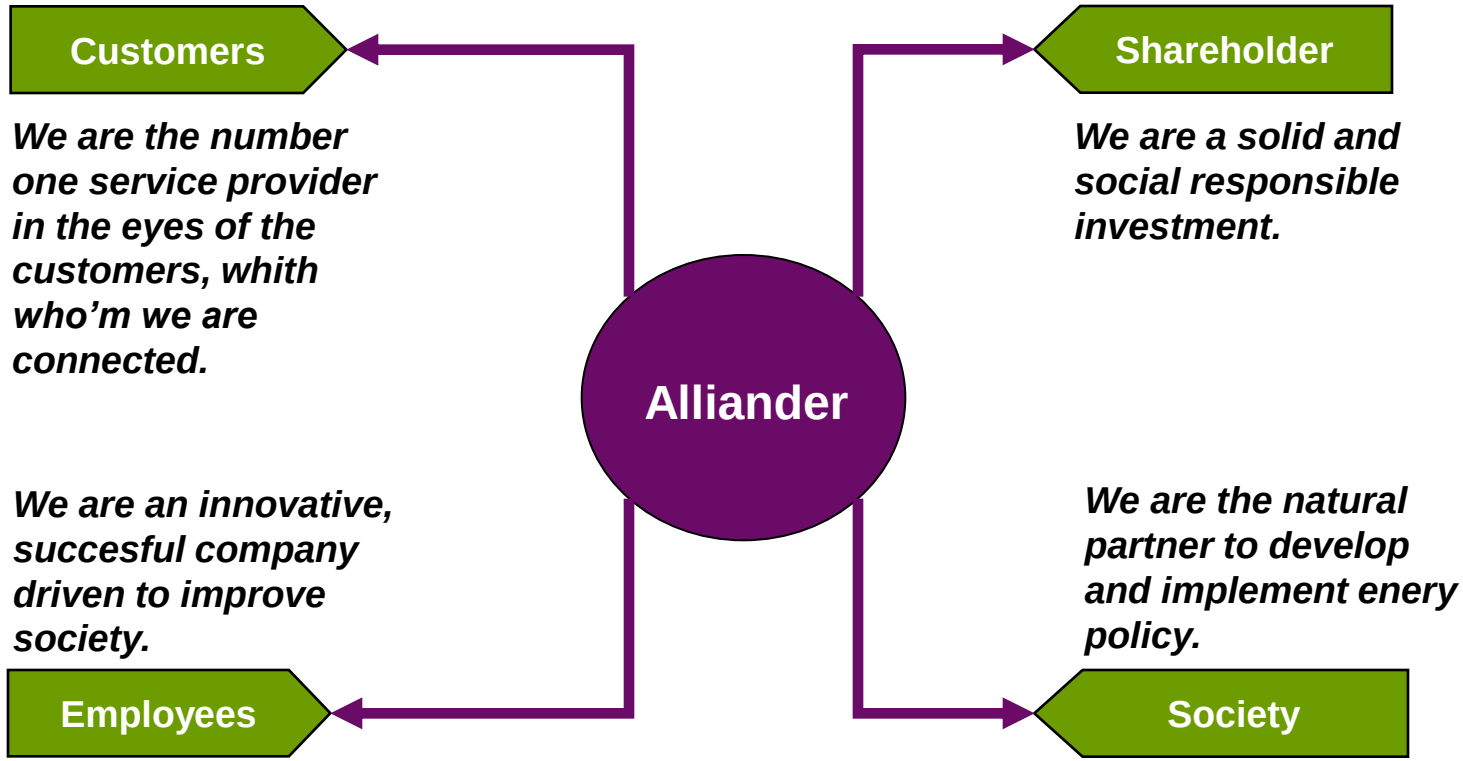
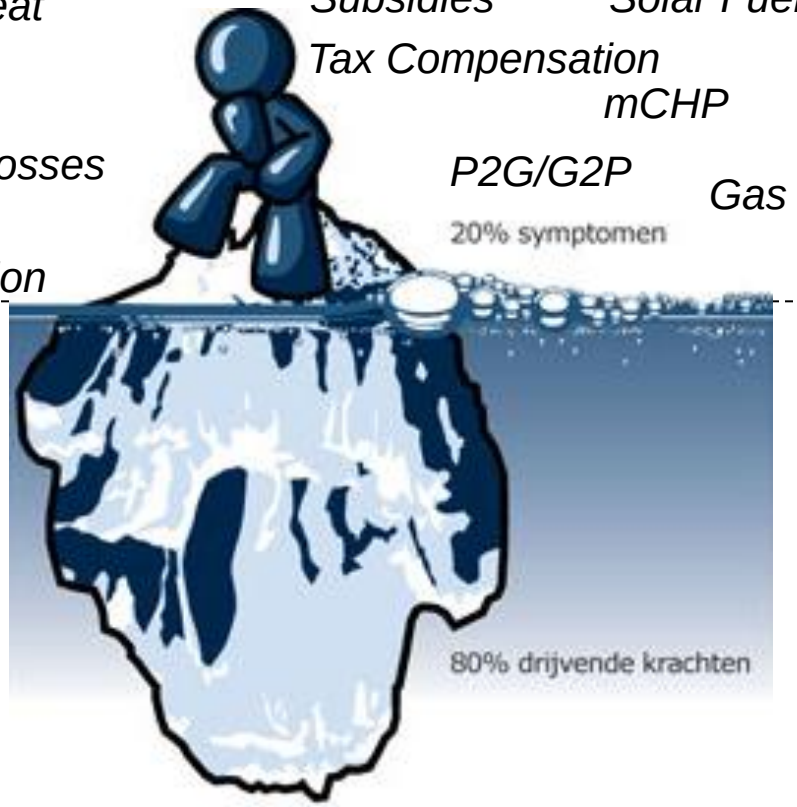
Our Mission/Vision

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



Energy Transition Trends

SMR's
Energy Saving
Electric Vehicles
Smart Grids
Storage
Heat Storage
Nuclear Energy
Green Gas
CCS
Climate Change
Heat Pumps
Energy Performance
Passive House
Block by Block
Super Grid
uCHP
Solar Panels
Local Initiatives
UWP
CO2 Storage
Subsidies
Solar Fuels
ETS
Heat
Climate Convenant
Tax Compensation
Green Deal
Energy Neutral
mCHP
Heat Infrastructure
Shale gas
P2G/G2P
Green grid losses
Gas Rounabout
Hybride Heat Pump
Wind at Sea
Municipal Energy Corporation



Dependancy

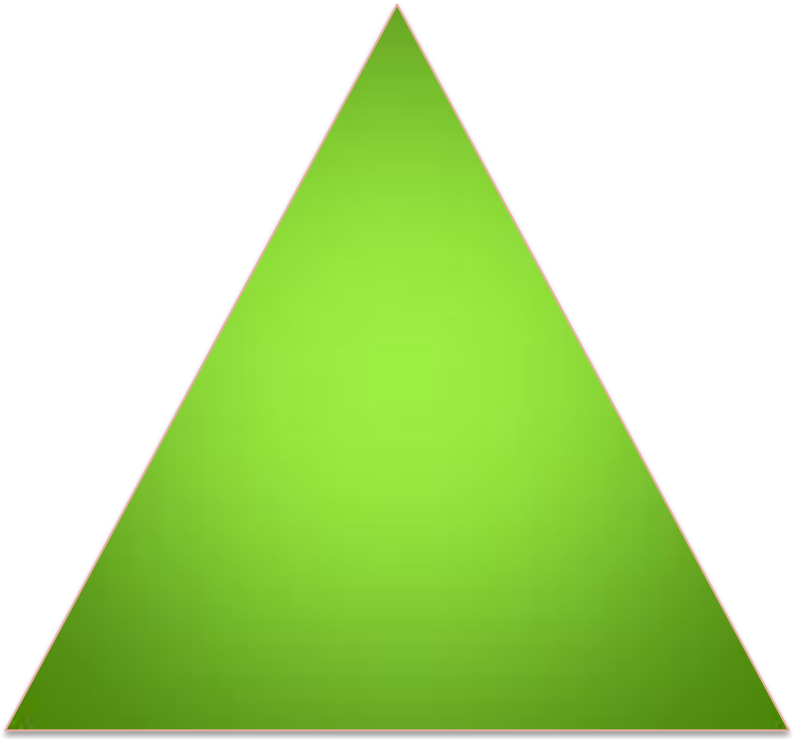
Resource shortage

Climate

Economy

Stakeholder model Energy Transition
(in a nutshell)

Government

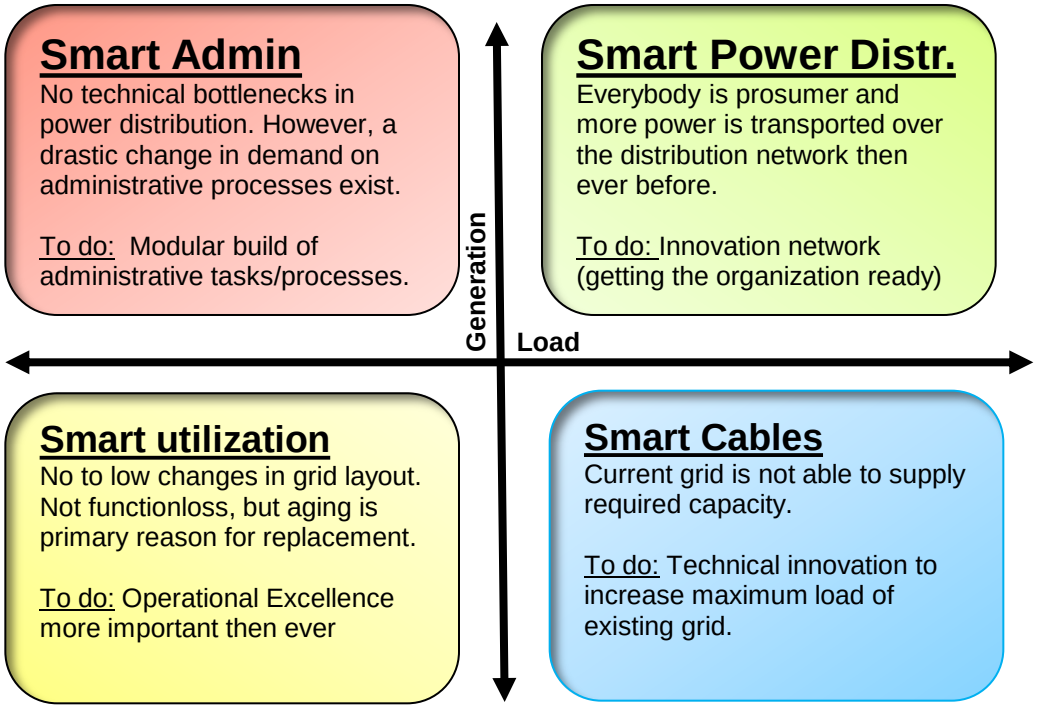


Industry

Customers

Electricity Grid: Scenario's

Decentral Generation
- µCHP, mCHP, CHP
- UWP
- Medium solar plants



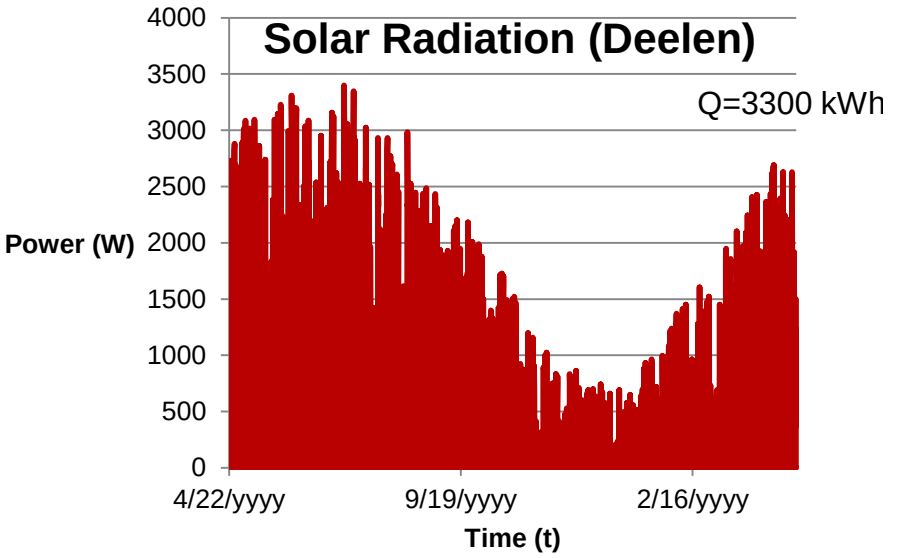
Load Reduction
- 20% reduction target
- Local generation
- Price stimulus

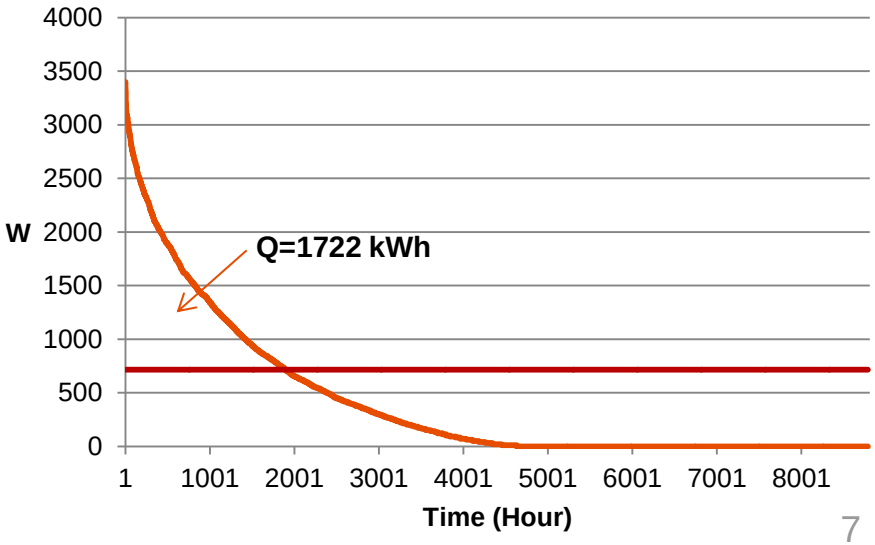
Load Increase
- Airconditioning
- Electric Vehicles
- (hybrid) heat pumps

Central Generation
- Carbon Capture and Storage (CCS)
- Large wind power (Wind at Sea)
- Nuclear power (far future = fusion)

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*

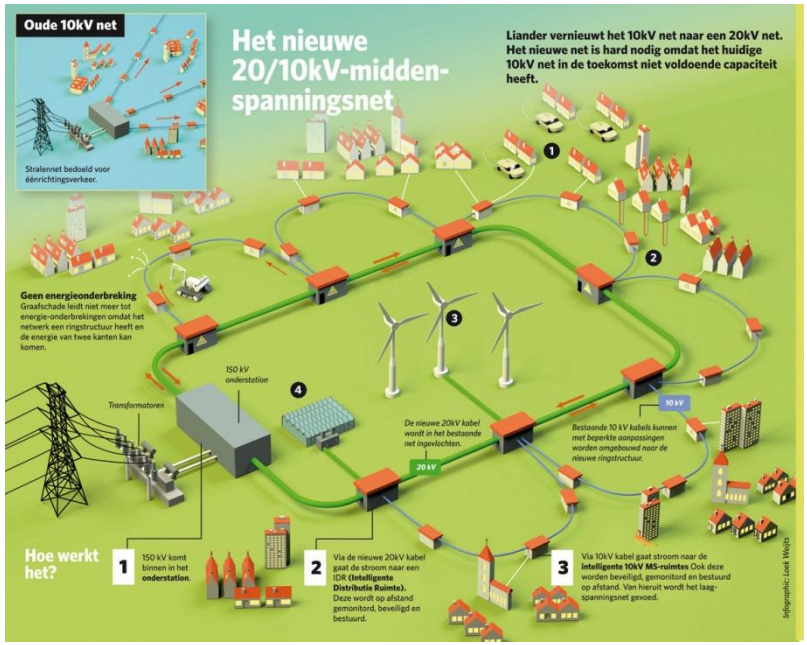




Challenges of a DSO

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 controle
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 incumbant?
- How to monitor/understand development of local vs centralized power production?