

Optimizing water control using renewable energy

With help of Delft-FEWS

Nelen & Schuurmans



2-11-2016



Sustainable world goal nr 7

7 AFFORDABLE AND
CLEAN ENERGY





Sustainable world goal nr 7

7 AFFORDABLE AND CLEAN ENERGY

“If we succeed, we create exciting new industries, welfare, **clean** energy and we might avoid the greatest disaster in human history, we save millions of lives and improve the lives of billions.”

Al Gore





Sustainable water management





Sustainable water management





How does it work?





How does it work?





Unbalanced energy market





Leveling demand-respons





Negative for.....



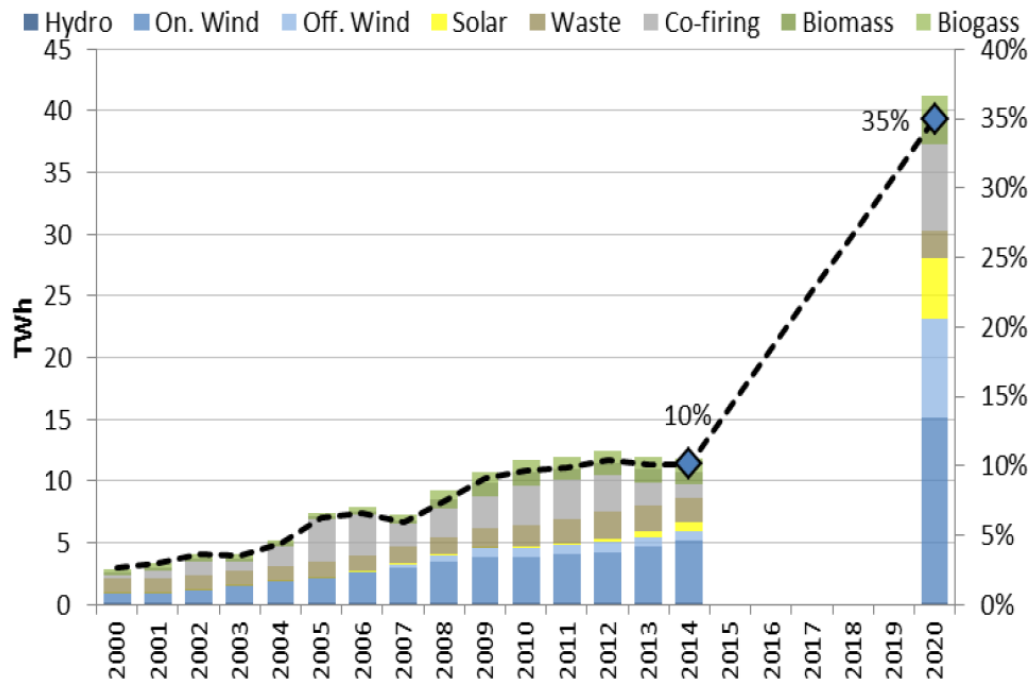


and for



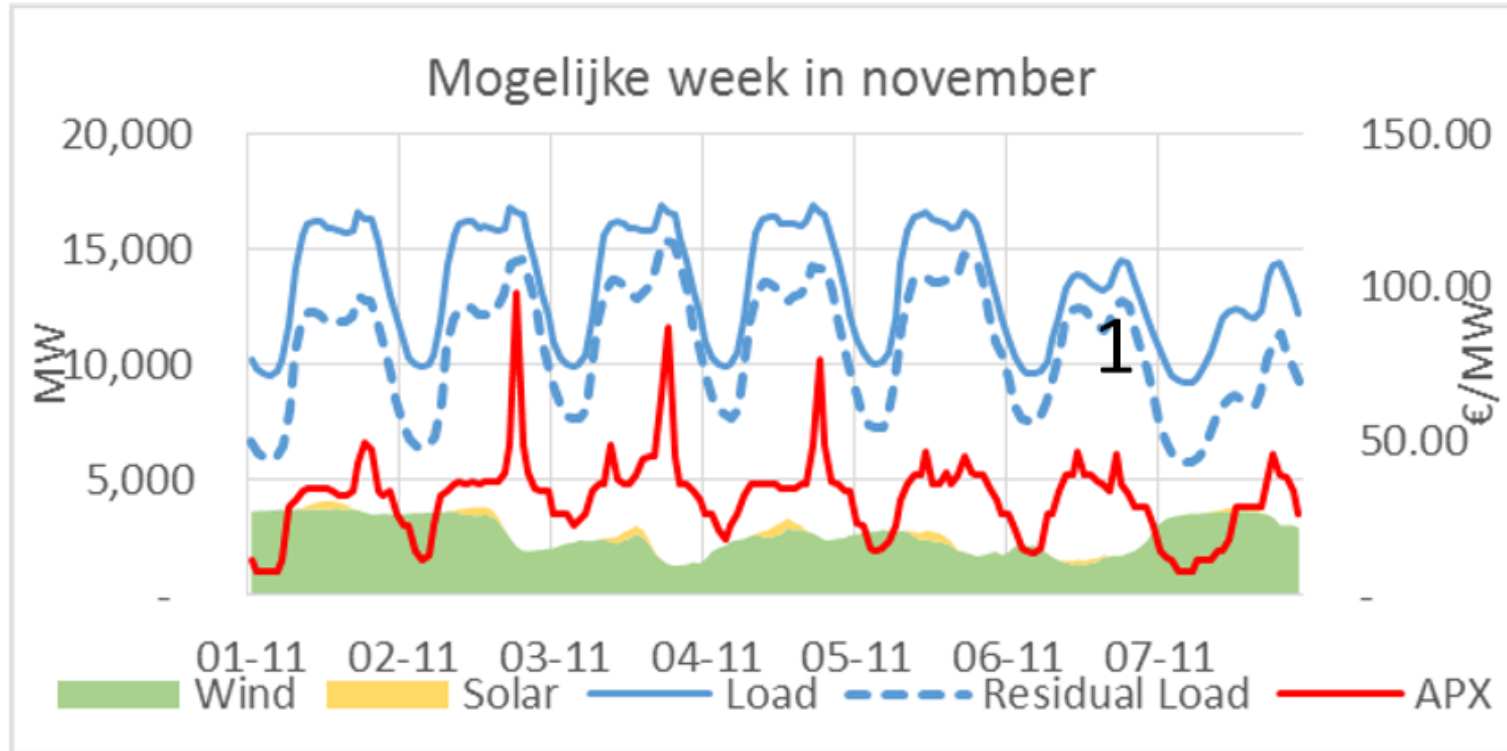


Target % renewable energy



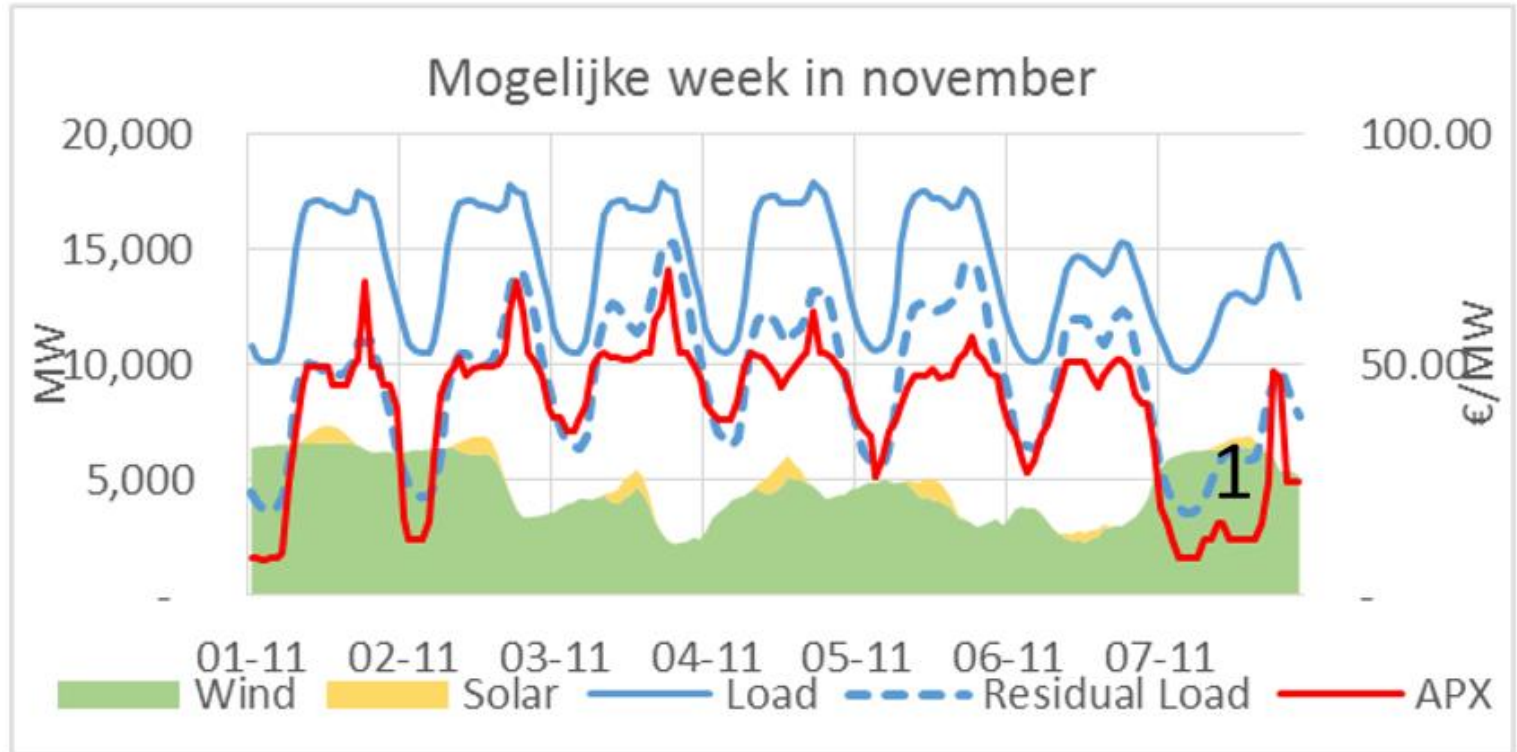


near real time weekly energy distribution



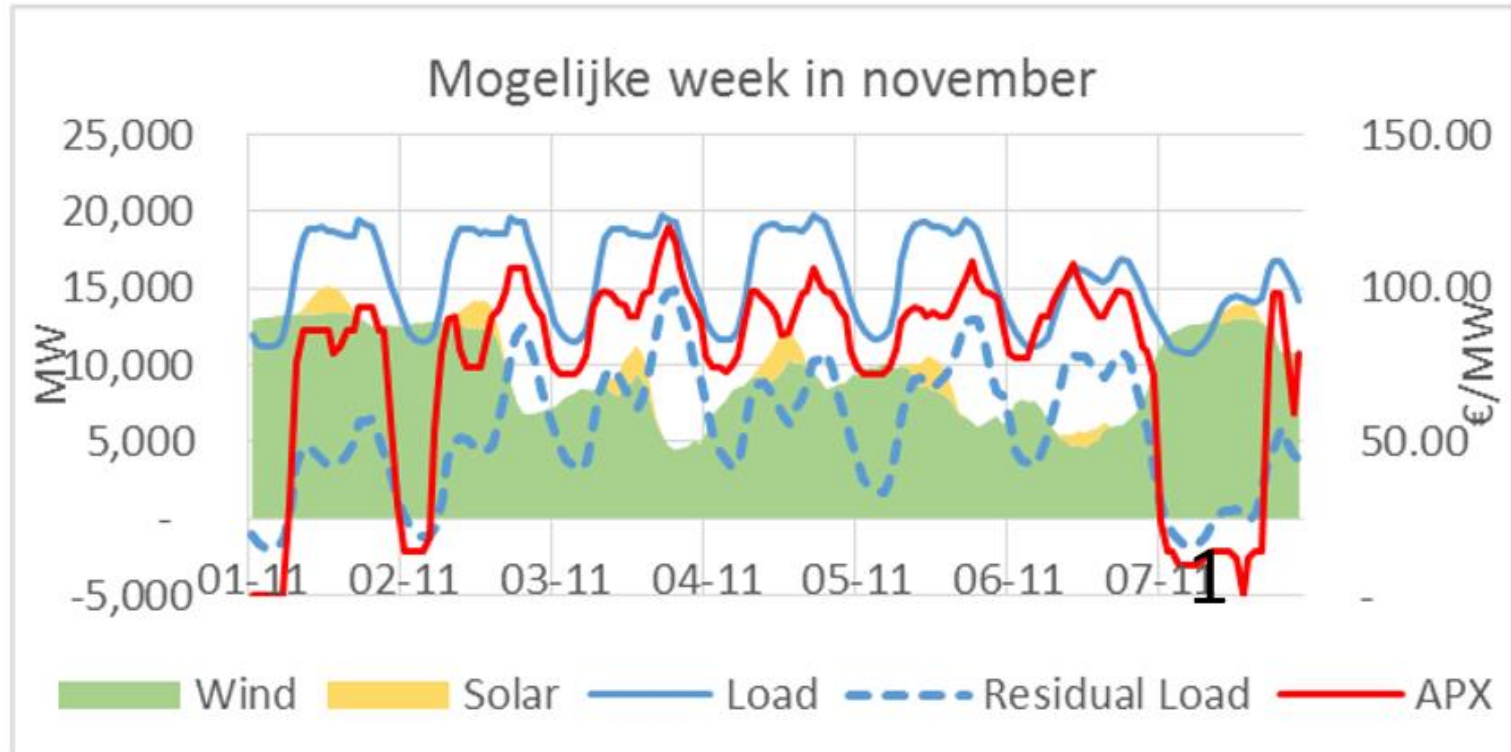


probable weekly energy distribution in 2020





probable weekly energy distribution in 2030





need for flexible energy consumers





water and energy



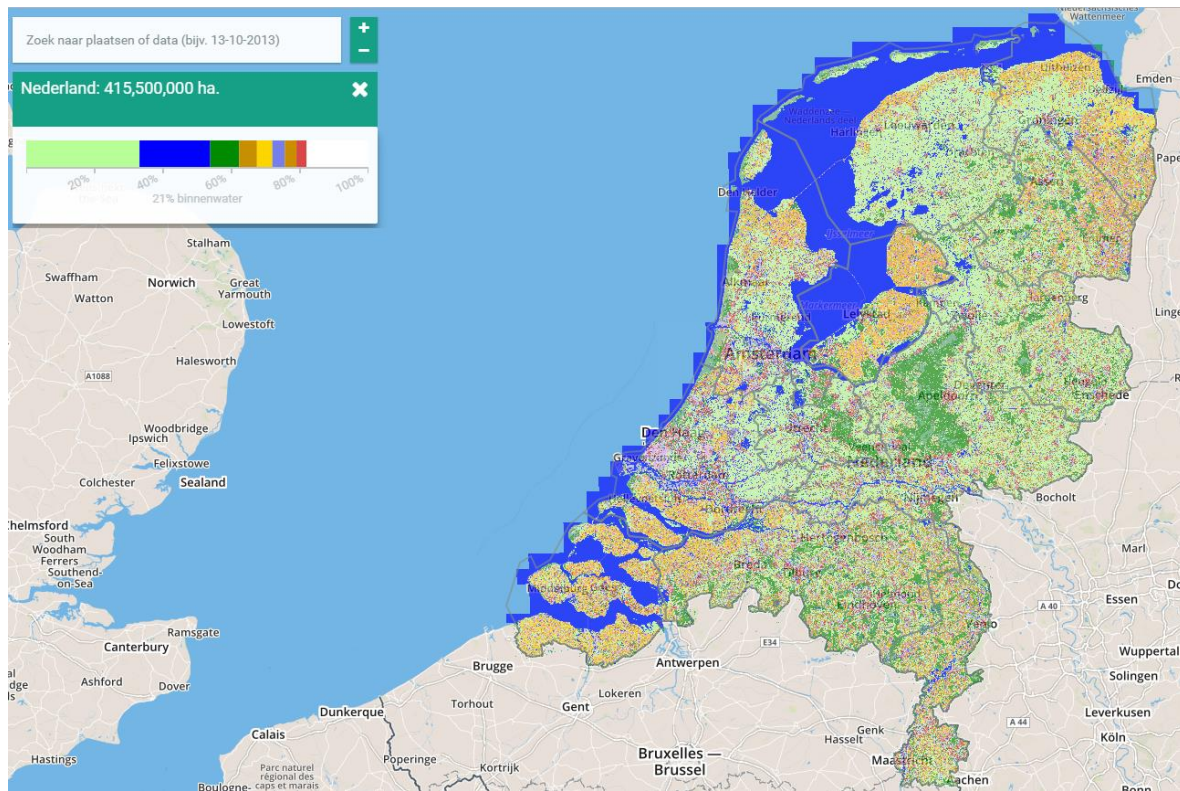


plan Lieveense (1981)





Water in NL



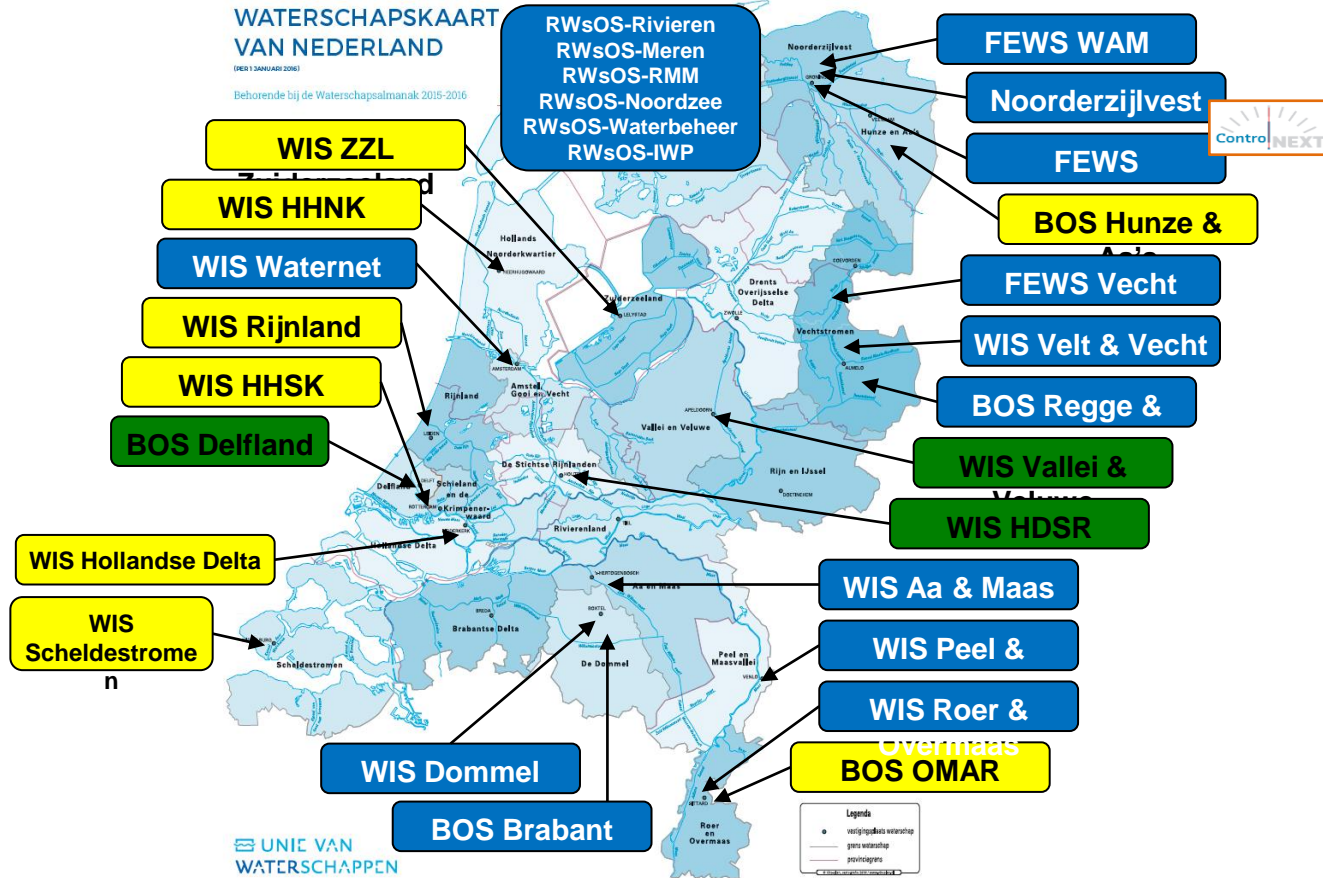


Predictive power



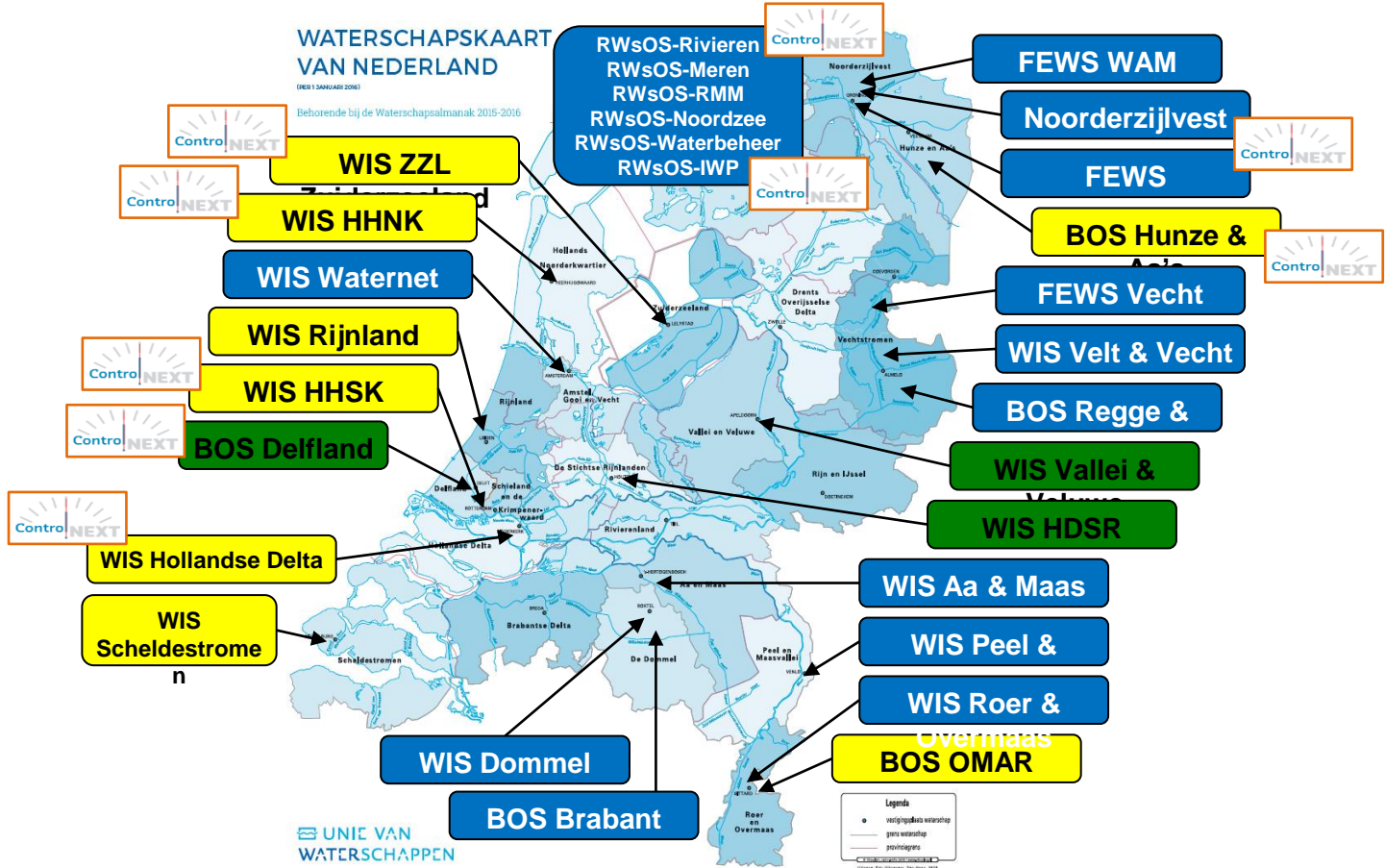


Why not use Delft-FEWS ?



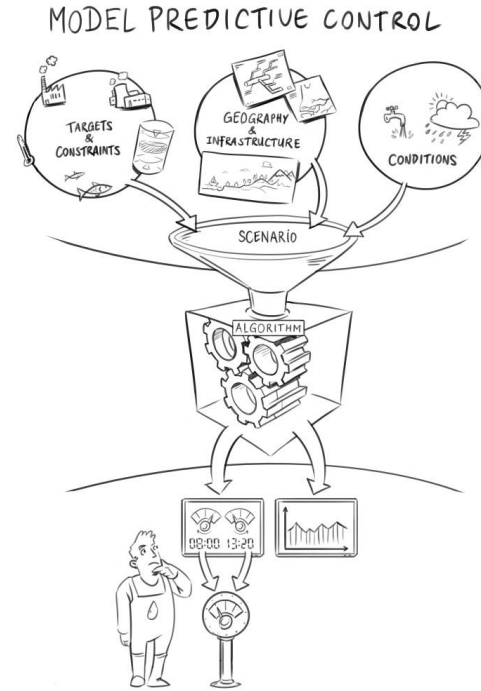


Delft-FEWS for RTC → ControlNEXT



Ingredients

- › Measurements
- › Meteorological forecasts
- › Hydraulic model
- › RTC algorithms





objectives

1. Increase the predictability of consumers
2. More responsive to supply and demand



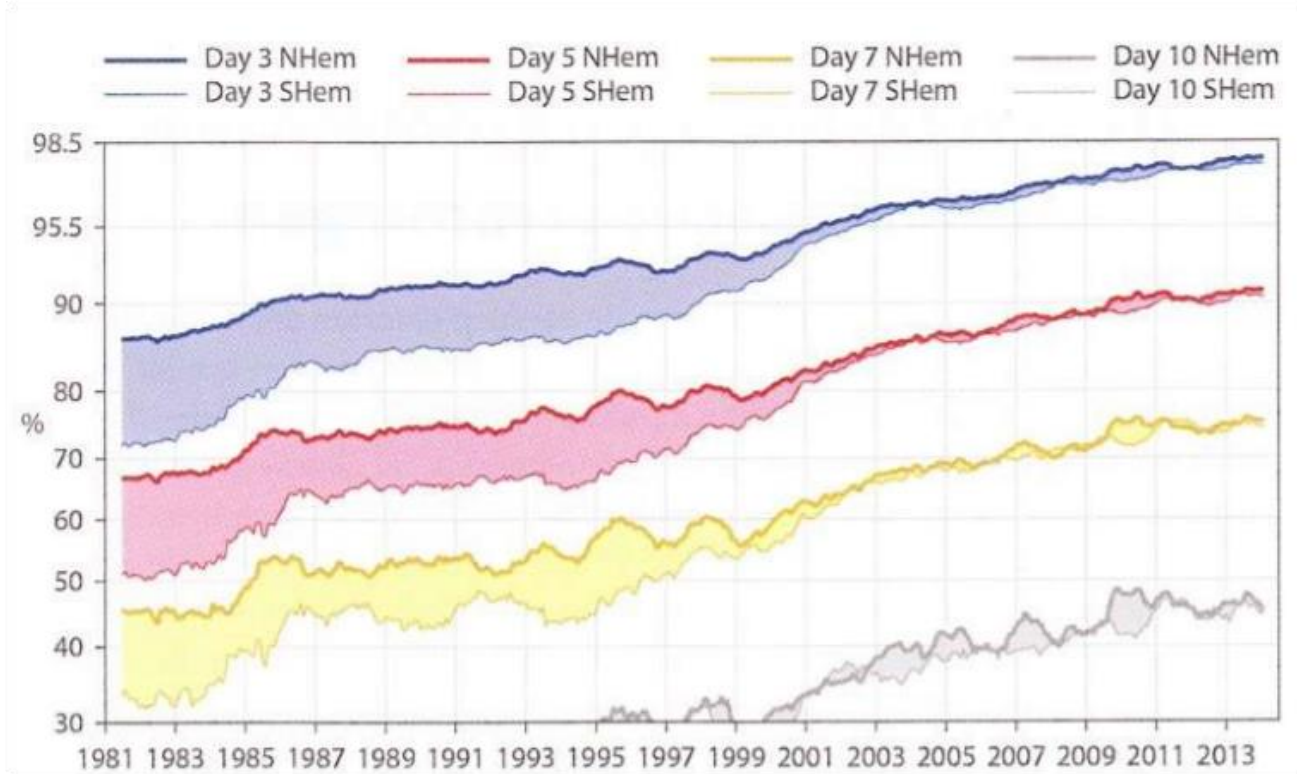
results

- › Cost reduction between 15 – 25 %
- › Predictive power for day ahead of 94.8 %





Uncertainty is dominated by the rain forecast

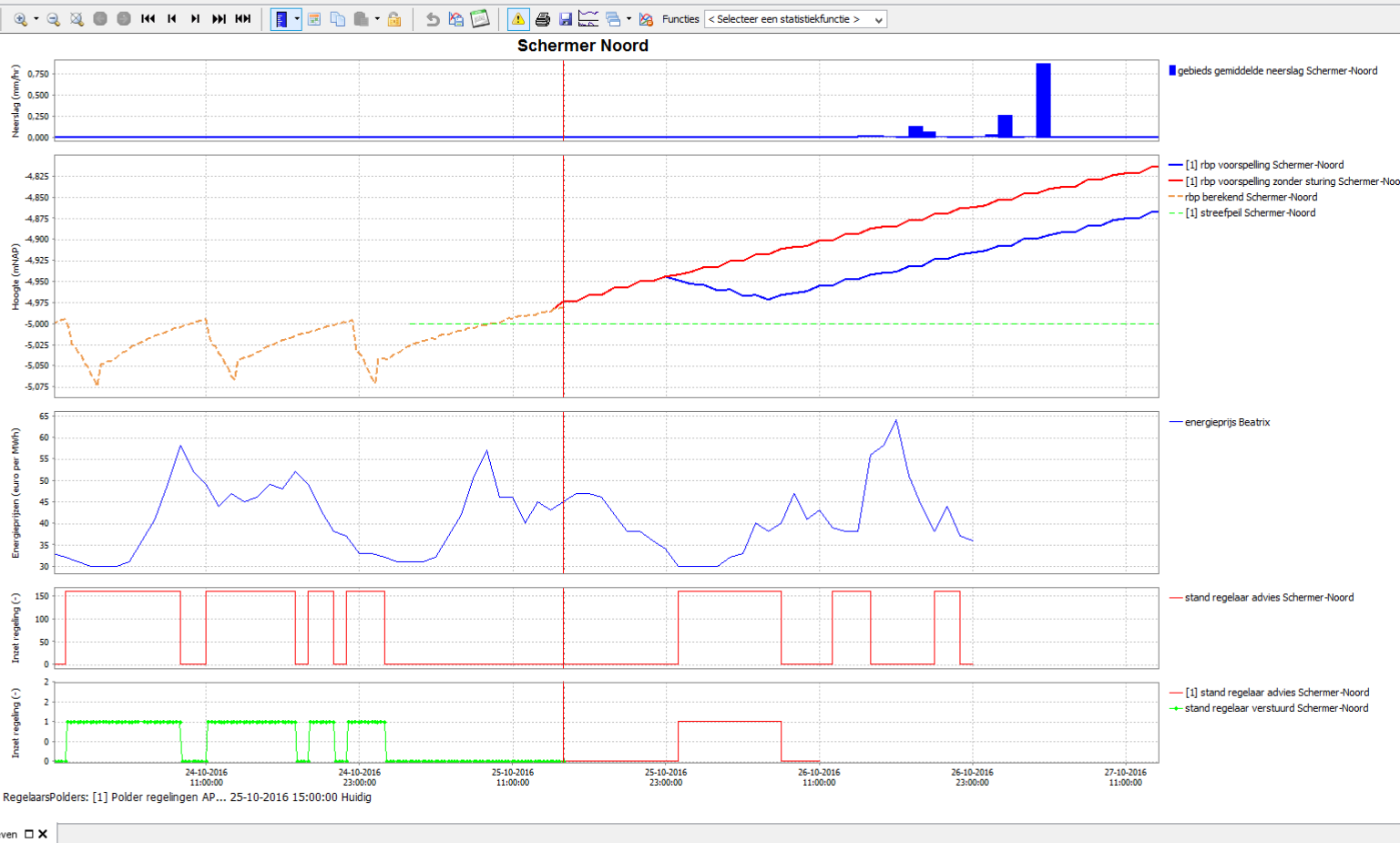


- Waterlandse boezem
- VRNK boezem
- Schermer boezem
- Schermer Noord
- Amstelmeer boezem
- Vier Noorder Koggen
- Purmer Noord
- Purmer Zuid
- Beetskloog
- Heerhugowaard
- Beemster
- Wijdewormer
- Schermer Zuid
- AssendelftNoord

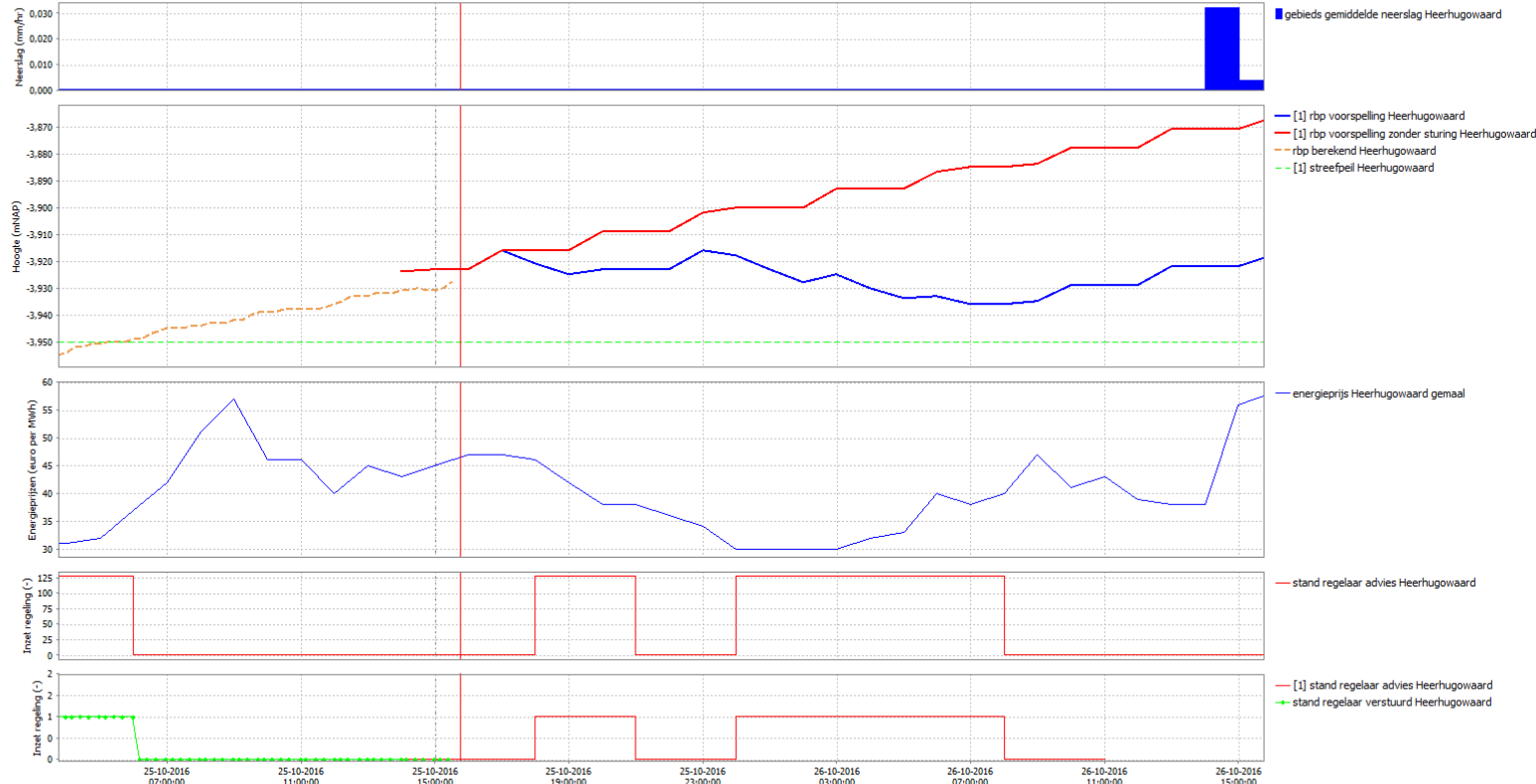
- Adammergouw
- Belmermeer
- Bloemendalergouw
- Broekerveer
- Kadoelen
- Overleek
- Poel (de)
- Poppendamgouw
- Purmerland oost
- Rijper dwarsweg
- Schellingwoudebreek
- Waterlandseboezem
- Woudweeren
- Zunderdorp

- belasting op boezem bereker
- debiet advies
- debiet meting
- debiet sturing
- gebieds gemiddelde neerslag
- hartbeat CN-TMX
- hartbeat CN-TMX
- neerslag (1u cumulatieve rad
- neerslag voorspeld (HARMON)

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- VRNK boezem
- Amstelmeer boezem
- Schermer boezem
- Vier Noorder Kogge
- Purmer Noord
- Purmer Zuid
- Energieregelingen
- Energie Markt
- AssendelftNoord
- Beemster
- Beetskloog
- Heerhugowaard
- Beemster
- Wijdewormer
- Schermer Zuid
- VRNK
- Waterlandse b
- Wijdewormer
- Regelingen Dashboard
- Waterlandse boezem
- VRNK
- Schermerboezem
- Amstelmeerboezem
- Vier Noorderkoggen
- Vier Noorderkoggen



Heerhugowaard



RegelaarsPolders: [1] Polder regelingen AP... 25-10-2016 15:00:00 Huidig

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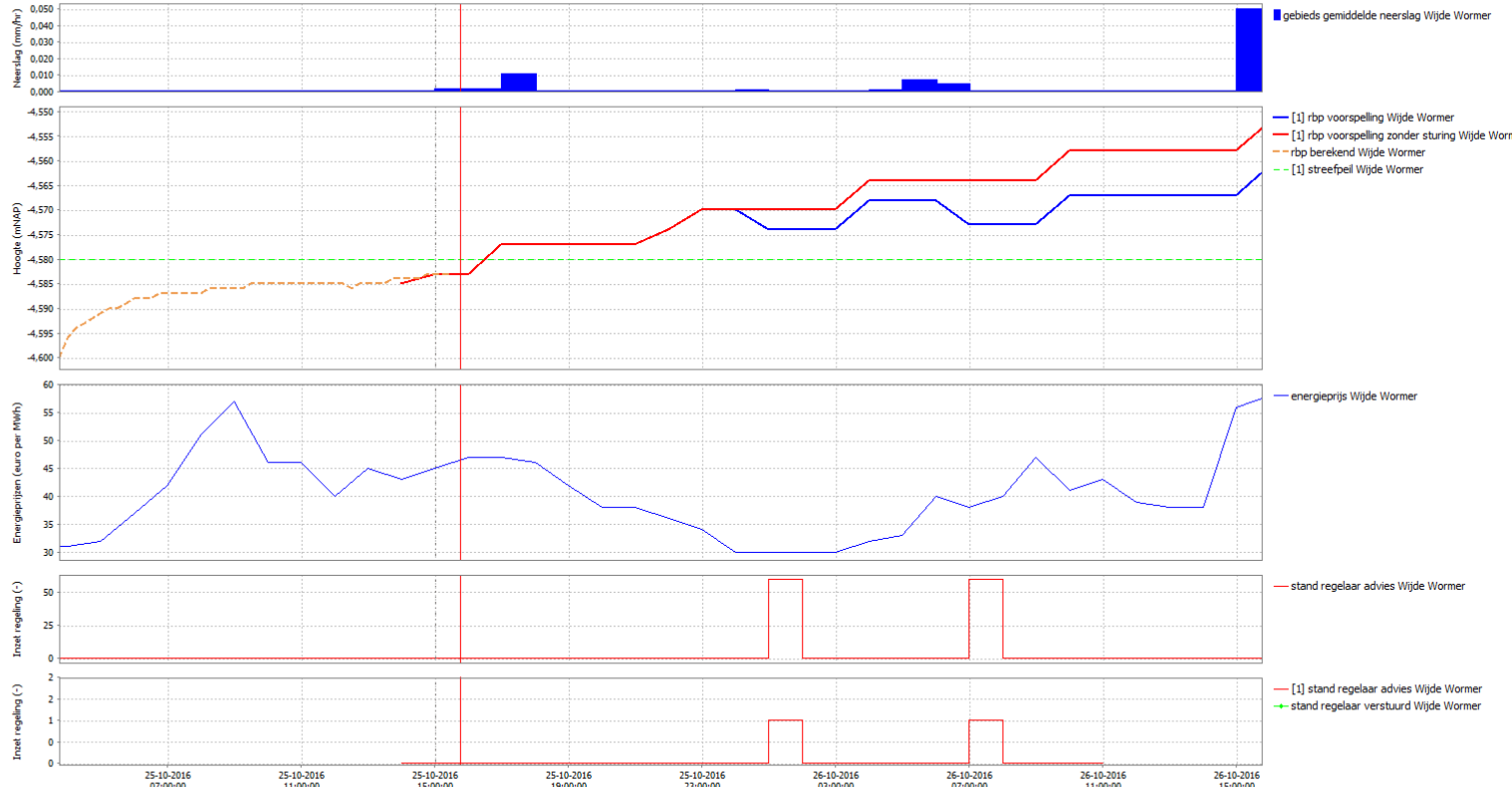
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Wijdewormer





Questions?





Colofon

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