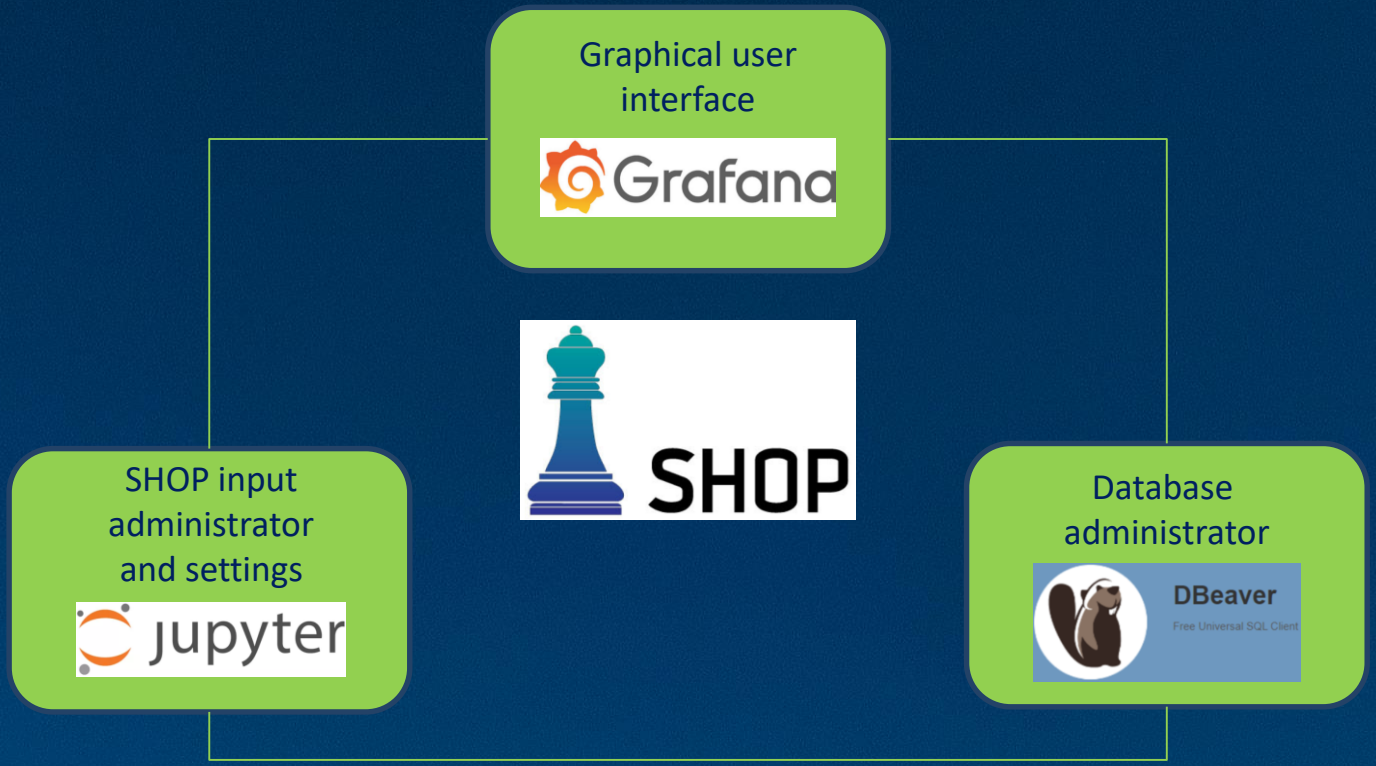
Model calibration with new interface

14.03.2019 | **Tarjei Lid Riise**

User Meeting Hydro Scheduling 2019

SHOP has made new friends



BKKBergsdalen

Sesjon 1 | 260 (B) Bergsdalen 2019-03-05 09:28:36+01 | Sesjon 2 | 259 (K) Bergsdalen 2019-03-05 09:25:15+01

KJØR SHOP

Prognose | Benchmark | Kalibrering

Objekt- og målverdier

Sesjon 1

Market sale buy	Start up Costs	Sum Penalties	Load value	Minor Penalties	Major Penalties	Bypass cost	Total	Solver Status	Rsv end value	Rsv end value relative	Oppnådd pris	Snittpris	Oppnådd pris-Snittpris
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Optimal solution is available	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Sesjon 2

Market sale buy	Start up Costs	Sum Penalties	Load value	Minor Penalties	Major Penalties	Bypass cost	Total	Solver Status	Rsv end value	Rsv end value relative	Oppnådd pris	Snittpris	Oppnådd pris-Snittpris
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Optimal solution is available	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Dashboard

Sesjon 1: Benchmark (Fri optimering med realisert spotpris og observert tilsig)

Sesjon 2: Kalibrering (Fastlåste historiske produksjonsplaner, realisert spotpris, observert tilsig)

Spotpris NO5

Sesjon 1: Vannverdier Bergsdalen

Hamlagrøvatn	Bergevatn	Storefossen	Torfinnsvatn
[redacted]	[redacted]	[redacted]	[redacted]

Sesjon 2: Vannverdier Bergsdalen

Hamlagrøvatn	Bergevatn	Storefossen	Torfinnsvatn
[redacted]	[redacted]	[redacted]	[redacted]

Produksjon Hodnaberg G1

Tilsig Bergsdalen

Magasinnivå Torfinnsvatn

Produksjon Hodnaberg G2

Shop Bergsdalen

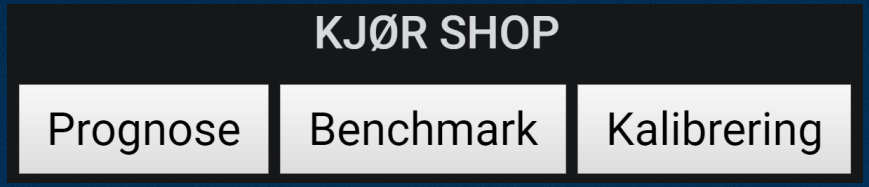
Magasinnivå Hamlagrøvatn

Produksjon Kaldestad G1

Magasinnivå Bergevatn

Produksjon Fosse G1

Three different «Run SHOP» buttons in Grafana



Prognosis

Use the water values and forecasts to see how SHOP manage the water in the future

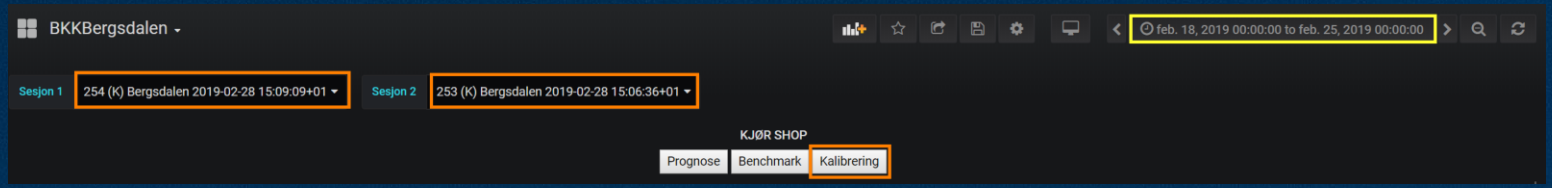
Benchmark

See how SHOP manage the water in a previous time period with observed historical inflow and historical spot prices

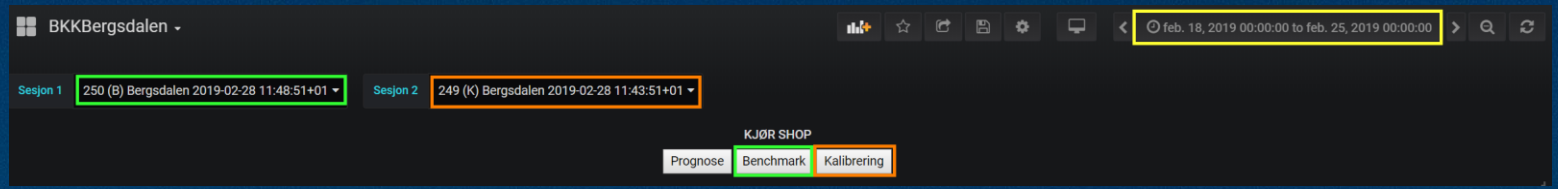
Calibration

Run SHOP for a previous time period with historical production plans and observed historical inflow

Run SHOP for a previous time period

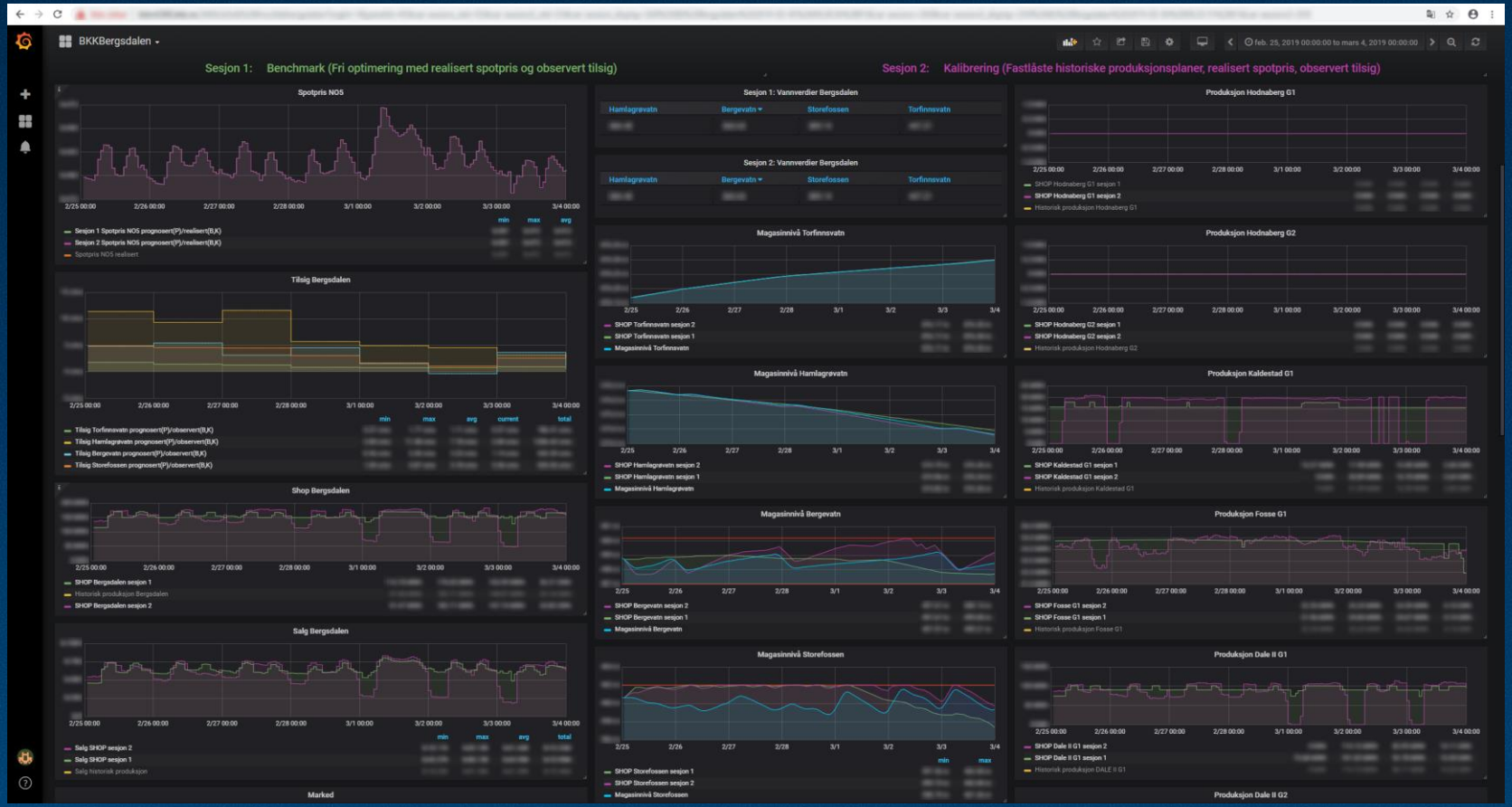


- Calibrate the SHOP model by comparing the SHOP Calibration results (e.g. discharge, head, pressure) with real life measurements and water management calculations
- See the effects of input changes by comparing two SHOP Calibration sessions

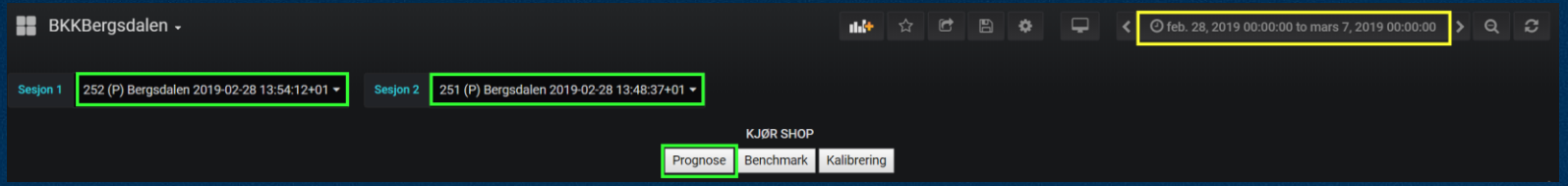


- Compare production, income and optimization objective numbers from SHOP Benchmark and SHOP Calibration

SHOP Benchmark and SHOP Calibration



Run SHOP forward in time

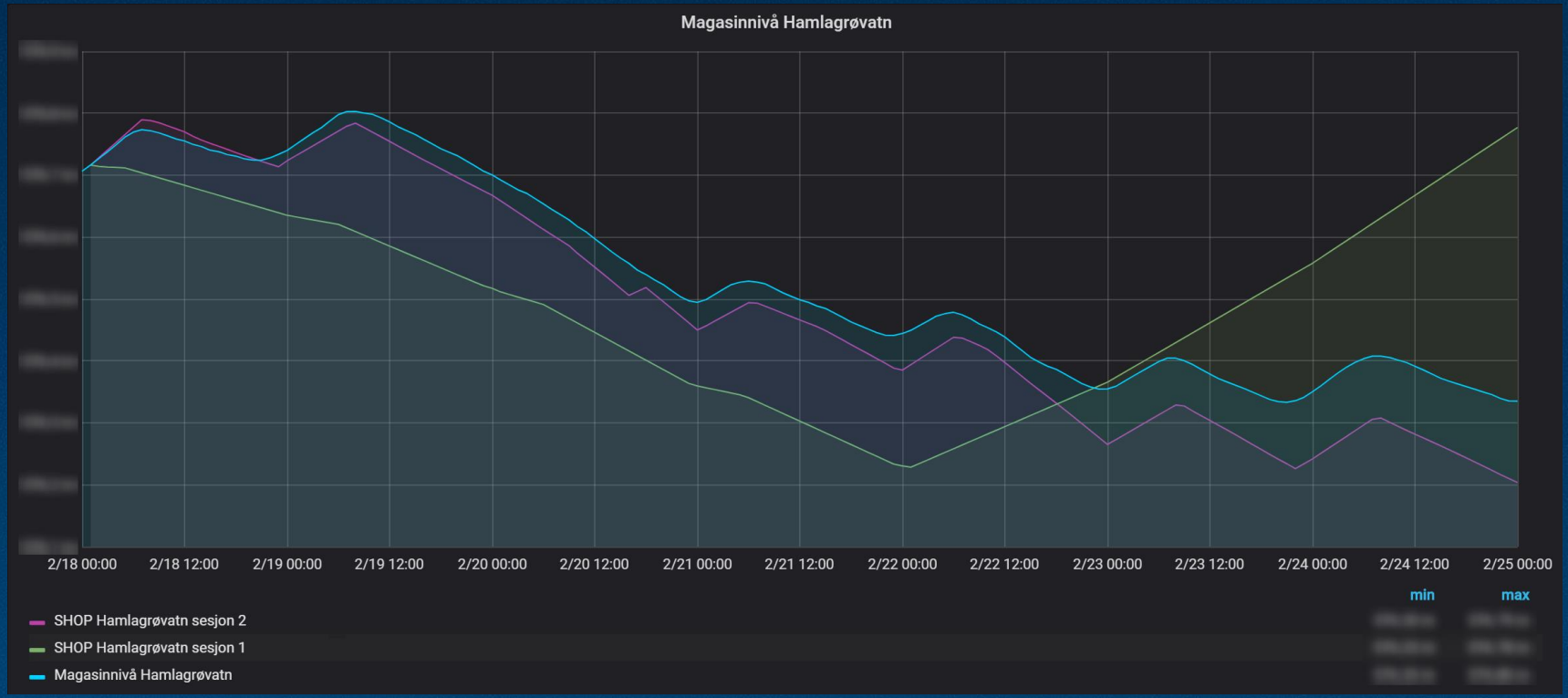


- Use the water values and forecasts to see how SHOP manage the water in the future
- Perform consequence analyzes to see the effects of
  - changed inflow
  - higher/lower prices
  - desirable reservoir head at a given time
  - desirable production pattern
  - availability changes

SHOP Prognosis

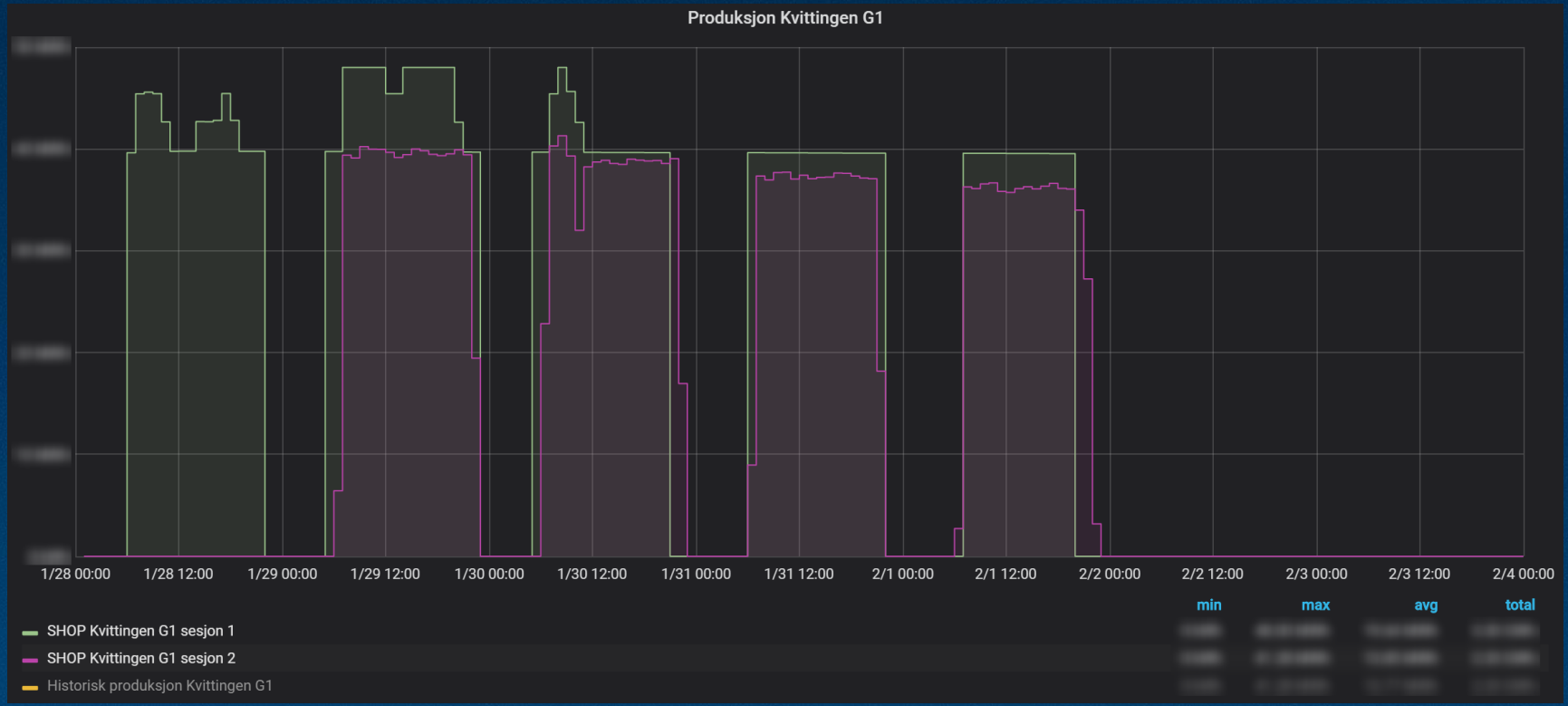
Example 1

Comparison of reservoir head from SHOP Benchmark,
SHOP Calibration and water management calculations



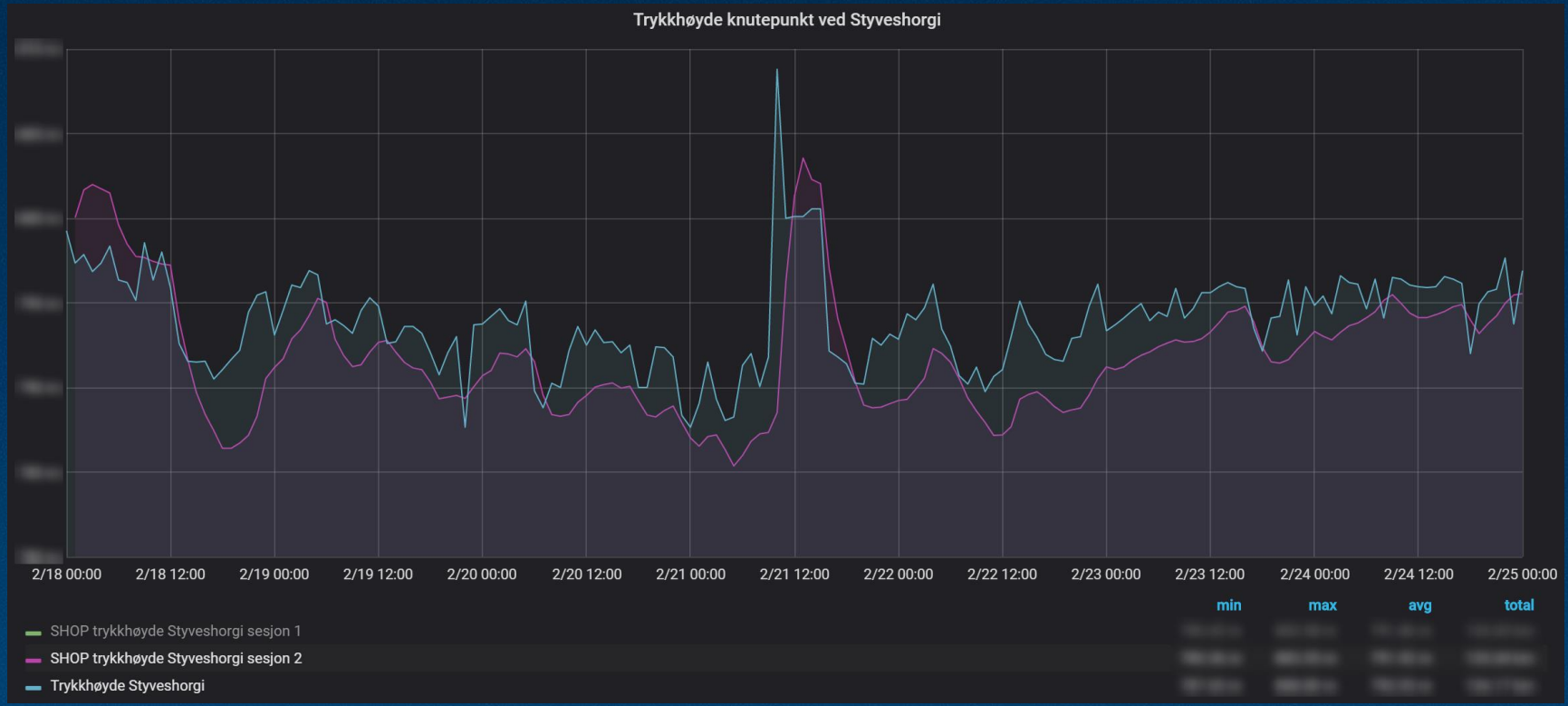
Example 2

Comparison of production from SHOP Benchmark and SHOP Calibration



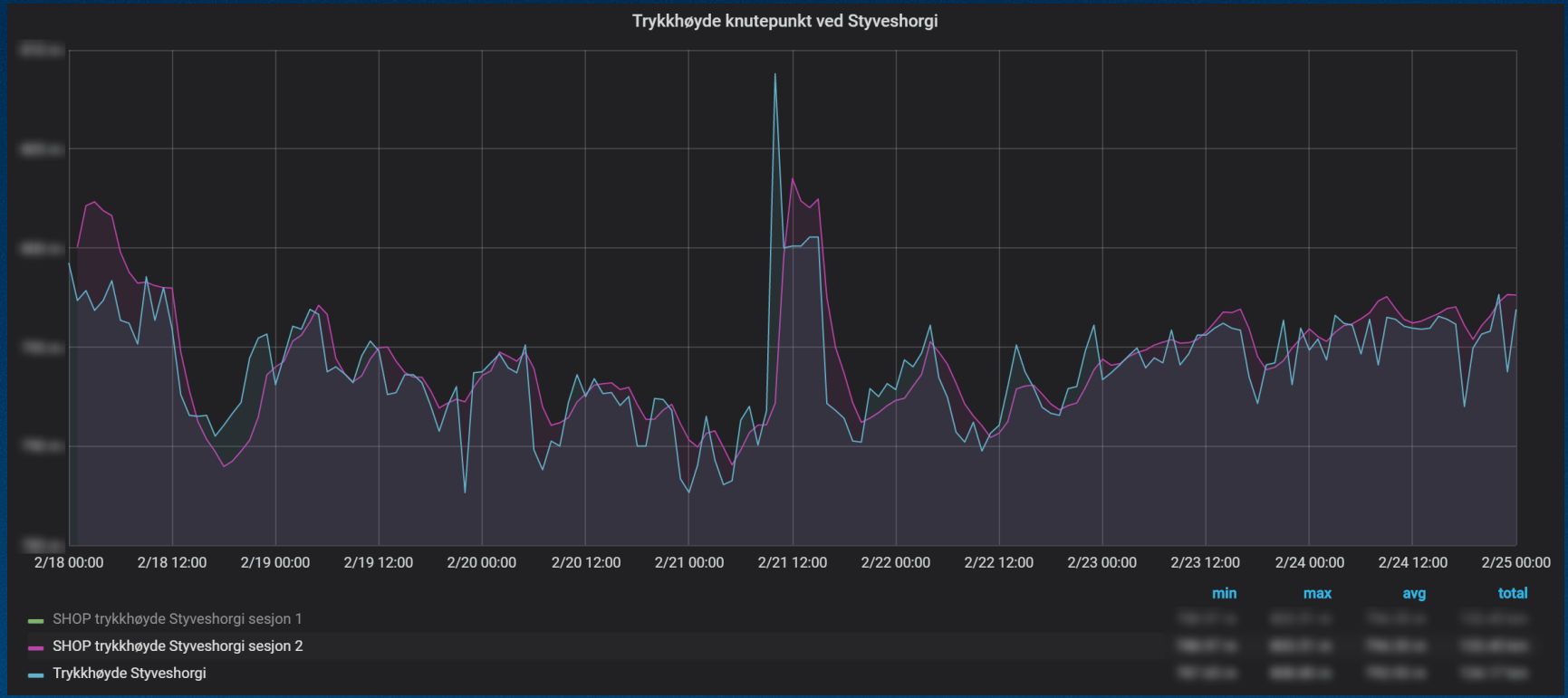
Example 3 (1)

Comparison of Junction Pressure Height from SHOP Calibration and real life pressure measurement from SCADA

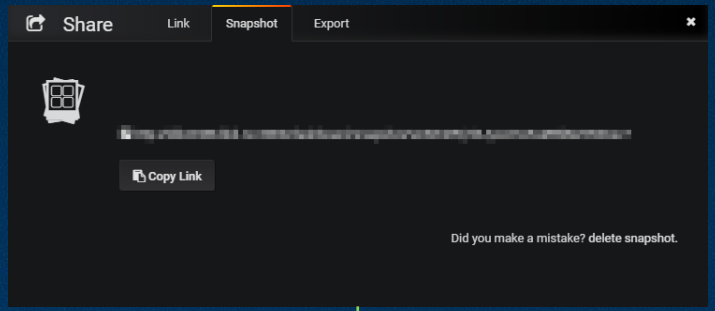


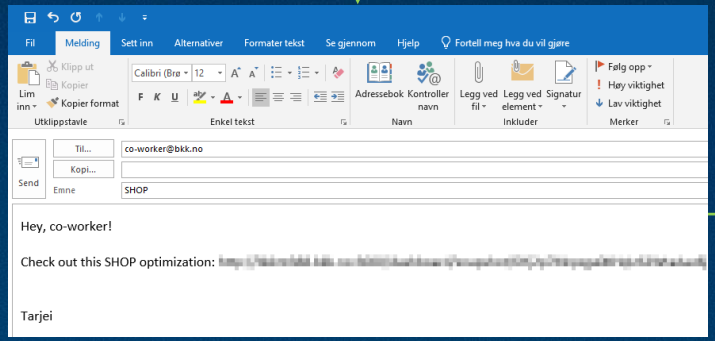
Example 3 (2)

Comparison of Junction Pressure Height from SHOP Calibration and real life pressure measurement from SCADA

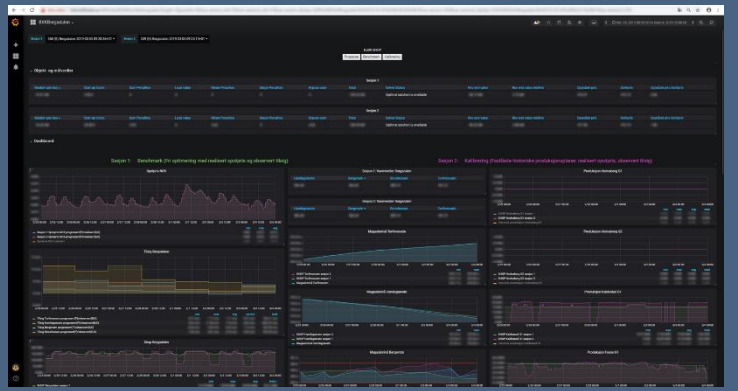


Share and discuss SHOP results with Grafana snapshot URLs





Co-worker's PC



My co-worker doesn't need a Grafana user to see the results!

API = Digitalization?

- The SHOP API offers good cooperation conditions between business and IT internally in BKK
- More and more companies are starting to offer APIs which can interact with each other

  e.g. shop.objects.reservoir.rsv1.attributes.inflow = Tss(Tims key)
- APIs provide opportunities for automation and flexible self-made interfaces (which hopefully suits future needs)
- Working with APIs brings new experiences and ideas which generates new digitalization projects

Thank you for your attention!