



eandis



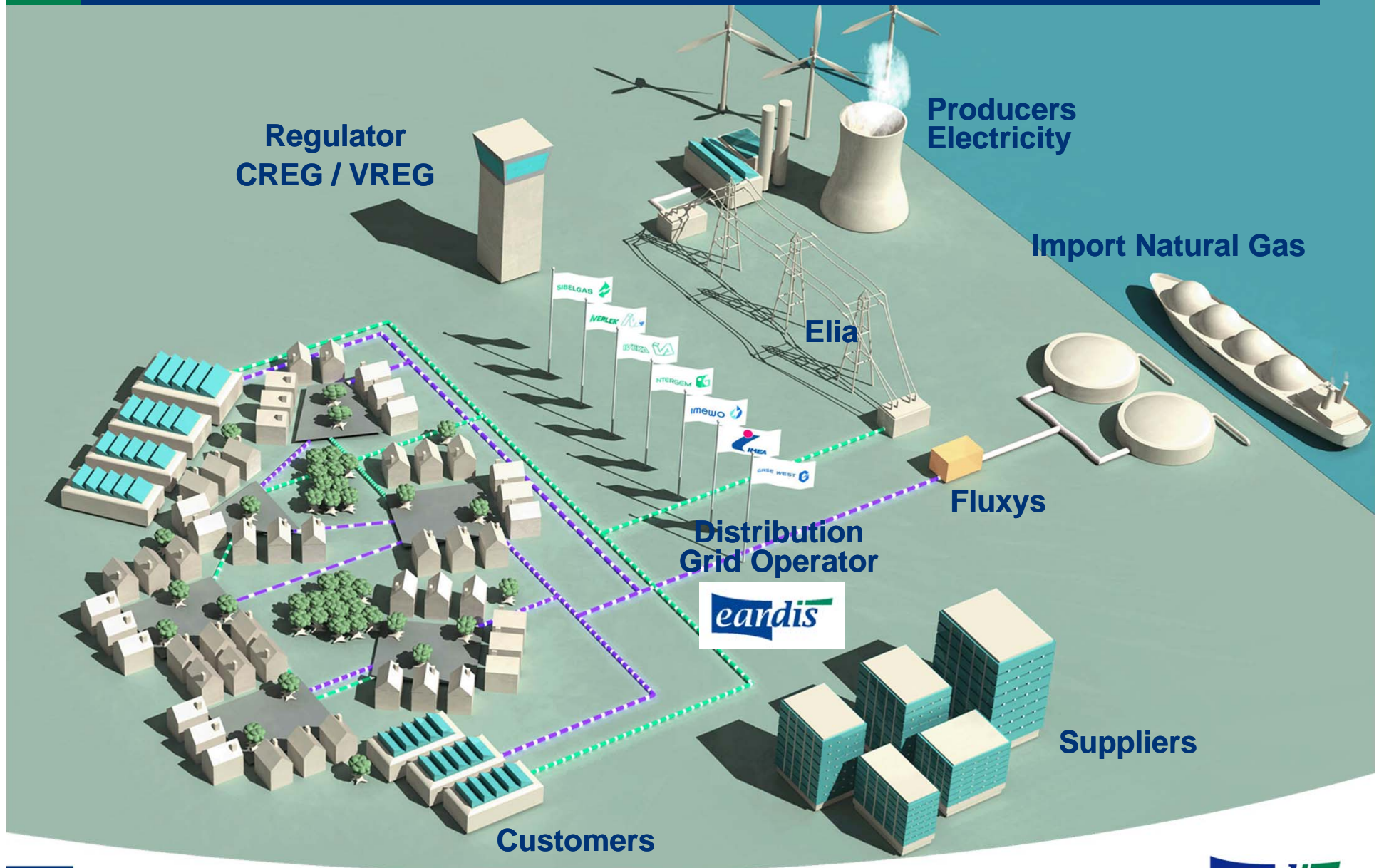
Smart Grid at the DSO - Eandis

1 oktober 2014

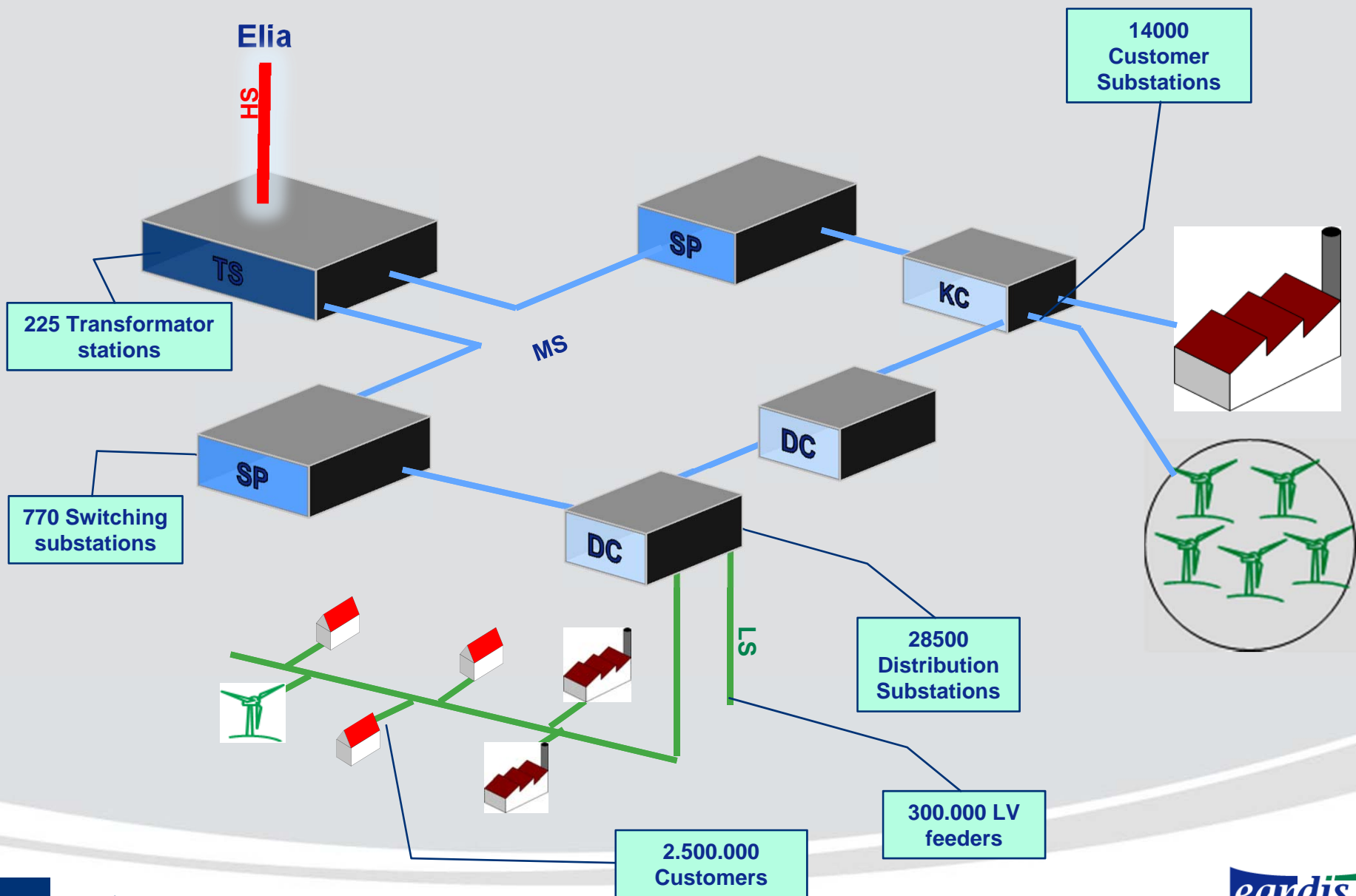


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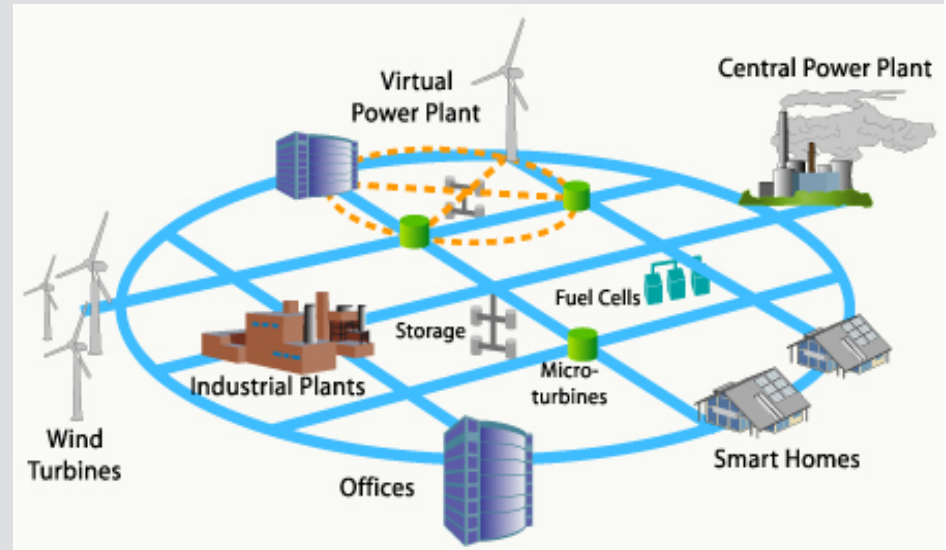
Eandis in the Energy market



Eandis Network: TS -> SS -> DS

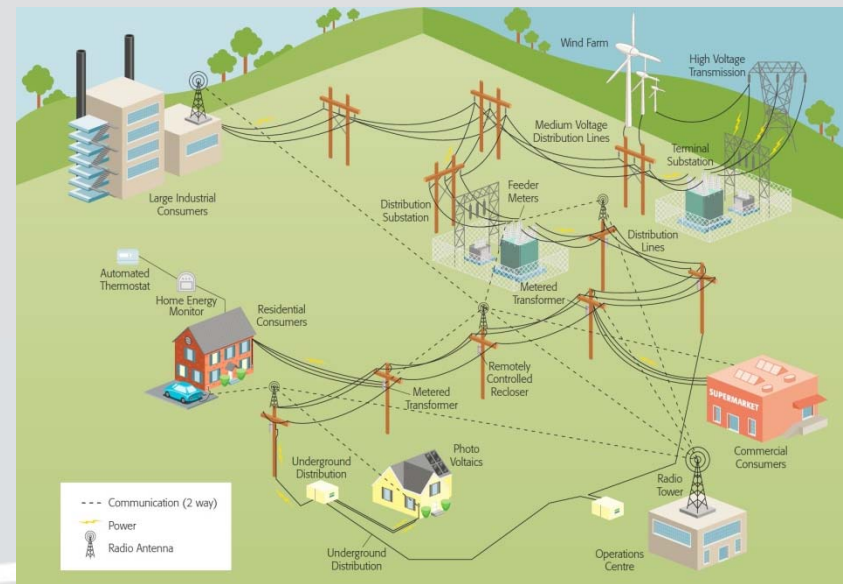
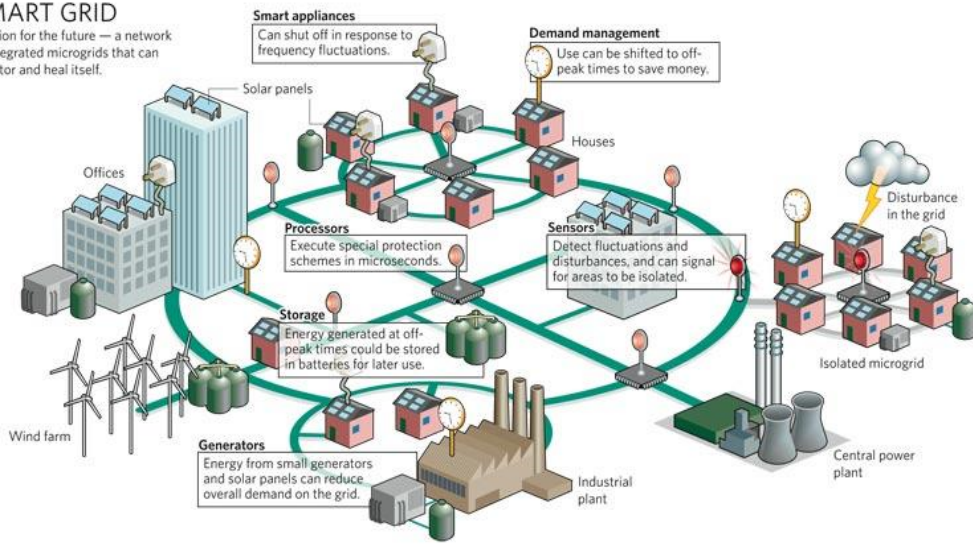


Smart Grids : some slides?



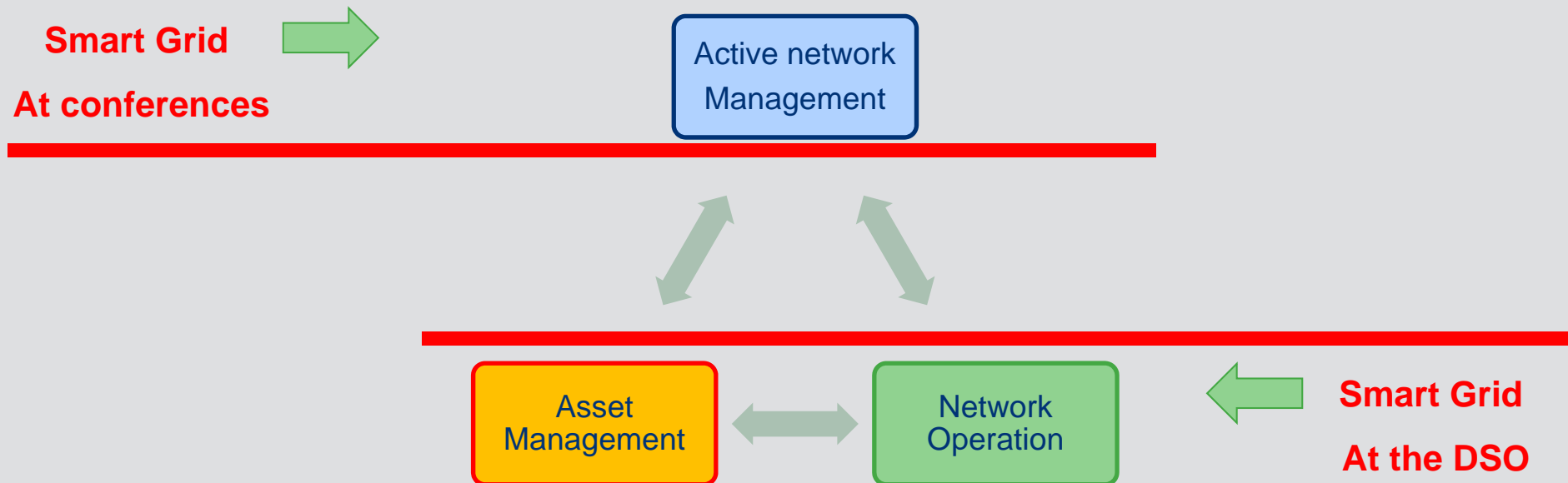
SMART GRID

A vision for the future — a network of integrated microgrids that can monitor and heal itself.



Smart Grid in Eandis:

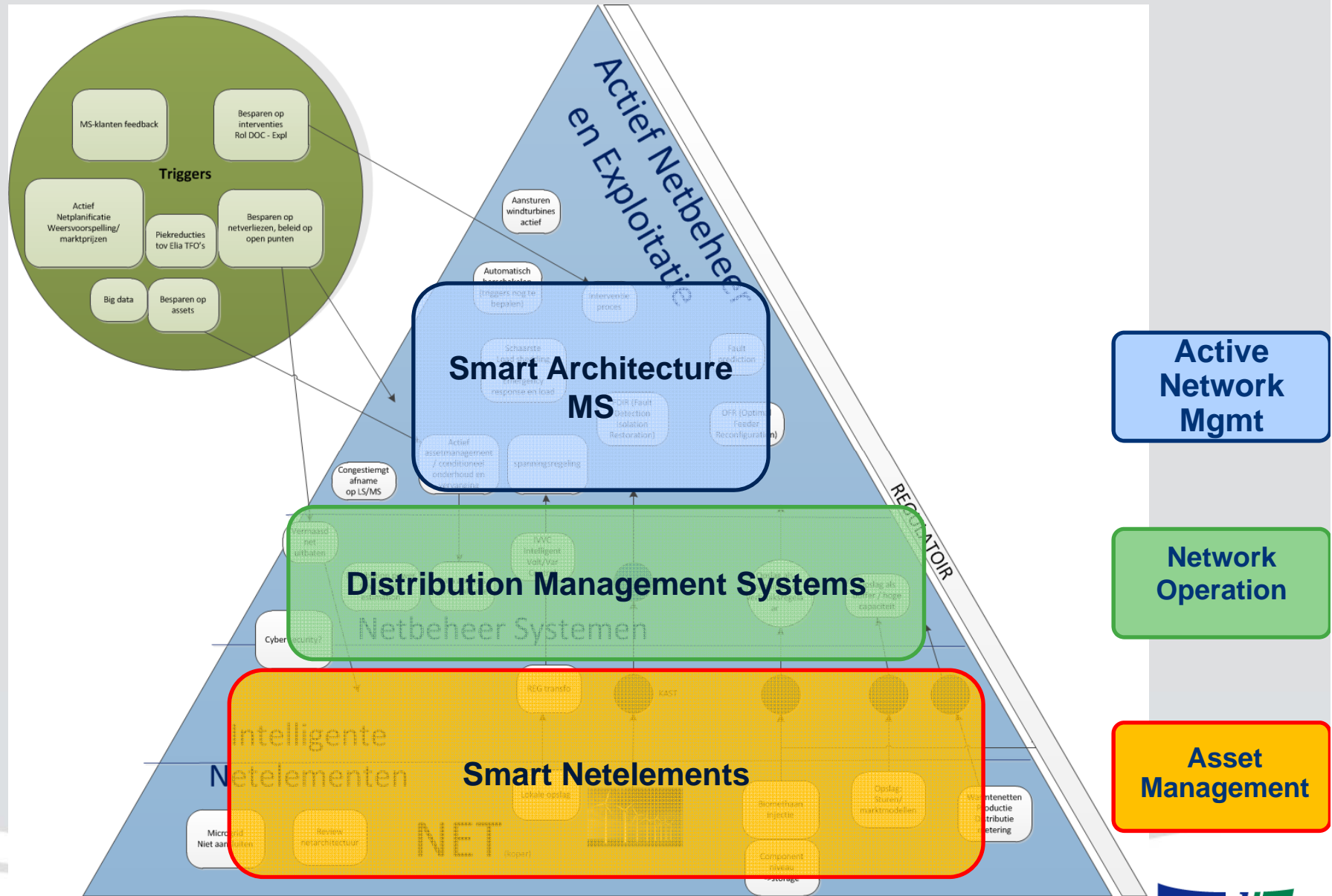
- Optimising network investments and exploitation



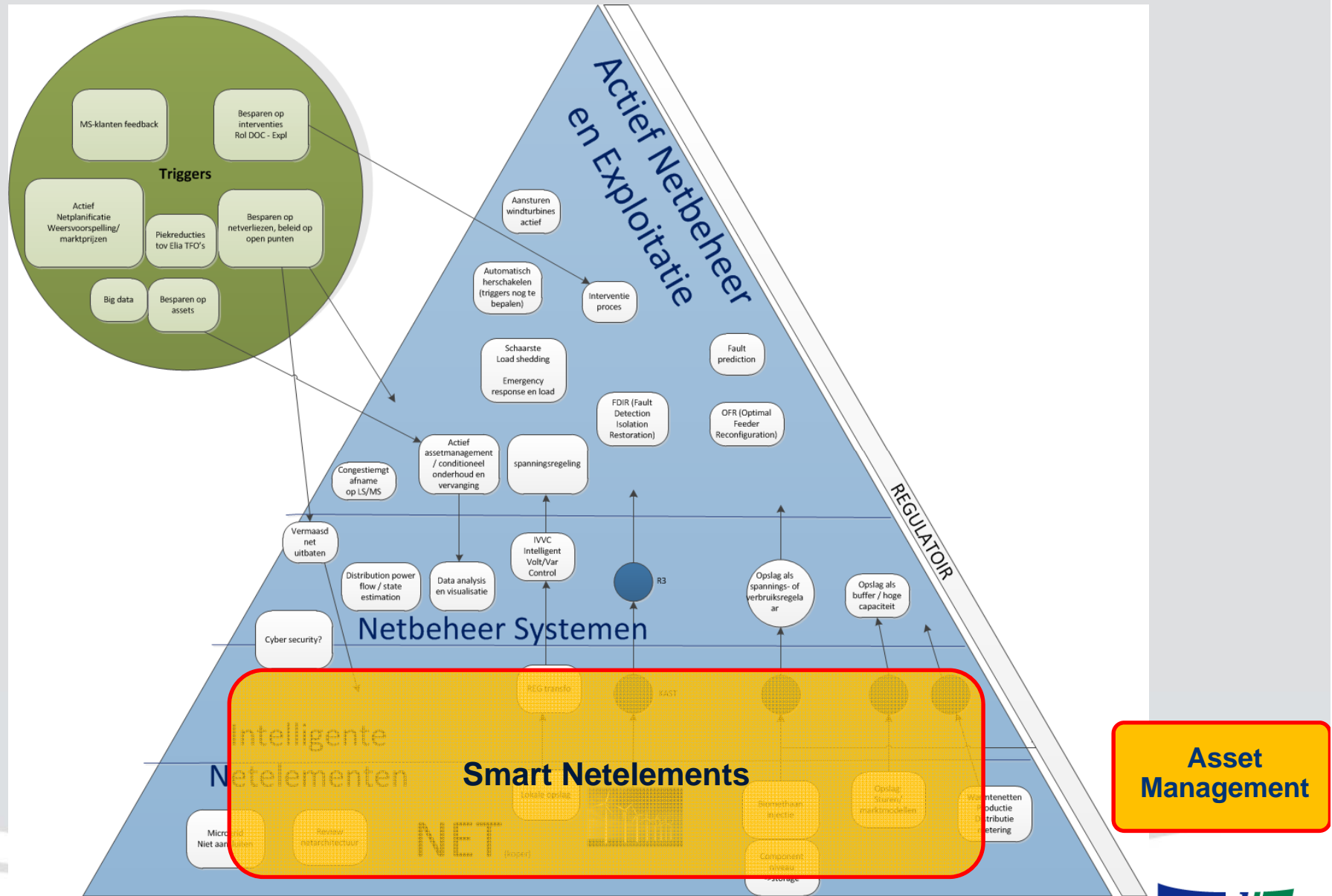
- More measurements
- Data quality
- Network Calculations

- Real time operations
- Current Netstatus

Eandis Smart Grids Program

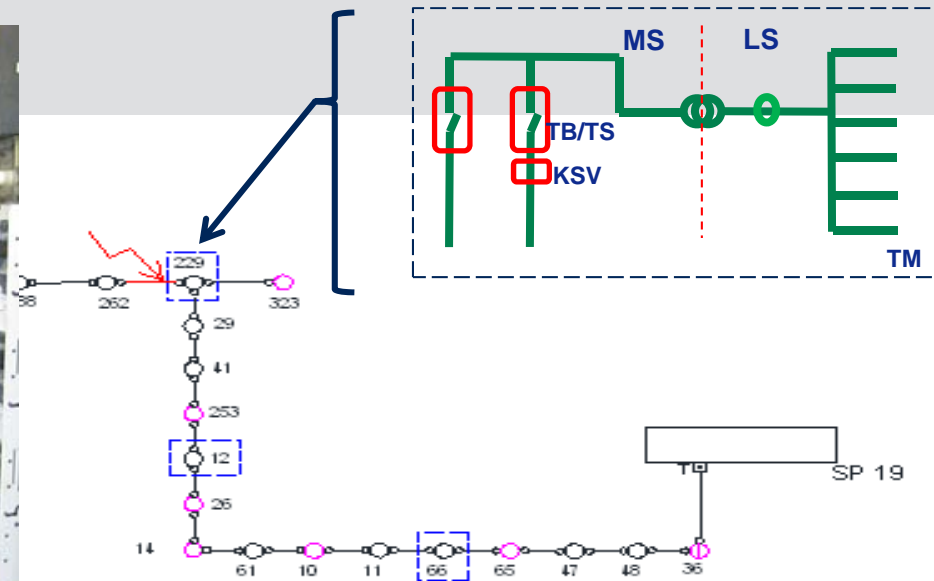


Eandis Smart Grids Program

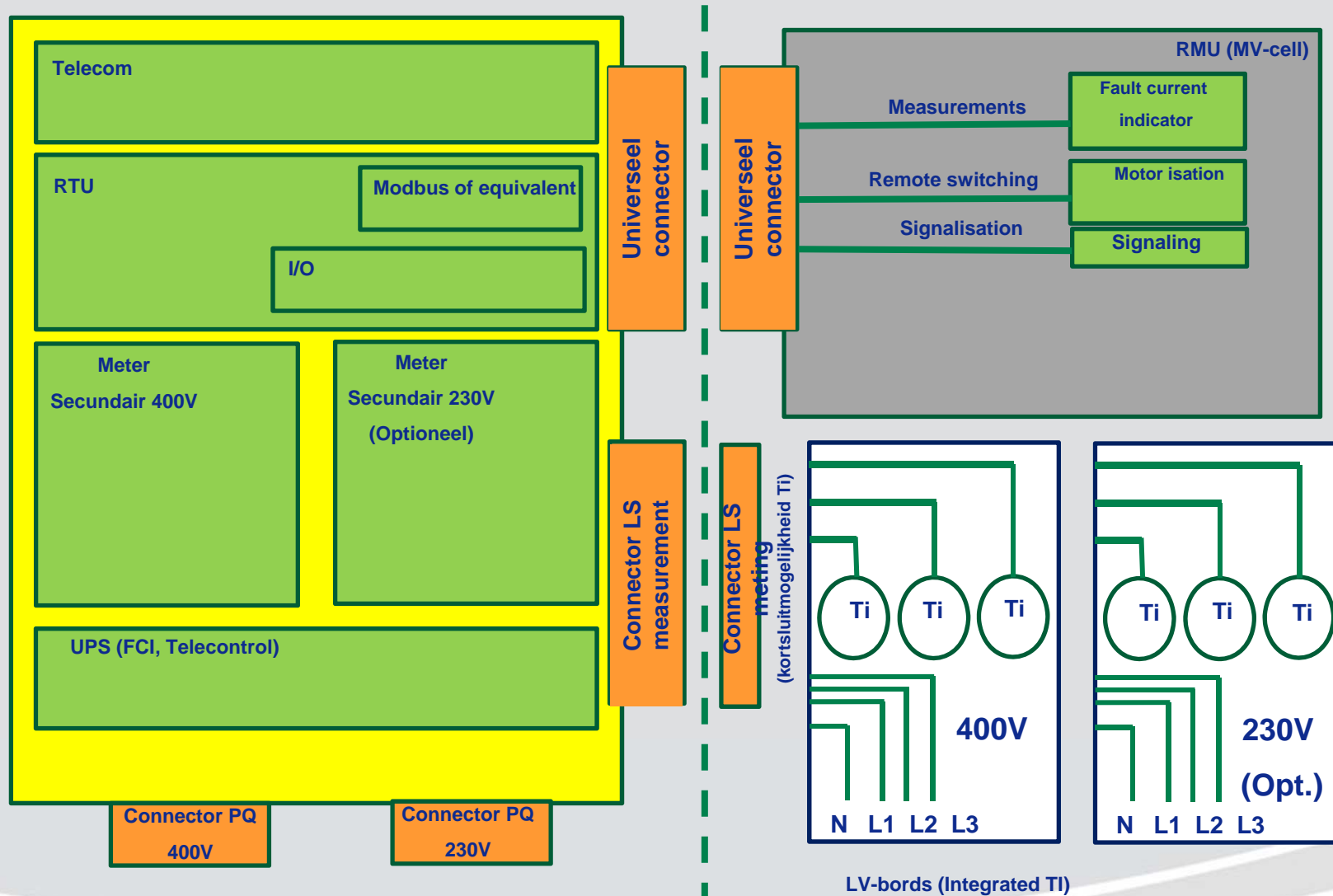


2012: Substation Automation PoC

- Distribution substations
 - **Measurements** to DMS
 - **Remote Fault current indication**
 - **Remote Switching** via DMS
 - **State estimation** in DMS
- Installation of 70 substations in four distribution networks
- Improve investment planning and asset management
- Minimize network losses
- Improve voltage regulation
- Extend capacity for decentralised production
- Improve fault localisation and restoration



Final design: Telecontrolled substation



Some ideas did not make it...



Measurements on LV feeders

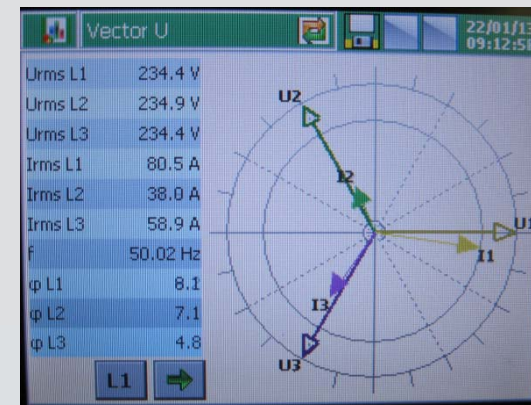
→ Replaced by an aggregated measurement on the LV side of the transformer

Extensive Power quality measurements

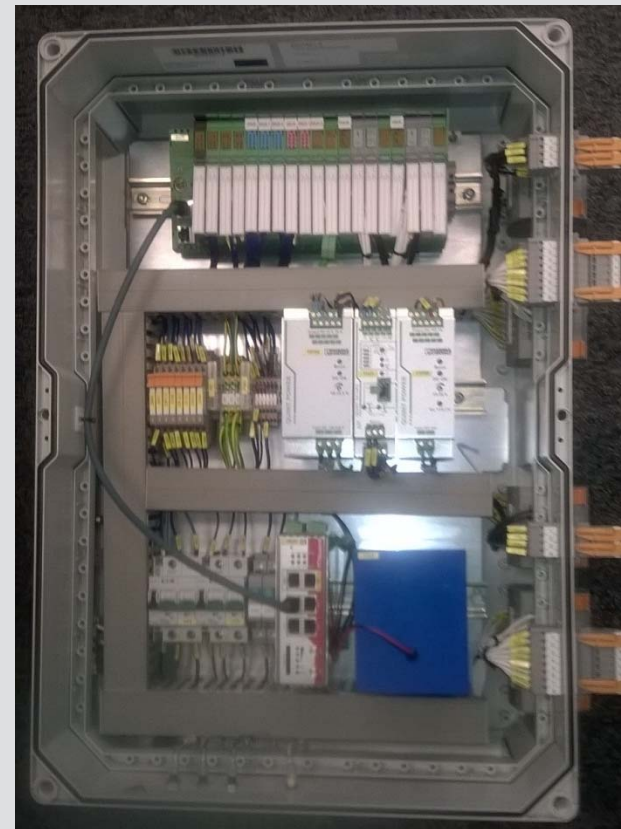
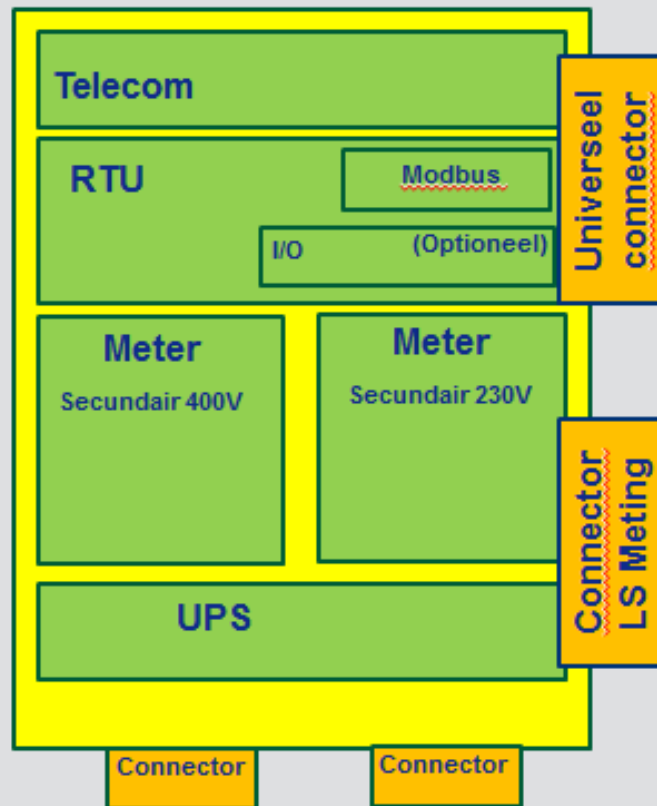
→ Basic measurements were included

(U, I, P, Q en $\cos \Phi$)

-> Some power quality measurements were included at no extra cost (THD, Flicker)

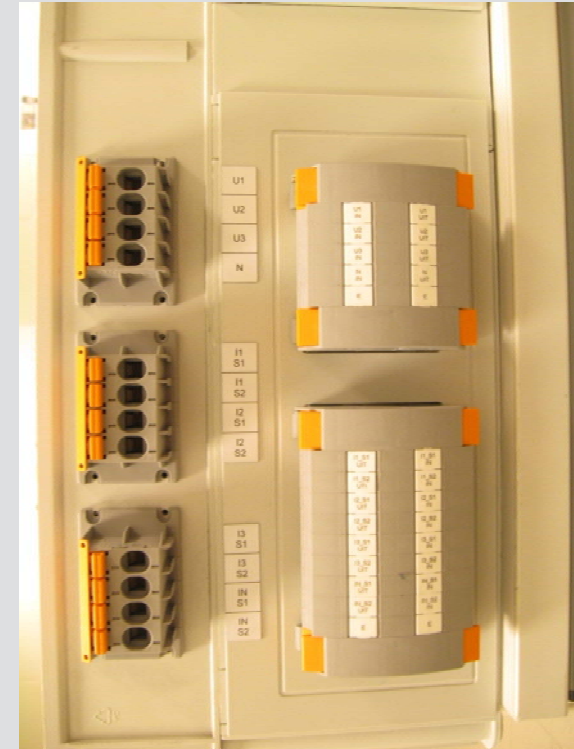
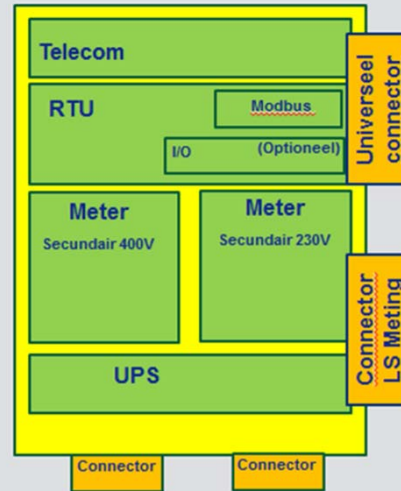


Final implementation: Phoenix Contact

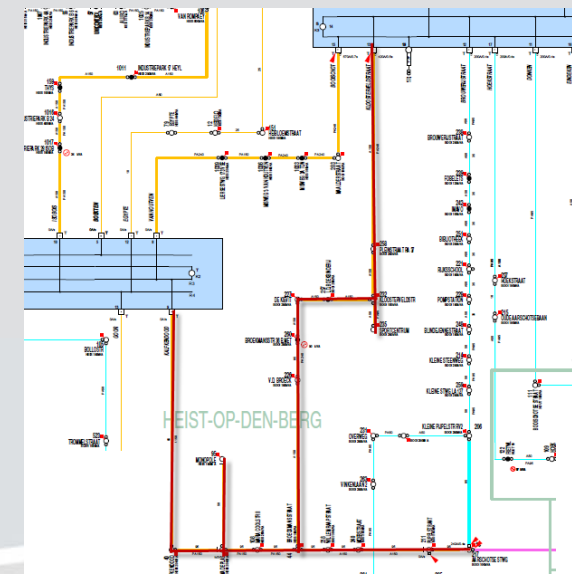
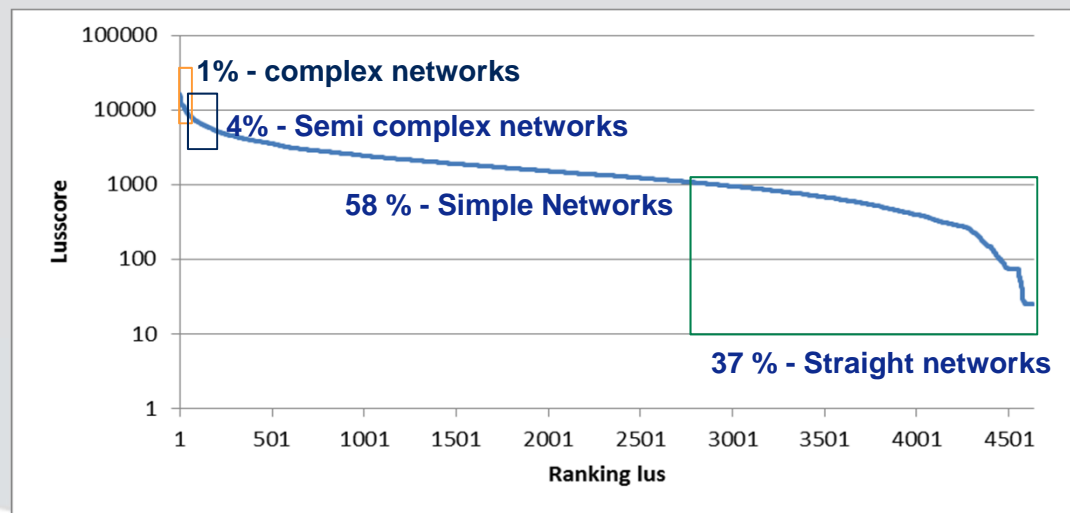
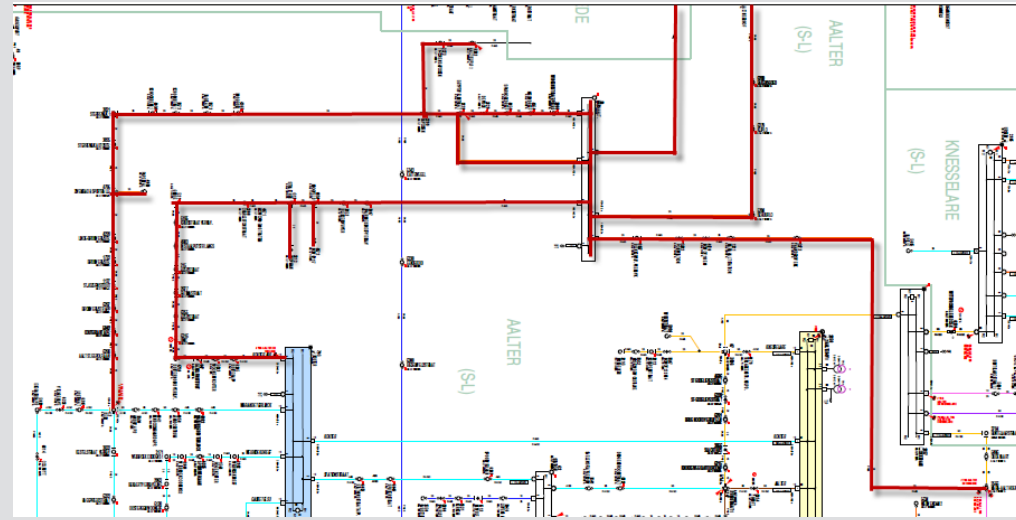
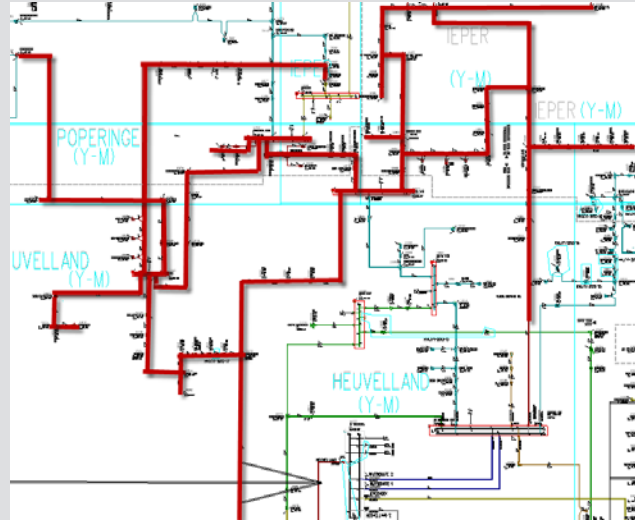


- **2015: Distributiecabines uitrol @ 100/jaar**
 - **2013: PoC 70 cabines in 4 lussen**

Lessons learned: Connectors/testconnectors

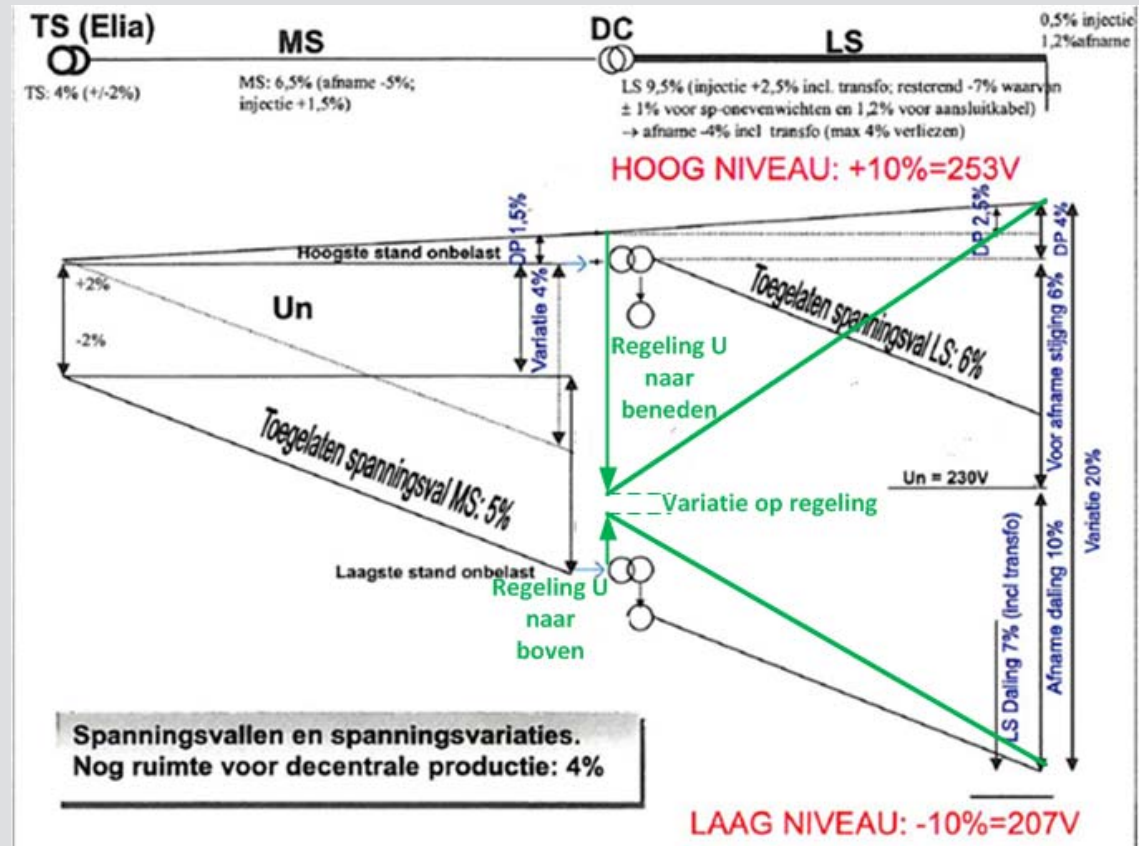


Driver: reduce investments/increase visibility



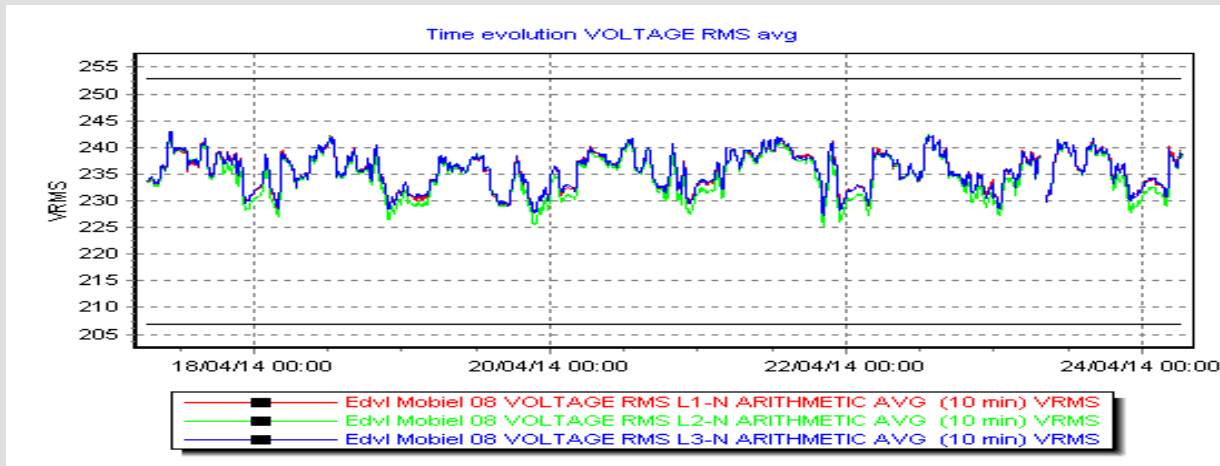
Voltage Regulated Distribution Transformers

- Regulated distribution transformers:
 - Increase the voltage variation on LV
 - Compensate the voltage fluctuation on MV
- +/-10 % voltage variation to be used completely on LV
- Increase the capacity for Dec. Production



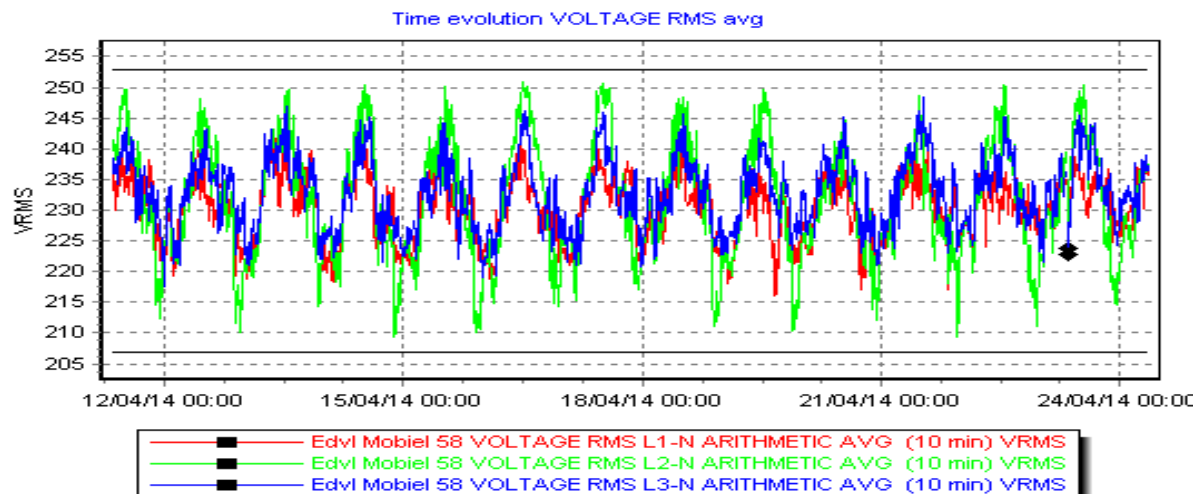
Example measurements

■ Distribution substation: 7%



- Cogeneration injecting on MV

■ Customer: 18%

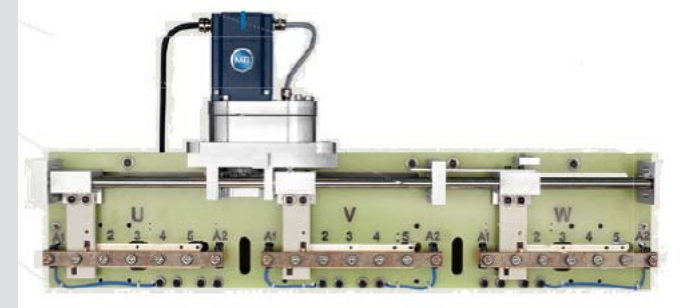


- Long LS feeders
- PV injecting on LV

Market analysis

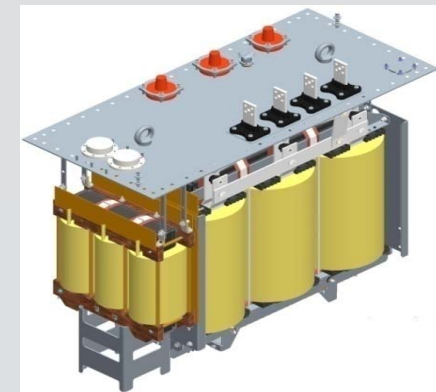
■ On Load Tap Changer (OLTC)

- Motorized change of tap while on load
- Technology of Maschinenfabrik Reinhausen (MR), also applied by different vendors e.g. Siemens and CG



■ Booster Technologie

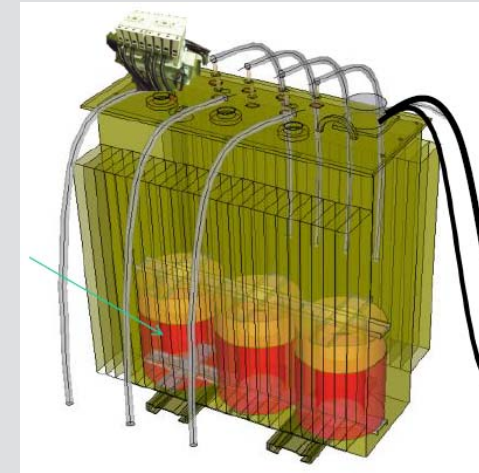
- Extra Coils on MV regulate the voltage
- Patented solution presented by Schneider



Market analysis

■ Magnetic voltage regulation

- Saturation of the core
- Presented by Magtech
- Expensive solution



■ Retain the existing transformer

- Extra Coils on LV regulated the voltage
- Supplied by A-Eberlee
- Extra cabinet in substation, increasing the size



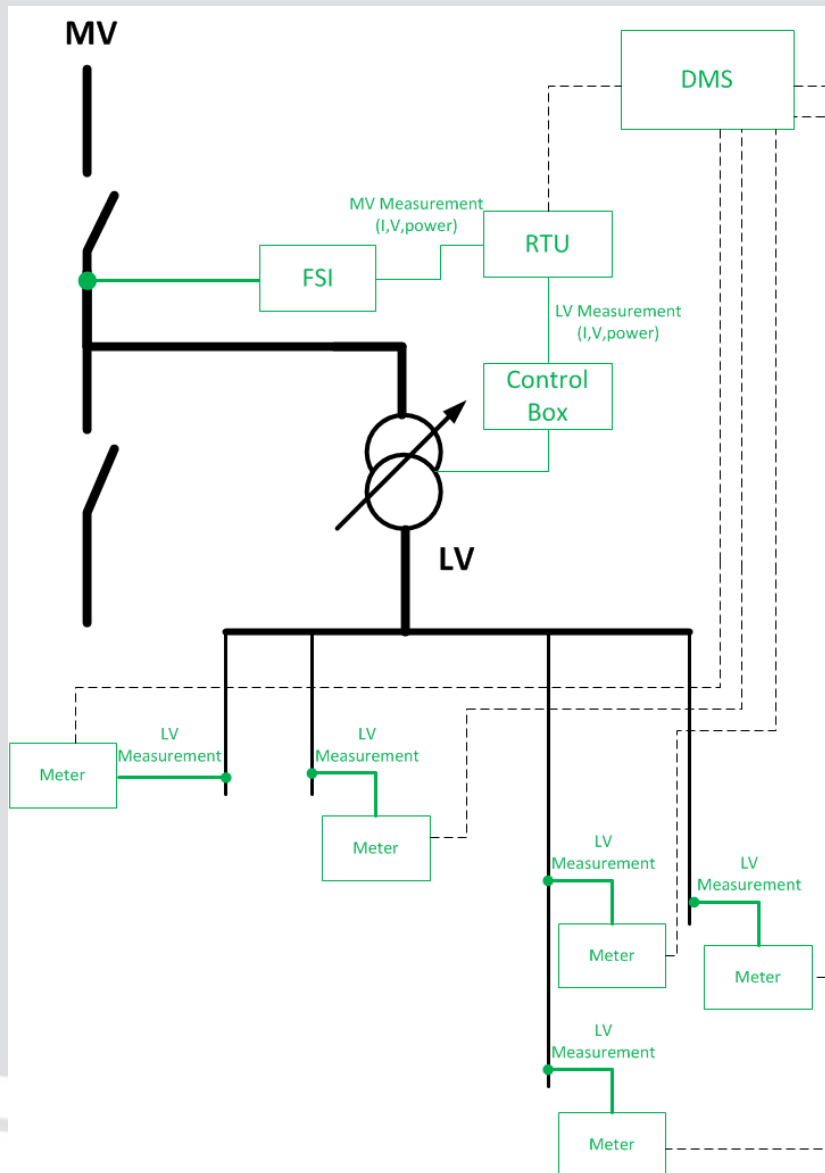
Schneider - Minera Sgrid

■ Technische Specifications

- Booster Technology
- Vermogen: 400kVA
- Afmetingen: 1350x830x1550
 - Standaard: 1250x850x1300
- Tapstanden
 - ON-Load: $\pm 2 \times 2,5\%$
 - OFF-Load: $\pm 2 \times 2,5\%$



Control Algorithms



■ Phase 1: Local Algorithms

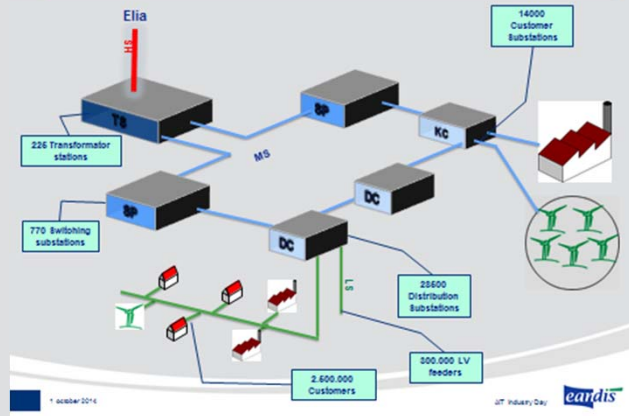
- Standard Algorithms
- Implemented in Control Box
- Stable LV output voltage
- Voltage drop (correction based on current measurement)

■ Phase 2: Centralised Algorithm

- Development necessary
- Implemented in DMS
- Setpoint transformer based on Voltage Measurements in the grid

Summary

Eandis Network: TS -> SS -> DS



Eandis Smart Grids Program

