Enterprise GIS - What’s needed in a changing utility landscape?

Esri Day 2024

JAN VAN DE STEEN, 28/11/2024

Abstract

Title: **Enterprise GIS - What's needed in a changing utility landscape?**

Speaker: **Jan Van de Steen, Geospatial Asset Management Expert**

Abstract:

Building a 'GIS centric' enterprise may have been a dream for many network operators. New utility challenges require a smarter network model and advanced functionality. 'Strategic' implementation decisions from the past therefore have to be revisited. A point of view.

Enterprise GIS implementation – the ‘strategic choices’

- Will the **Enterprise GIS** hold the Master of the End-to-end network model?
  - Including in-plant connectivity?
  - On what level of detail (functional breakdown)?
- Will the enterprise manage the full network lifecycle (design / build / operate / retire) from the **Enterprise GIS**?
- Should the **Enterprise GIS** therefore support multiple graphical representations of the network?
  - Large scale topographic
  - Geo-schematic
  - Orthogonal schematic
- Are the customer supply points and lines to be linked to the network in the **Enterprise GIS**?

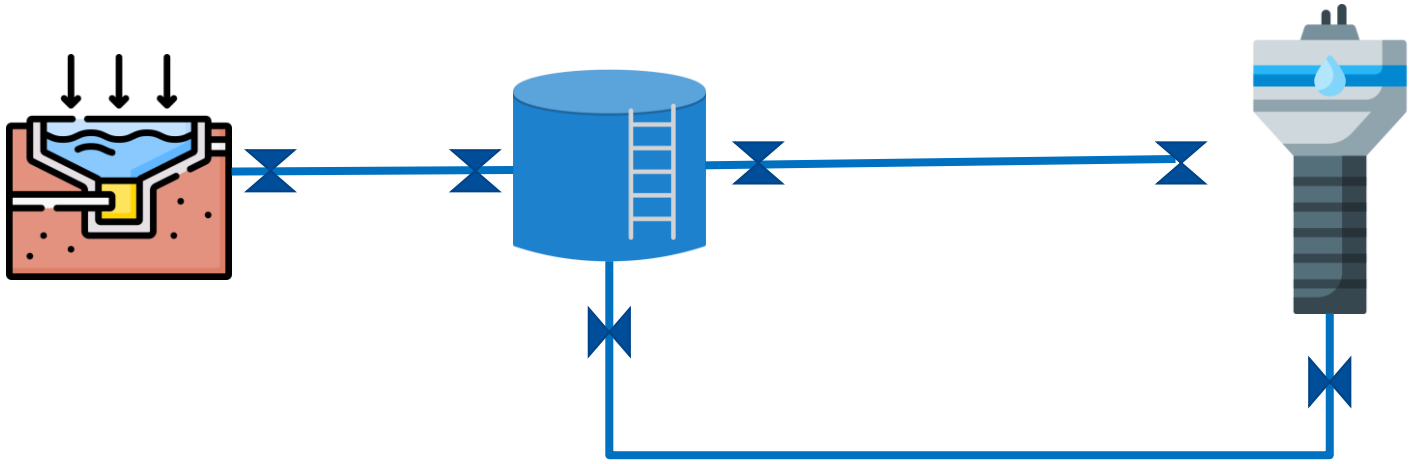
Will the **Enterprise GIS** hold the Master of the End-to-end network model?

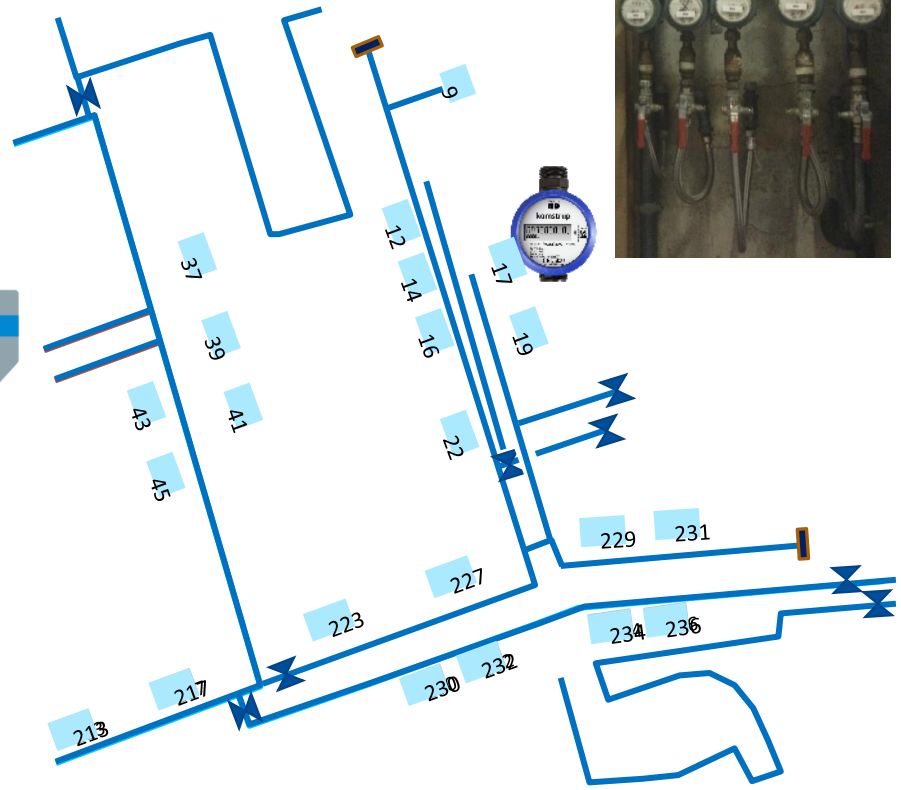
PRODUCTION

TRANSPORT

- **Including in-plant connectivity?**
- **On what level of detail (functional breakdown)?**

DISTRIBUTION





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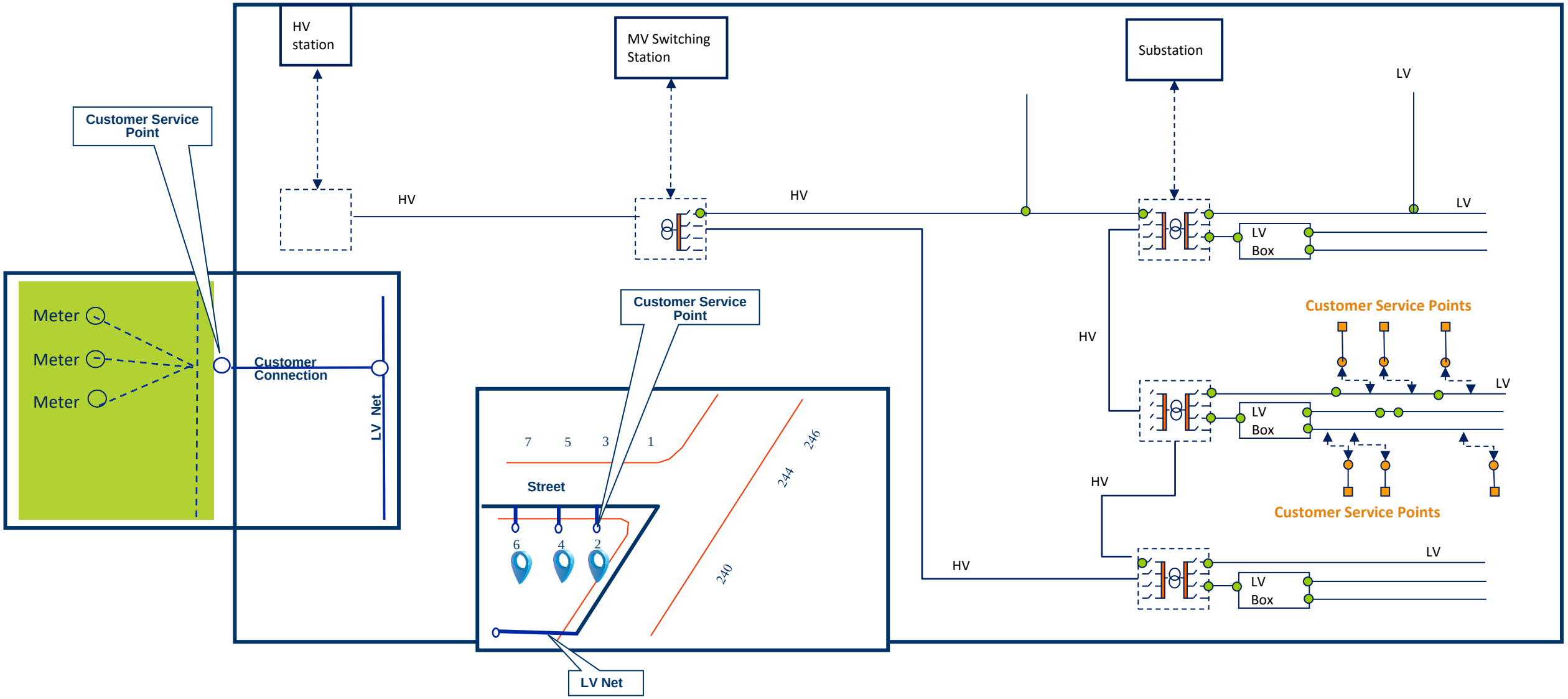

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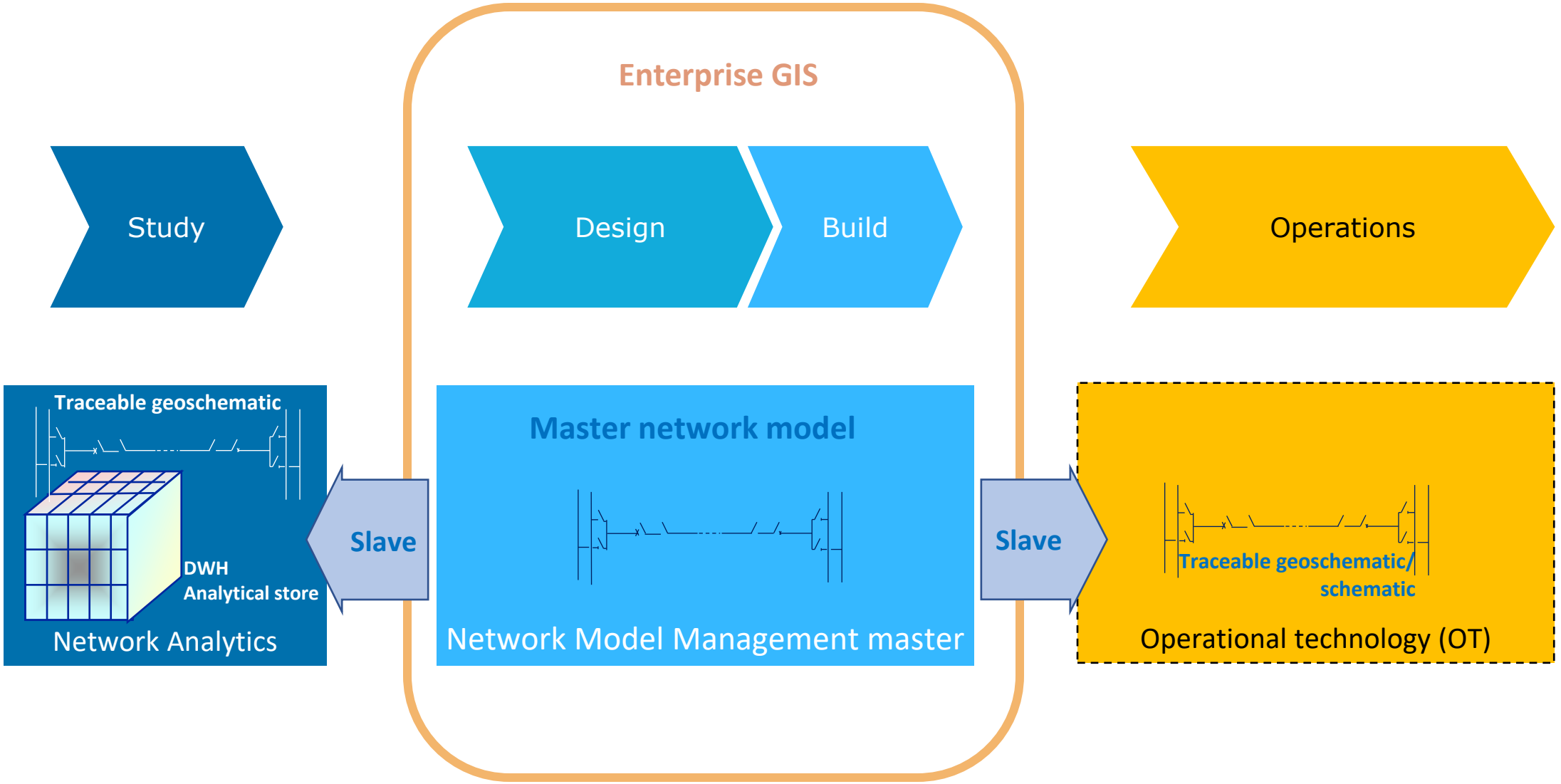
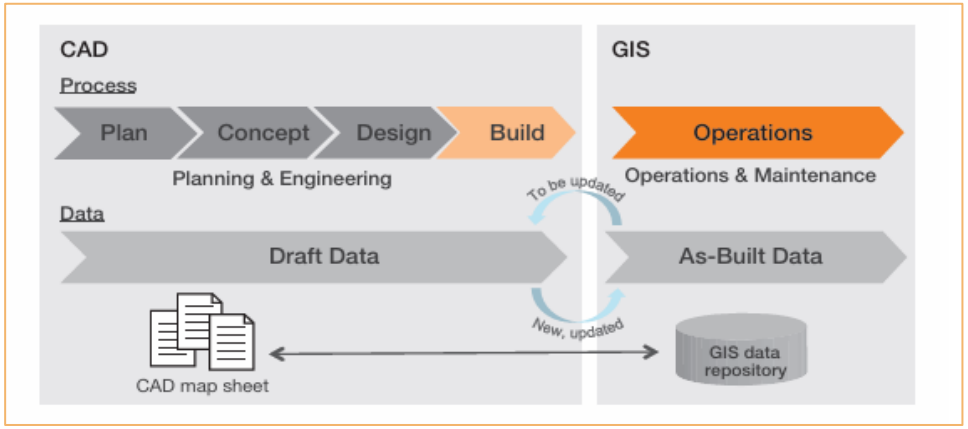
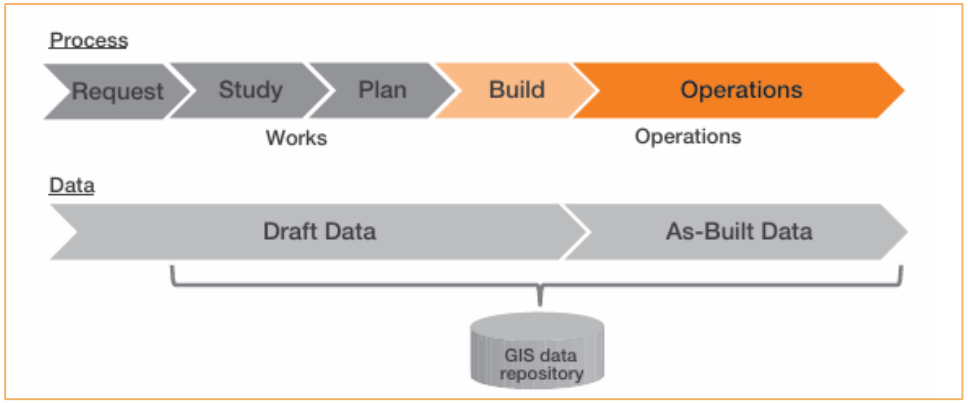


Will the enterprise manage the full network lifecycle from the **Enterprise GIS**?

Hybrid approach

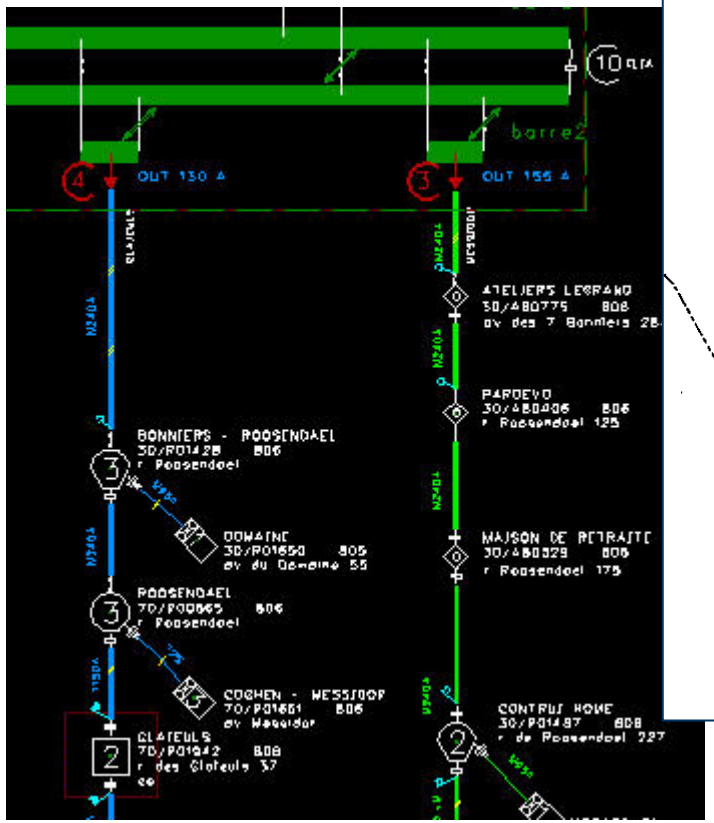


Full GIS lifecycle approach

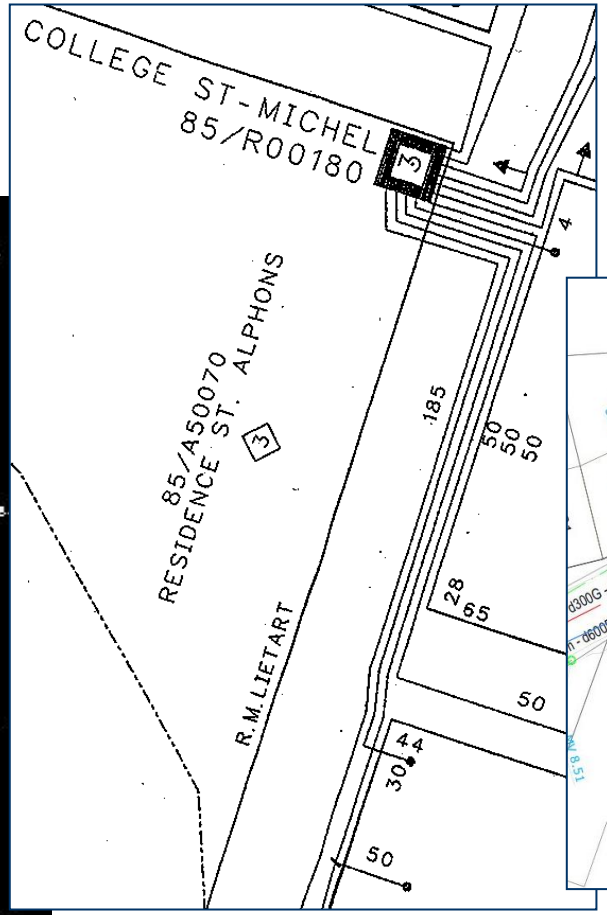


Should the **Enterprise GIS** therefore support multiple graphical representations of the network?

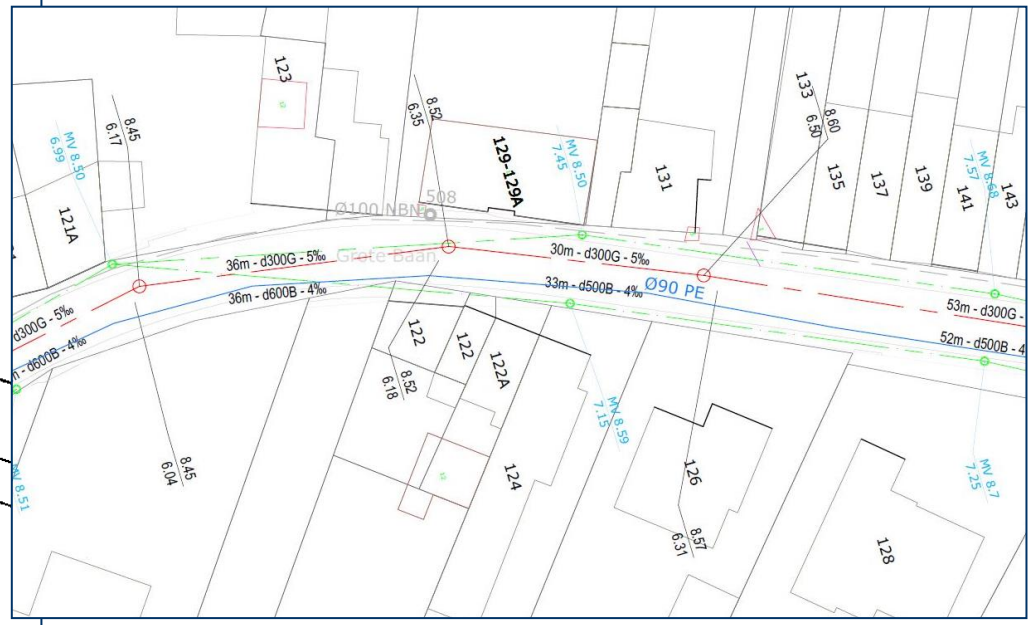
SCHEMATIC



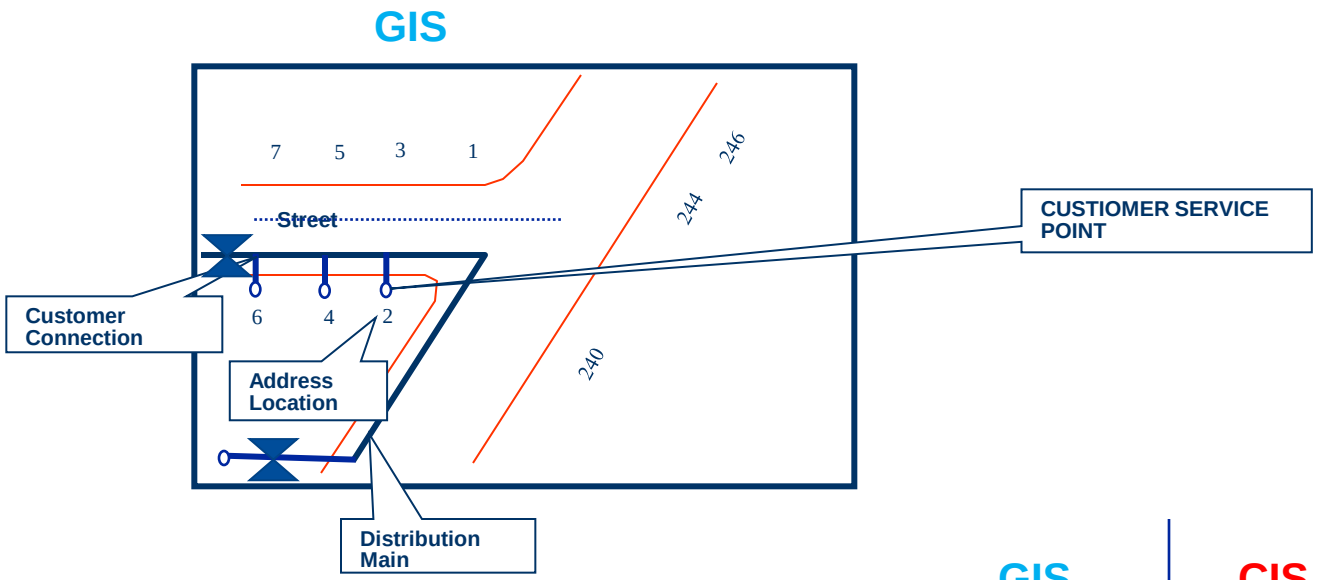
GEO-SCHEMATIC

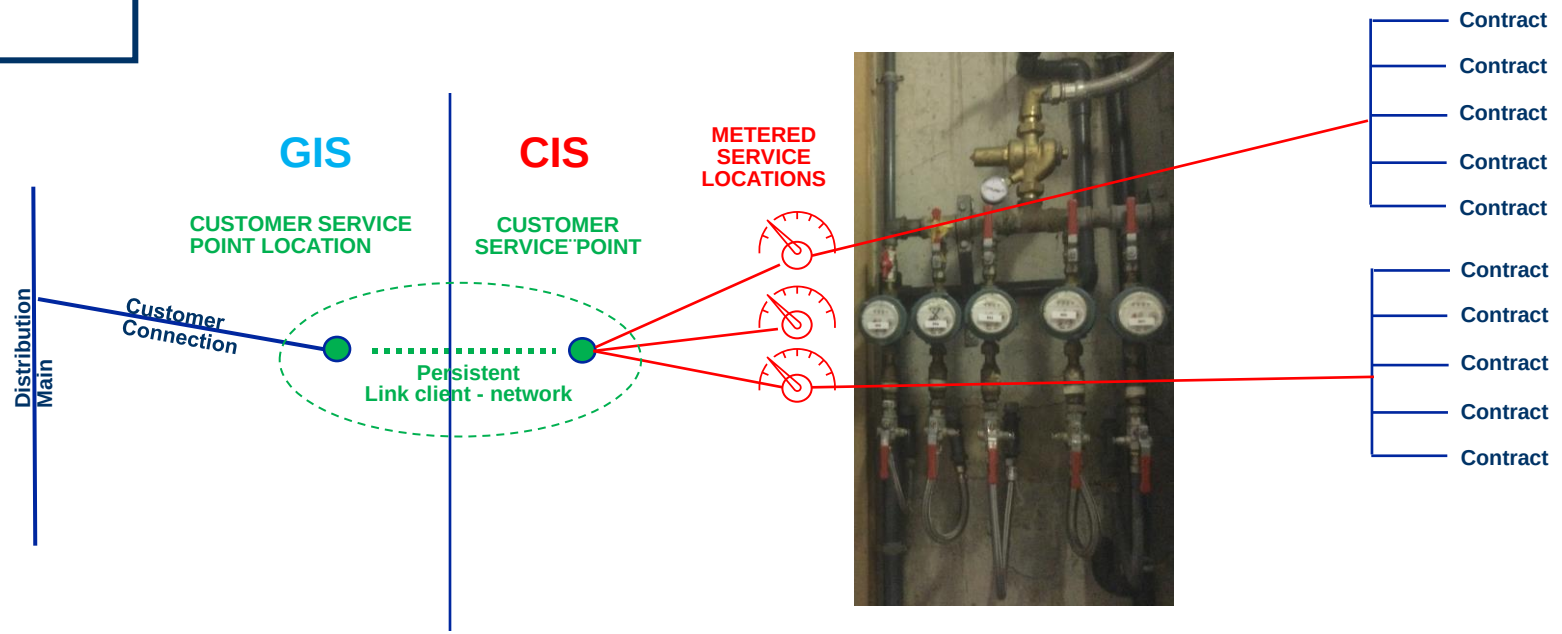


TOPOGRAPHIC

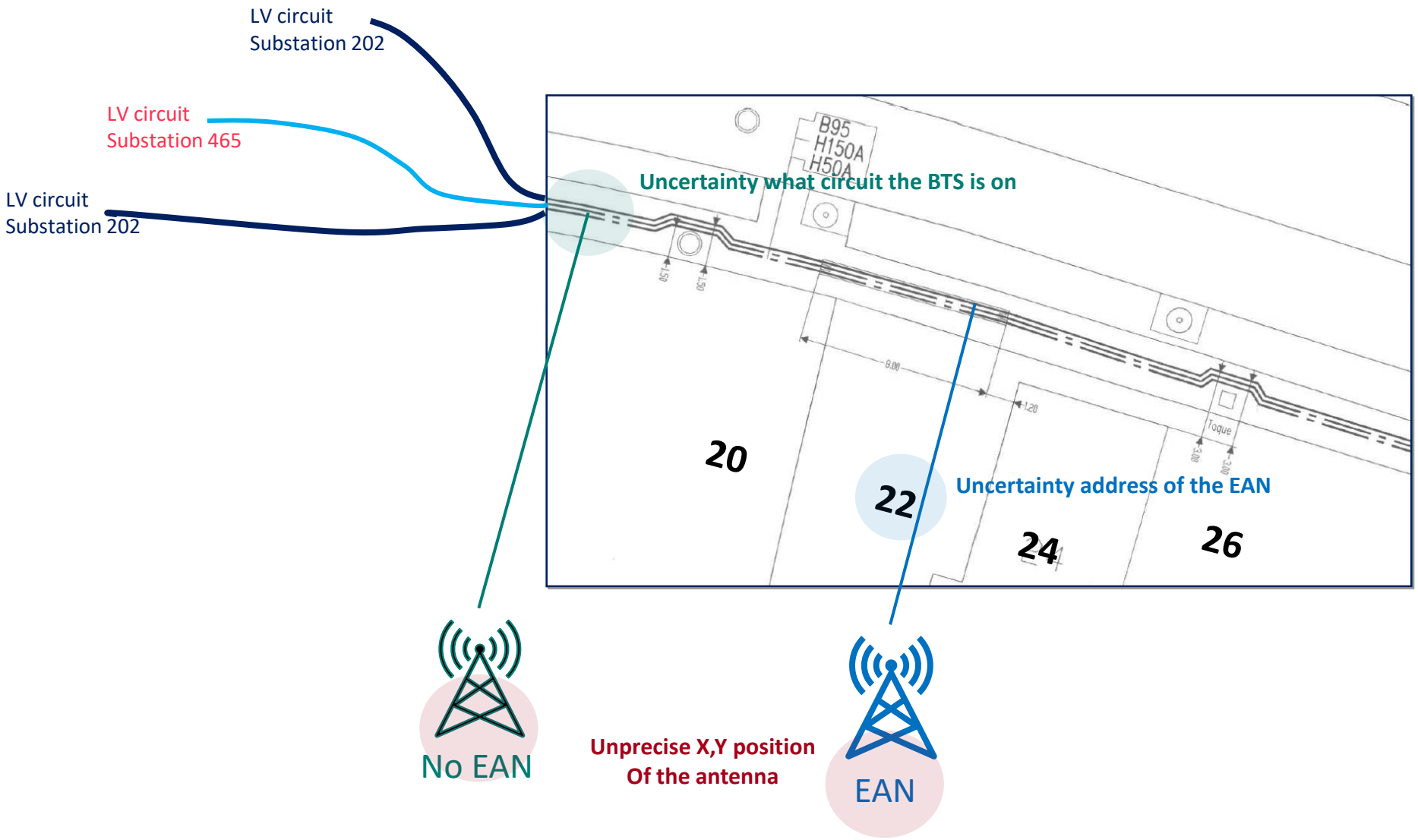


Are the customer service points and lines to be linked to the network in the **Enterprise GIS?**





An example (1)


LV circuit
Substation 202
LV circuit
Substation 465
LV circuit
Substation 202
B95
H150A
H50A
Uncertainty what circuit the BTS is on
20
22
24
26
Uncertainty address of the EAN
No EAN
Unprecise X,Y position
Of the antenna
EAN

An example (2)

BIPT ID: 4243

Dorpsplein
3110 Rotselaar

Status
Operationeel

WGS84
4.70910167 O / 50.95139859 N

België Lambert 72
X: 173918 / Y: 182402 m

Antennes
1. Telenet _VB4053D Operationeel
2. Proximus 16ROK_01 Operationeel
3. Orange Belgium 30639F1_1 Operationeel

Minder Info ▲

An Example (3)

Geselecteerde site: 3558

Onze-Lieve-Vrouwkerk
Kerkstraat / Dorpsstraat 1
1910 Kampenhout

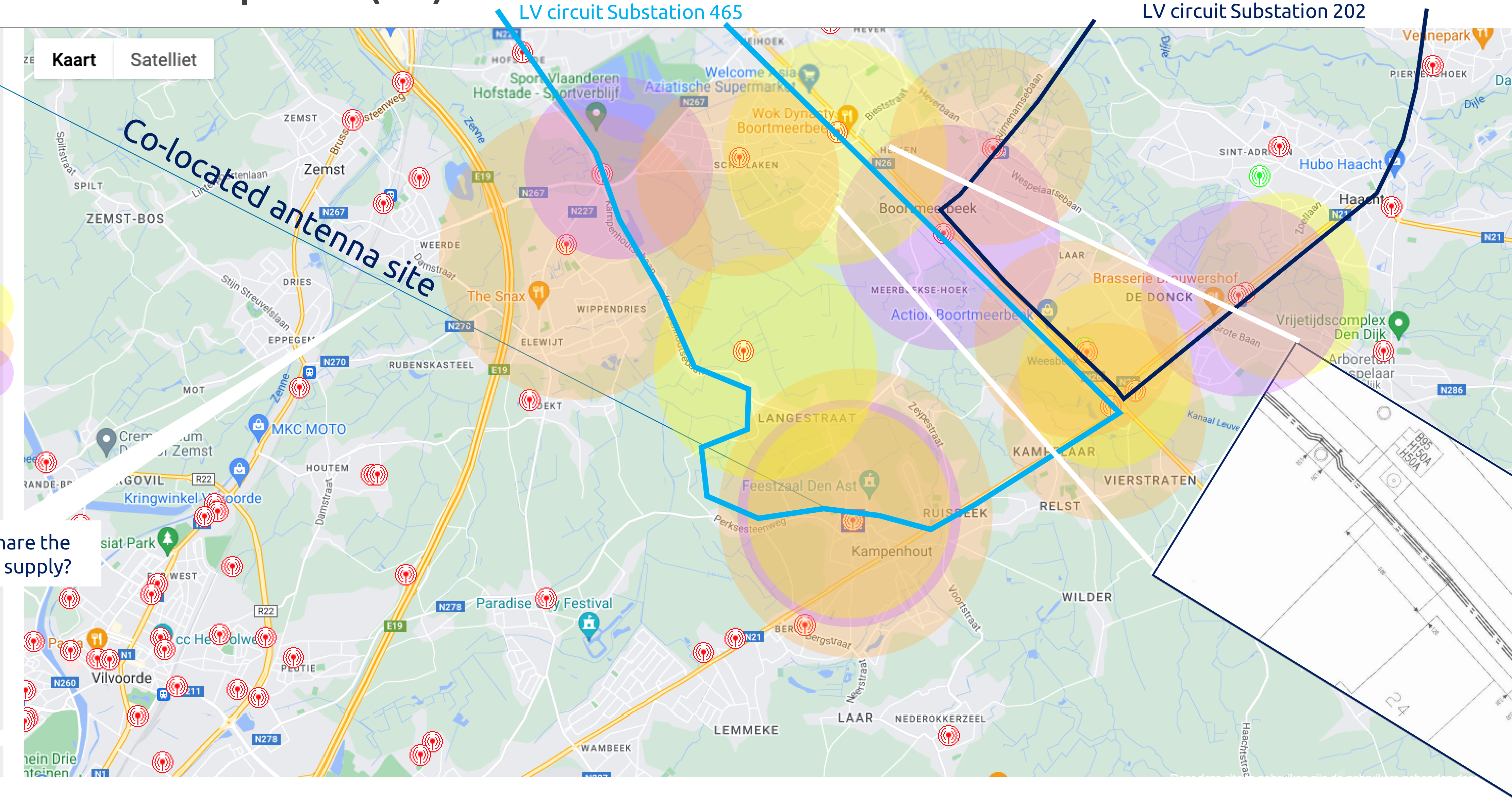
Status: Operationeel

Coördinaten: 4.54864 O / 50.94161 N
Lambert: X: 162645 / Y: 181274 m

Antennes:

1. Telenet: _VB4045A
2. Orange Belgium: 224F1_4
3. Proximus: 16KPH_00

Aanmelden (bevoegd personeel)



(Why) are this ‘strategic choices’ for Enterprise GIS?

- Will the **Enterprise GIS** hold the Master of the End-to-end network model?
  - Including in-plant connectivity?
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New challenges in the changing utility landscape

Intermittent energy sources play a big role in future consumption coverage

Electricity production (Figure 17): nuclear electricity production disappears completely by 2025 and is replaced by more gas production (although to a lesser extent than in the REF) and RES production. As from 2025, the share of gas decreases as RES production from wind, solar, biomass, geothermal and CHP see their role increasing. Intermittent RES represents ~50% of the mix in 2050. Imports of carbon-free electricity represent ~5% of the total supply.

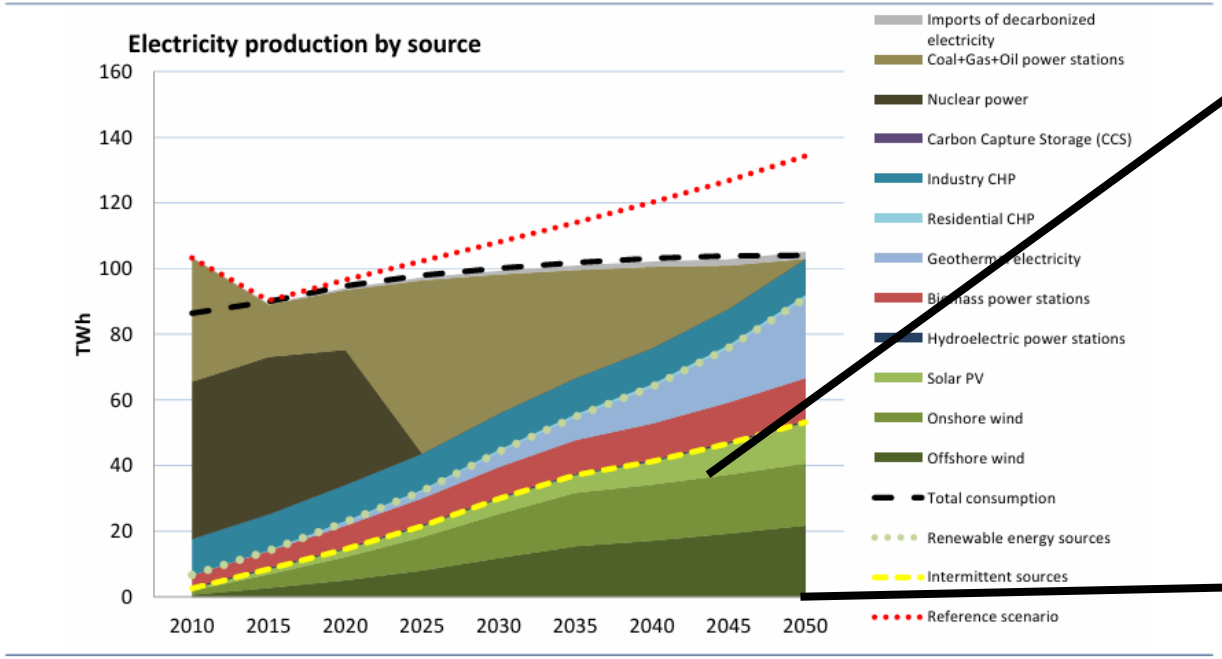
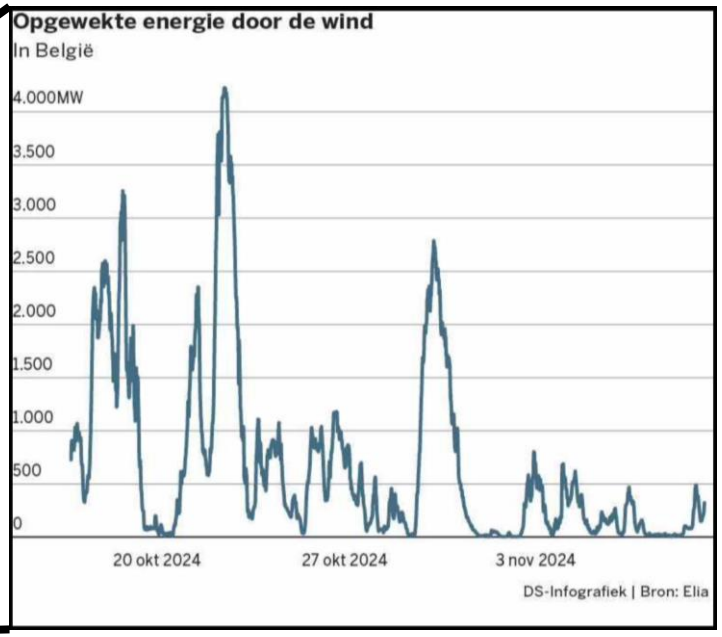


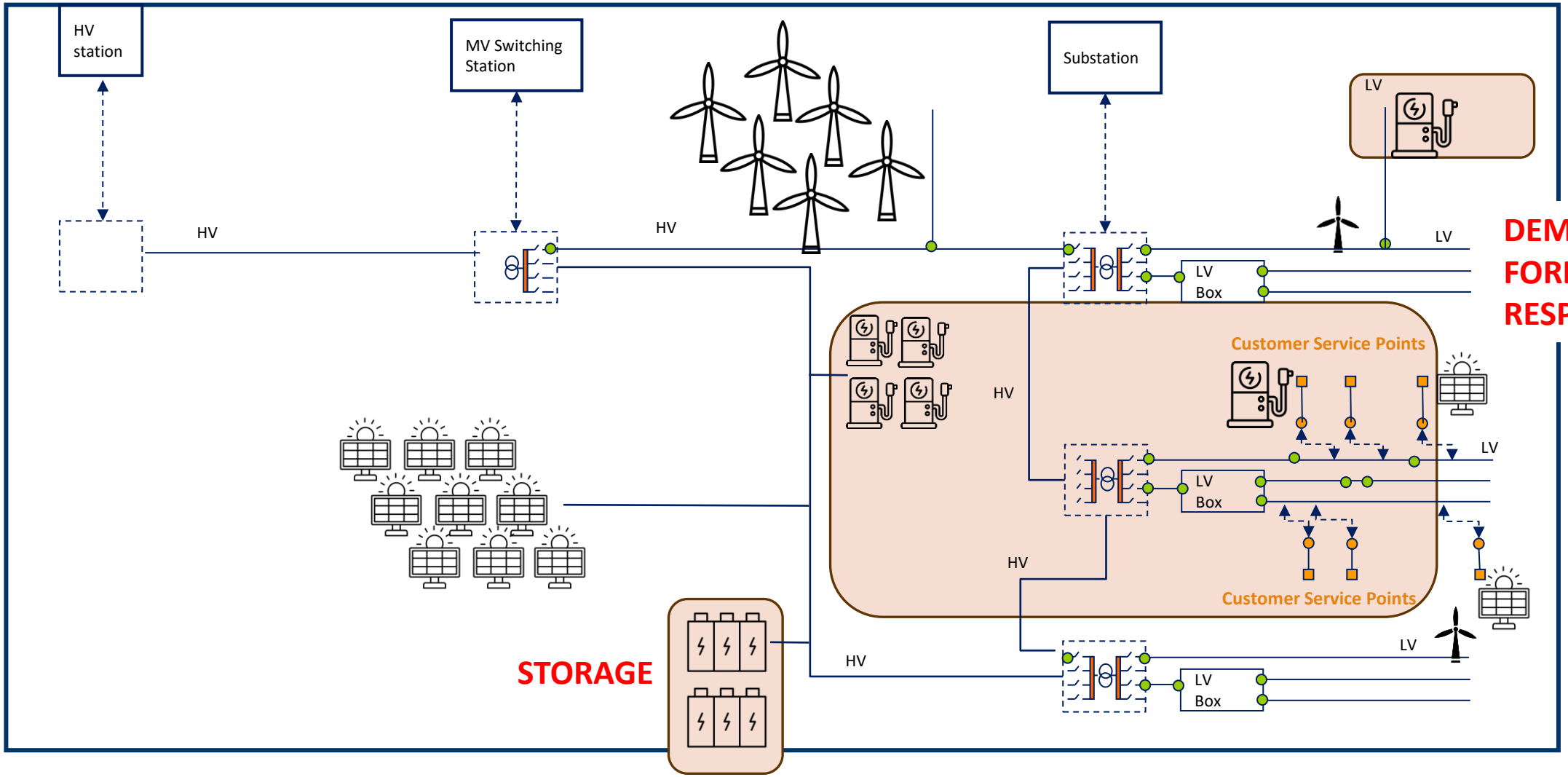
Figure 17. CORE scenario, Electricity production by source.



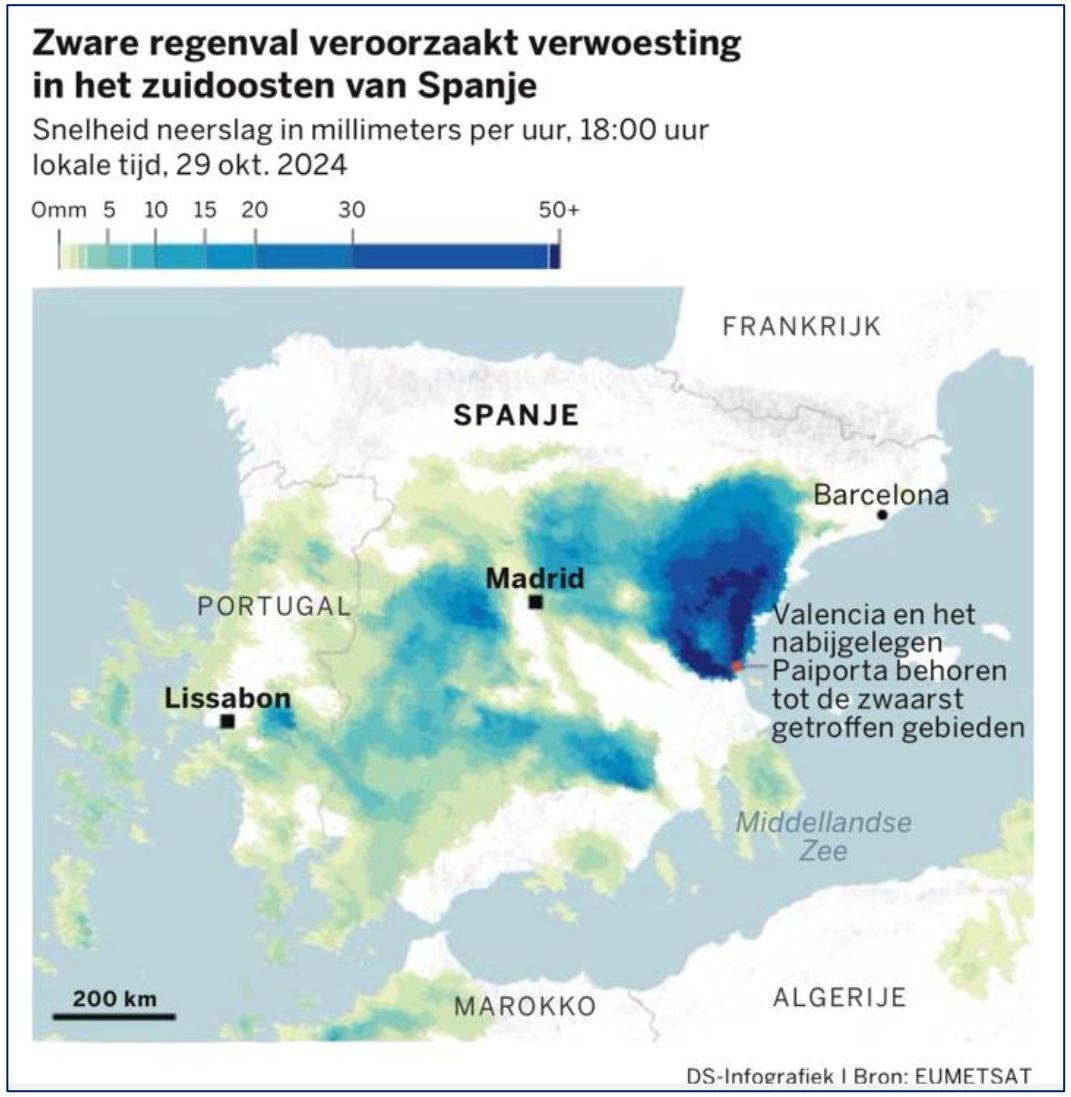
Source: Scenarios for a Low Carbon Belgium by 2050, VITO 2013

Source: De Standaard, 8 November 2024

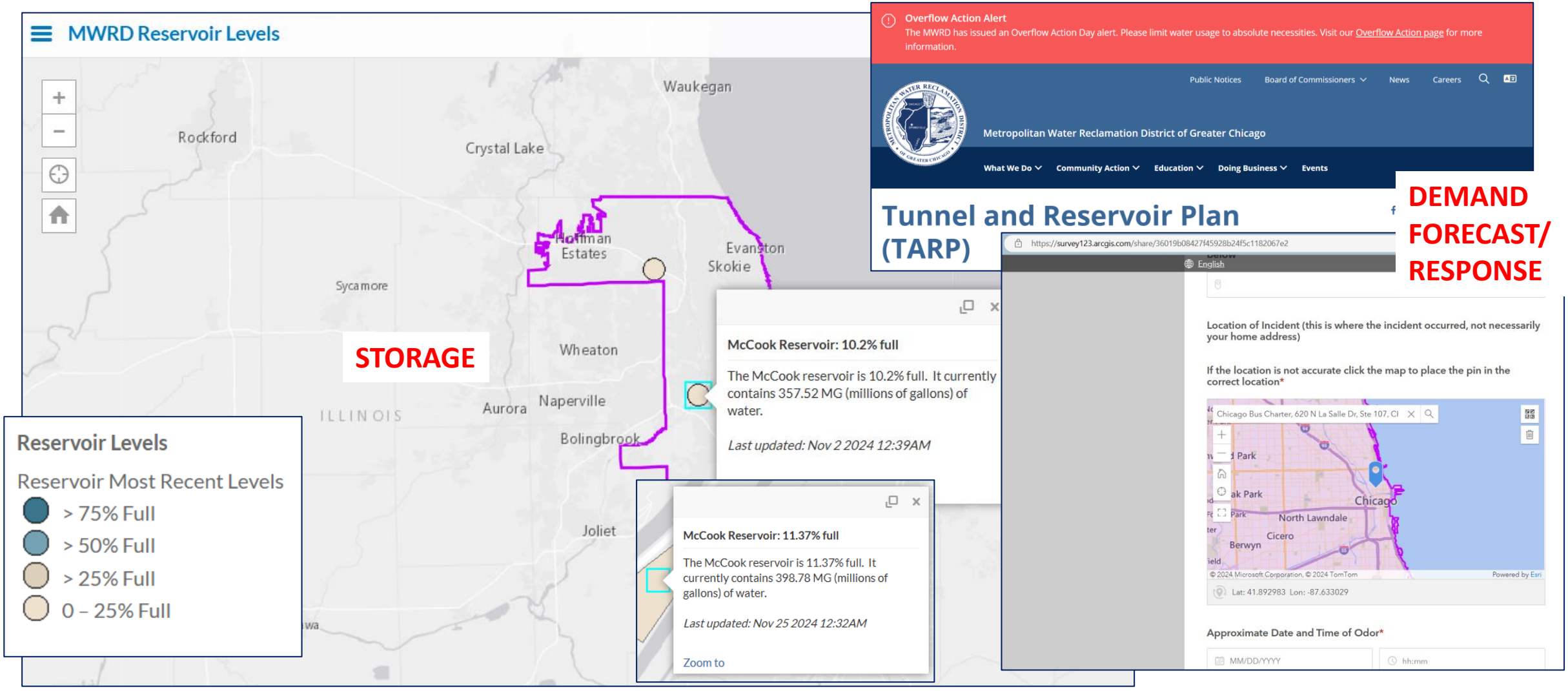
New demand profiles versus distributed intermittent production: balancing supply and demand



Responding to extreme weather events

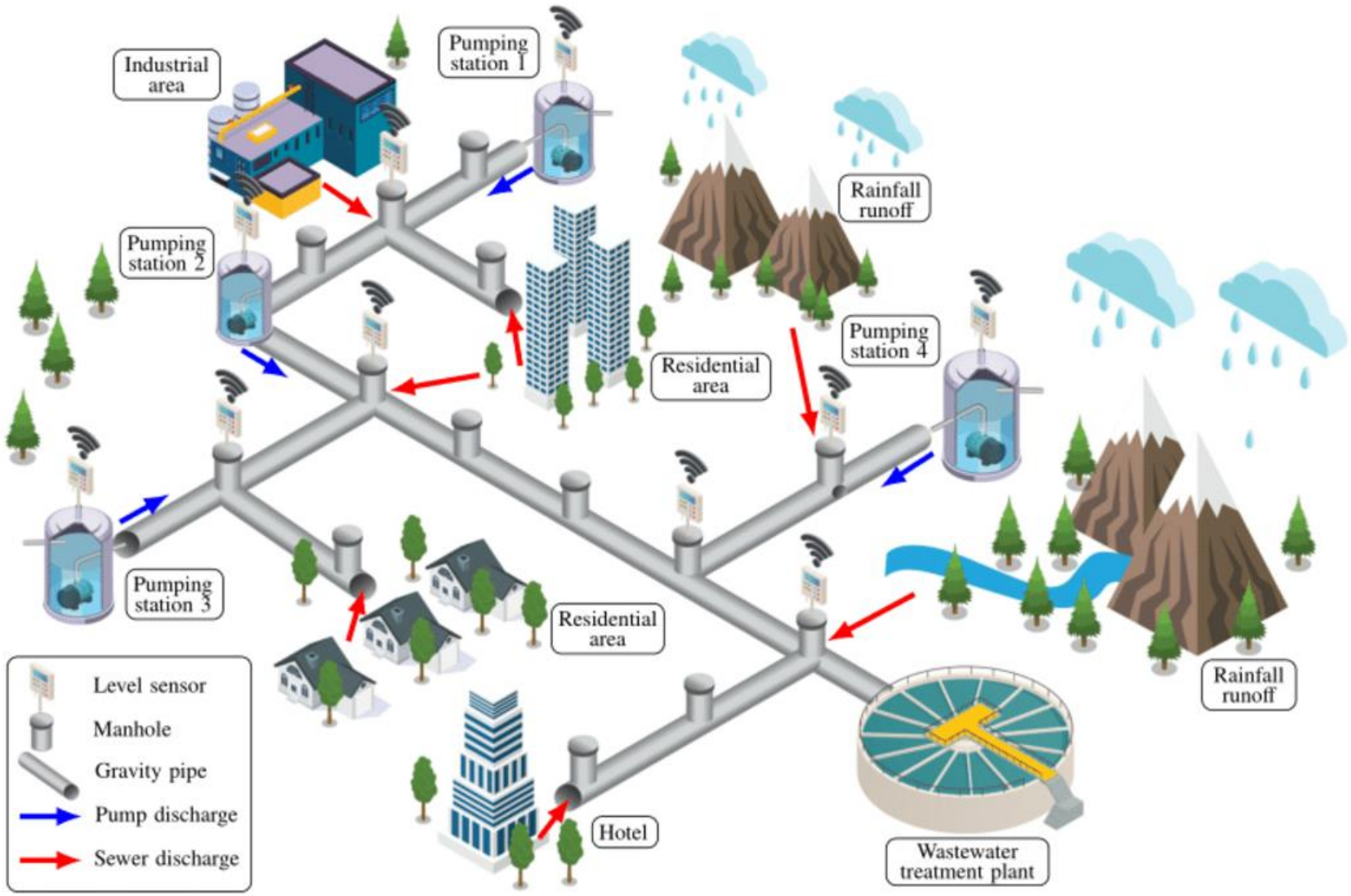


Forecasting and managing capacities

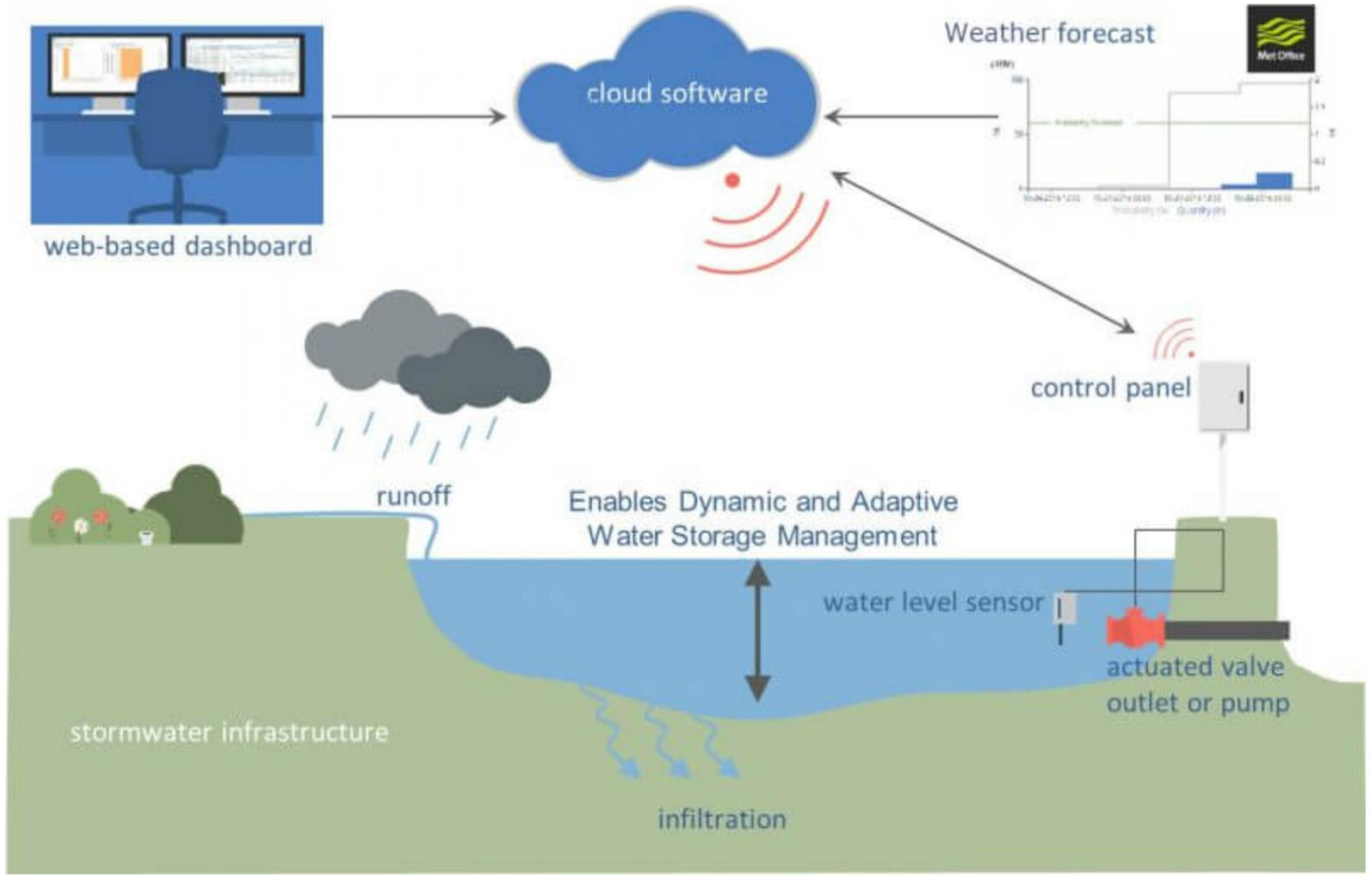


Monitoring and short term forecasting

An illustration of a pumped wastewater network, where water level sensors are deployed in critical points. (from: A learning-based approach towards the data-driven predictive control of combined wastewater networks – An experimental study – Water research August 2022.

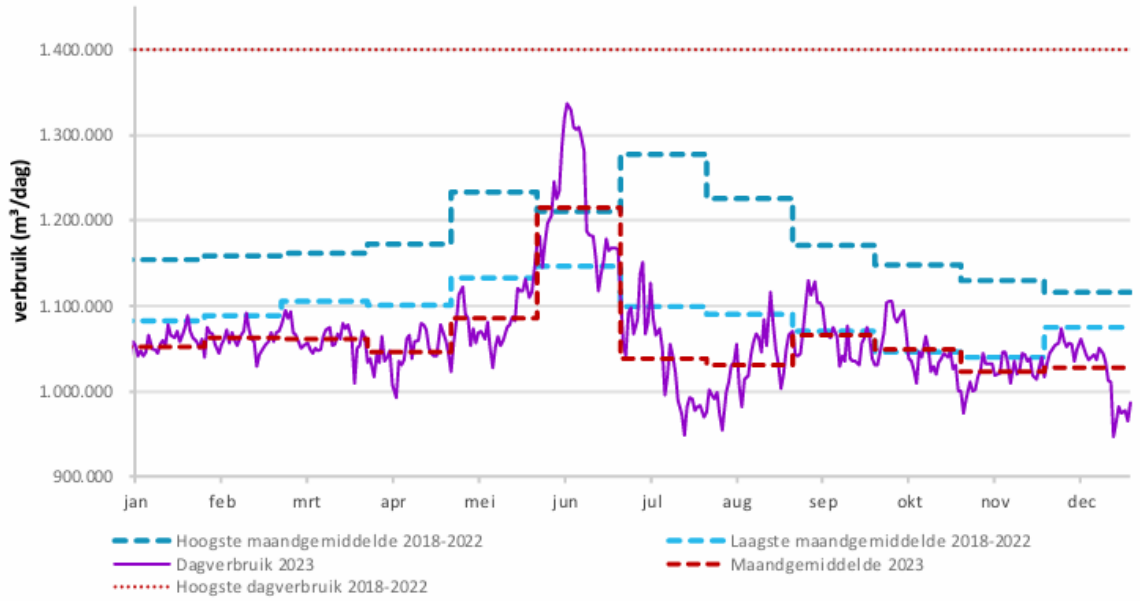


Dynamic and adaptive storage management



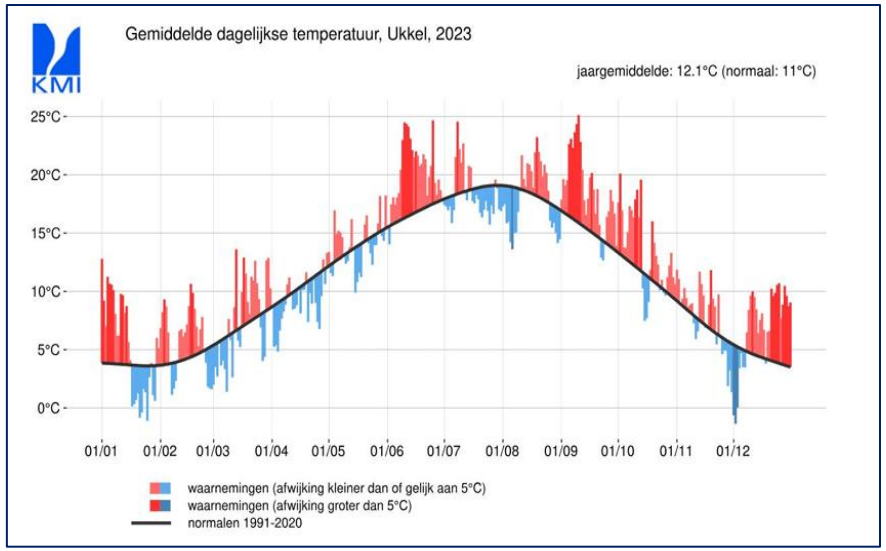
Source: Aqua-lity

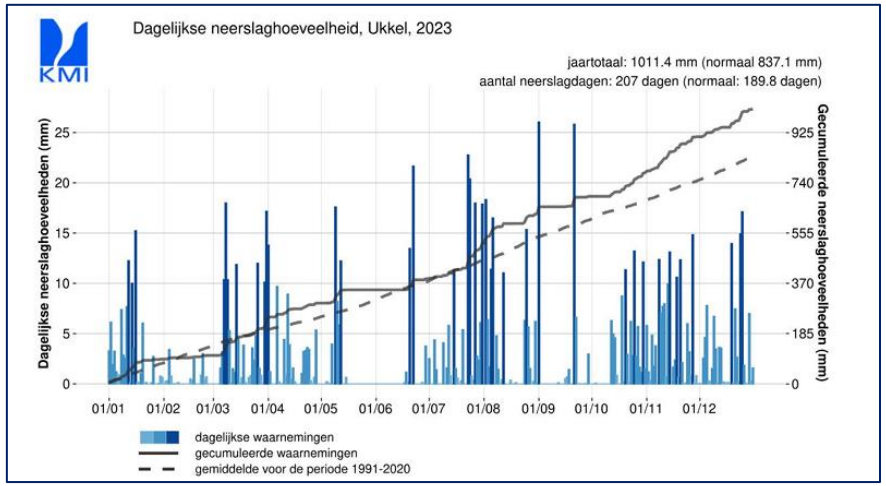
VMM Drinkwaterbalans voor Vlaanderen 2023



Opgelet: Y-as start bij 0,9 miljoen m³ per dag

figuur 17: Verloop van het gedistribueerde volume (hier verbruik genoemd) in het jaar 2023 in Vlaanderen door de 6 waterbedrijven





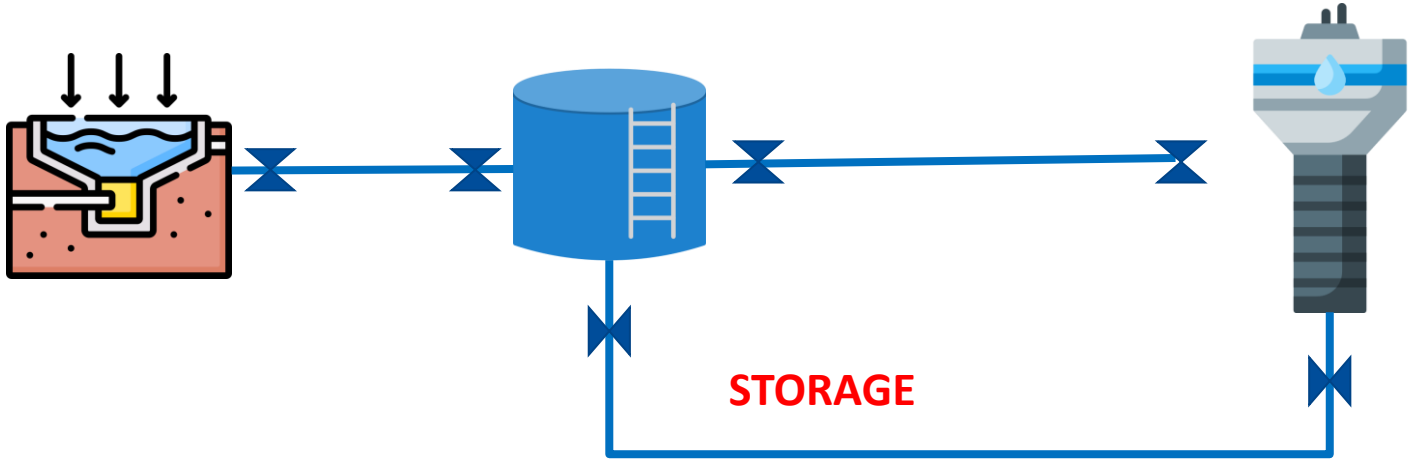
The challenge of balancing supply and demand – information and intelligence

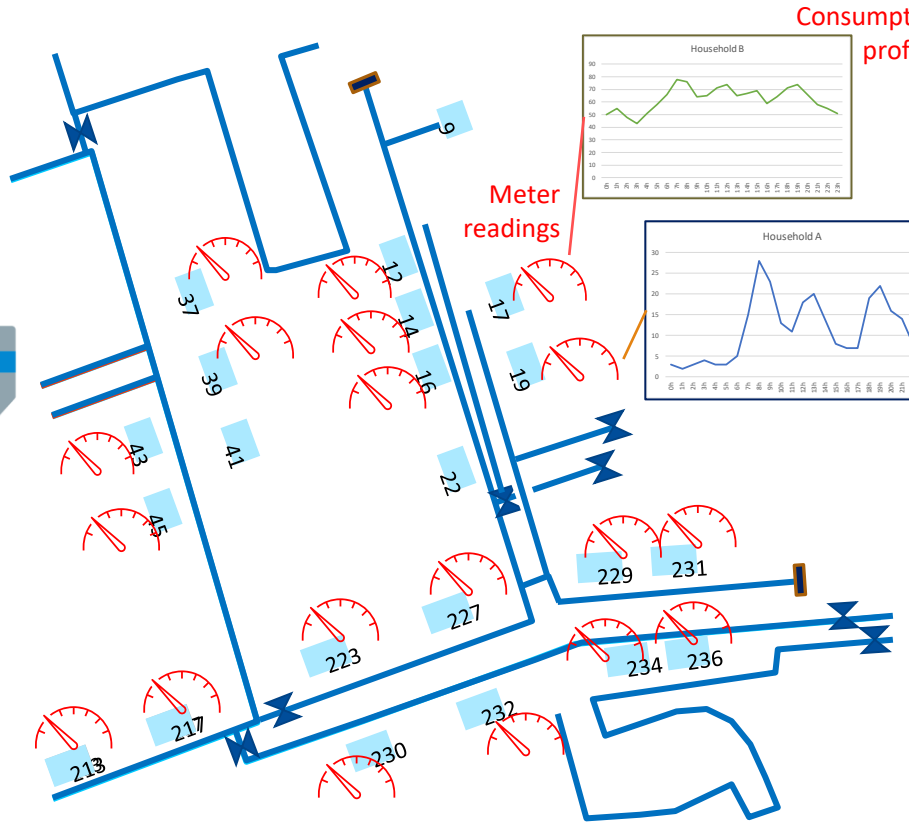
PRODUCTION

TRANSPORT

DISTRIBUTION

DEMAND FORECAST/ RESPONSE





Challenges in the changing utility landscape

Network capacity enhancement
- new networks
- dynamic line rating

Flexible production capacity and energy storage

Demand management at scale (downward flexible production)

NRW reduction, leak detection and mitigation

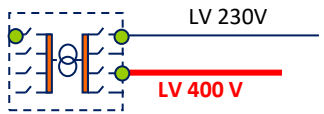
Storage/production capacity for dry seasons

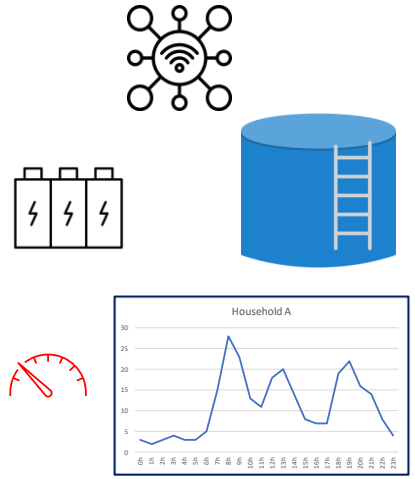
Demand forecasting and management

Separate stormwater / wastewater networks

Stormwater runoff control, storage and buffering

Stormwater home buffering and monitoring





Utilities will need:
- A uniquely defined and properly mastered network model for the existing net and planned extensions
- Historian of measurements and events linked on the appropriate network element
- Time-aware geographic applications for analysis, control and simulation of the network behavior

Conclusion – are these still ‘strategic choices’?

- Will the **Enterprise GIS** hold the Master of the End-to-end network model?
  - Including in-plant connectivity?
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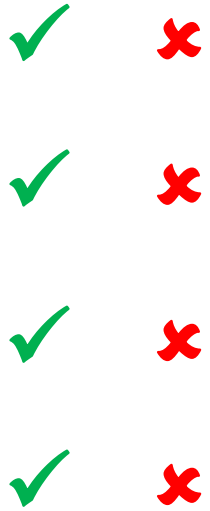

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