Network Investment

Leveraging SCADA capabilities to make accurate network planning, operation and investment decisions

2017-03-29
Agenda

- Introduction

- Scada solutions – view on the end-to-end chain

- Leveraging SCADA capabilities – Use Cases
  - Flexible production units – Port of Antwerp
  - Scarcity plan
  - Underfrequency Load Shedding
Who’s who in the Flemish energy market?

- CREG / VREG
- Local electricity generators
- Central electricity generators
- Importers of natural gas
- Fluxys
- Elia
- Distribution grid operators
- Suppliers
- Customers
- Suppliers
- Balance Responsible Party (BRP)
- ESCO’s
- Flexibility Service Provider (FSP)
Distribution grid operators

- Manage, build and maintain the **distribution grids for electricity and natural gas on a well defined territory**
- **Distribute**, on the request of the suppliers, energy towards the consumers connected to the distribution grid
- Act as **social supplier** for domestic customers who have been ‘dropped’
- Promote **rational use of energy**
- Manage the access register / **energy market data** in an independent way
Eandis Key Figures (01/03/2016)

**Active in 229 towns / municipalities**

- **4,041 employees**

**97,312 km** electricity network (twice around the world)
- 2,6 million connections
- 60,655 social supplier customers

**42,598 km** natural gas network (once around the world)
- 1,7 million connections
- 47,138 social supplier customers

**845,250 street lights**

**Customer contact**

- Website: visitors/month (upward) **260,086**
- Call centre: calls/month (downward) **108,310**
- 25 customer offices: visitors/month (downward) **13,712**
Agenda

- Introduction

- Scada solutions – view on the end-to-end chain

- Leveraging SCADA capabilities – Use Cases
  - Flexible production units – Port of Antwerp
  - Scarcity plan
  - Underfrequency Load Shedding
End-to-end chain

Local Logic

Central Logic

Solutions
Agenda

- Introduction
- Scada solutions – view on the end-to-end chain

Leveraging SCADA capabilities – Use Cases

- Flexible production units – Port of Antwerp
- Scarcity plan
- Underfrequency Load Shedding
Agenda

- Introduction
- Scada solutions – view on the end-to-end chain

Leveraging SCADA capabilities – Use Cases

- Flexible production units – Port of Antwerp
- Scarcity plan
- Underfrequency Load Shedding
Study results (trade off – investments)

15kV – Smart – Fase1

Zone 1

Zone 2

Zone 3

Zone 4

Windturbine Fase 1
Windturbine Fase 2
telecontrol (CNO)

Central Logic

- Development of the scripts
- Datamodel for LP-units
- Data quality
- Activating the scripts on the TS
- Interaction with TSO
- Testing – proof of concept
- ...

TC-cabinet
- Measurement
- Signalisation
- Reduction (%Pinst)
- IED
- Emergency stop

Local control (field agent)

G
Central Logic

Field
- Command (ICCP)
- Measurements
- Local action

DMS
- Event Trigger
- Logic
- Control action

Interaction with flexible production units
N-1 Initiator

EMS Elia

DMS Eandis

Acknowledgement

Group Control

Transfert Rapide
N-1 initiator Elia – start logic – Setpoint to the field

28/08/2015 16:06:14.420

KALLO (9120) - 500 TS KETENISSE

Ontw

N-1 Initiator Geactiveerd

---

Historian

KALLO (9120)- 5580 AFRULOG, LP Aggregaat 1 AP_Setpoint P set.Historian

Punt Naam: KALLO (9120)- 5580 AFRULOG, LP Aggregaat 1 AP_Setpoint P set.Historian


Waarde: 30,00

Kwaliteit: OK

Niet Geschaald
Agenda

- Introduction

- Scada solutions – view on the end-to-end chain

- Leveraging SCADA capabilities – Use Cases
  - Flexible production units – Port of Antwerp
  - Scarcity plan
  - Underfrequency Load Shedding
Voorstelling Eandis

Januari 2012

Leveranciers

Klanten

ESCO's

Flexibility Service Provider (FSP)

Responsible Party (BRP)

Fluxys

Elia

Central electricity generators

Importers of natural gas

Fluxys

Suppliers

CREG / VREG

Local electricity generators

Importers of natural gas

Customers

Balance

Responsible Party

(BRP)

Flexibility Service Provider (FSP)

ESCO’s
Scarcity Plan

Step 1:
2 actors
Scarcity Plan

Step 2:
Energy flows
Scarcity Plan

**Step 3:**
Elia communicates the activation of the scarcity plan
Scarcity Plan

Step 4:
DSO opens the switches, but not those of important grid users and those of the active feeders.
Scarcity Plan

Step 5:
End of load shedding: distribution grid operator resets all feeders
Implementation of central logic

- **Two step approach**
  - Logic has been validated by the exploitation community and this logic calculates which switches to control
    - Tracing of important customers (taking actual grid state into account)
    - Interpretation of actual + historic measurements
    - Taking into account switching substations (diff)
  - DMS sends a group command to switches based on the logic after the activation of the plan by Elia
First step

Field
- Measurements
- Command (ICCP)

Local action

DMS
- Manual action in PowerOn
- Calculation in DMS

Event trigger

Logic
- Reporting
- Support for an operator

28/03/2017
SGTech
Second step

Field
- Measurem ents
- Command (ICCP)
- Local action

DMS
- Manual action in PowerOn
- Calculation in DMS
- Event trigger
- Logic
- Reporting
- Support for an operator
Agenda

- Introduction
- Scada solutions – view on the end-to-end chain

**Leveraging SCADA capabilities – Use Cases**

- Flexible production units – Port of Antwerp
- Scarcity plan
- *Underfrequency Load Shedding*
UFLS

- Classic way of working

- New way of working
Logic in DMS

- **Script** decides the importance of a switch:
  - GROUP1: not important, not an active feeder: switch off
  - GROUP0: important, active: stay on

- **Script** runs once a month
Local Logic

Trip signal by Elia

Open switch if necessary

Check trip with group signal

Block or allow Elia trip
Introductie uitschakeling UFLS

- Reaction time Trip UFLS Elia -> Trip Feeders < 20 ms
  -> *(not taking into account switching time of the switch!)*