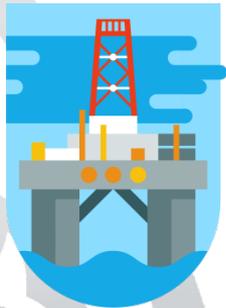




КМГ
ИНЖИНИРИНГ

Application of Integrated Reservoir to Surface Network Coupling of Uaz Oil Field, Kazakhstan

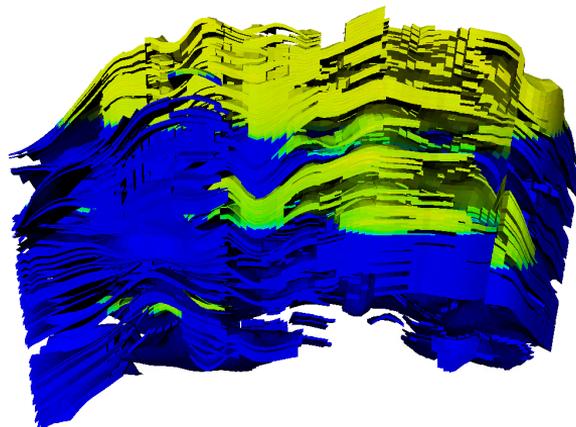
Akzhan Kassenov– Reservoir Simulation Section Head
Denis Tsoy- Senior Reservoir Engineer
Nurzhan Kushekbayev- Production Engineer
Bagdad Amangaliyev- Senior Reservoir Engineer (SIS)



- Assess the impact of multiple reservoir and reservoir to surface coupling on prediction results of Uaz Central & East fields
- Evaluate the interaction between reservoir wells and surface network
- Set the vision of approaches and the way of their application for further work

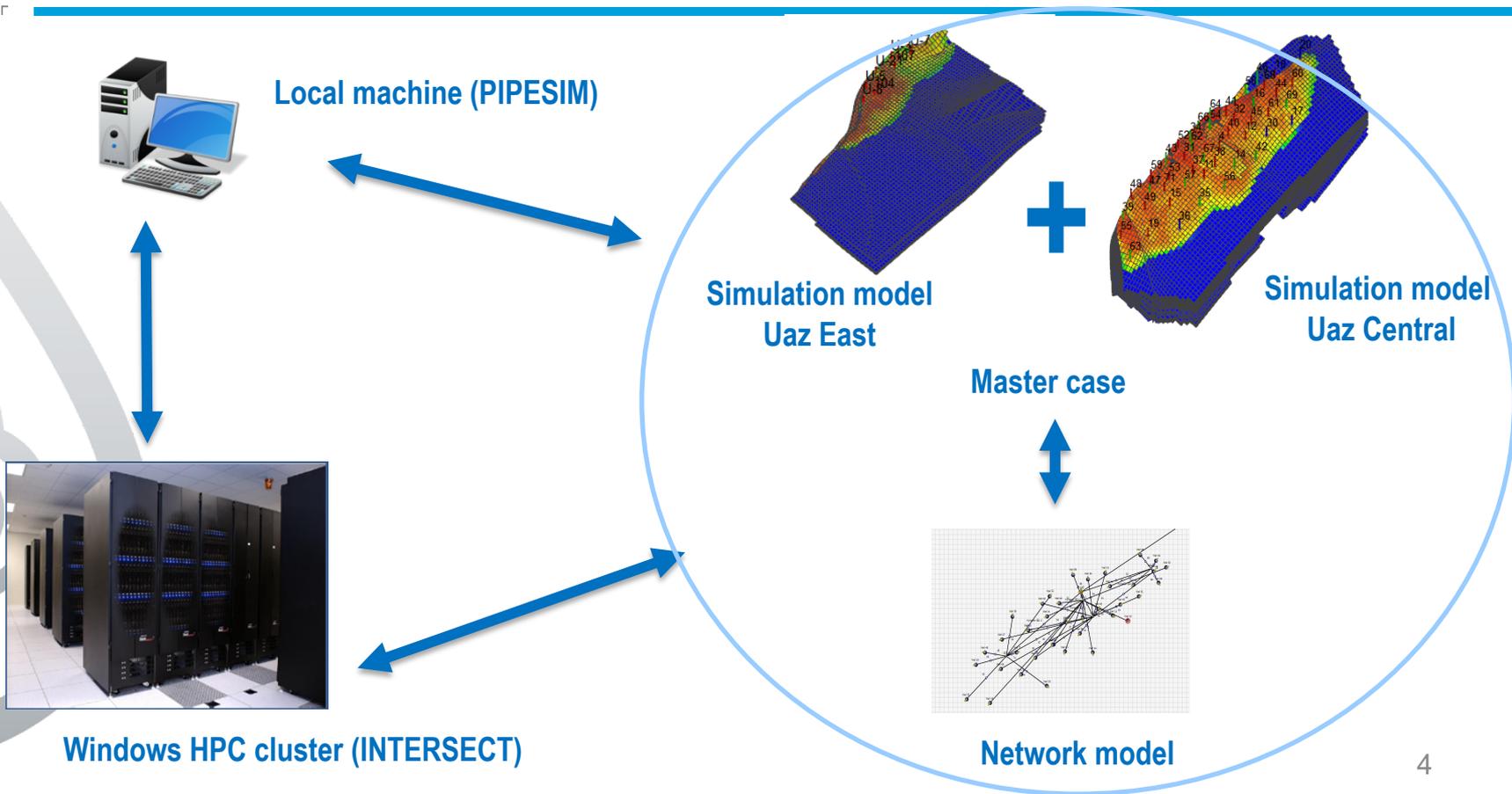
Reservoir Simulation model

- ~ 370k active cells (Uaz Central)
- ~ 188k active cells (Uaz East)
- Blackoil fluid model
- Fetkovich aquifer
- 54 wells (47- Uaz Central, 7- Uaz East)

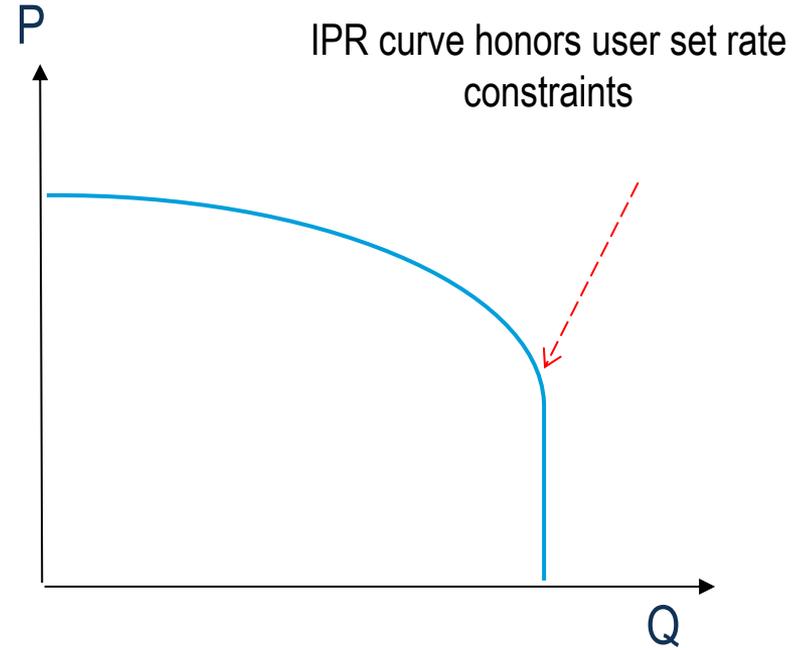


Surface Production Network model

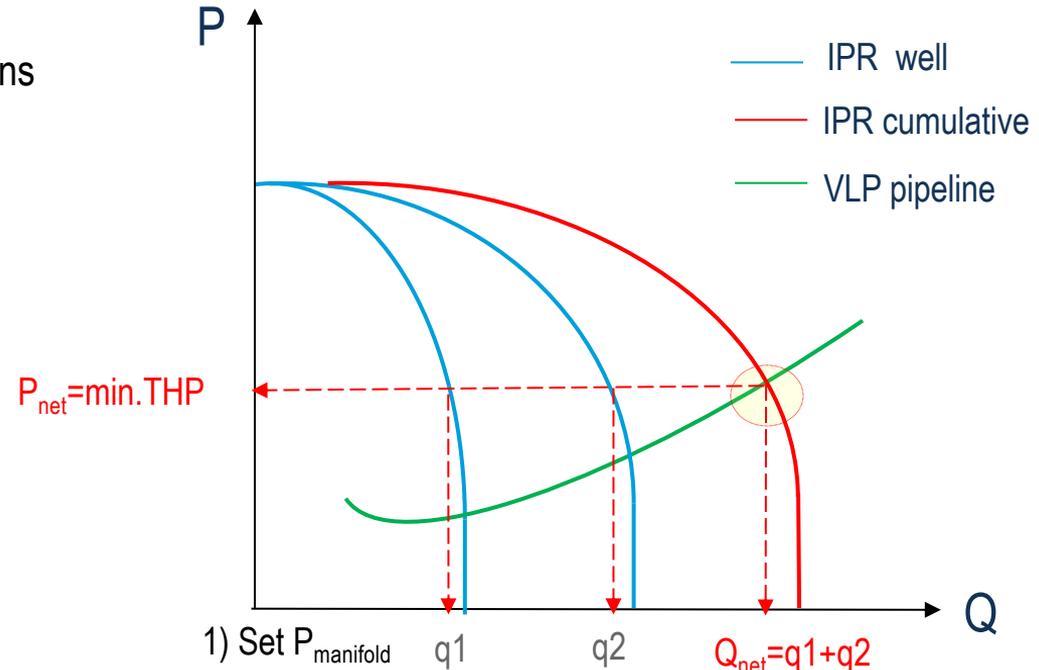
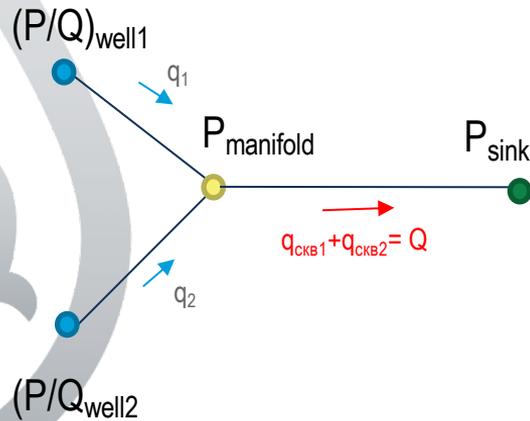
- 47 wells
- 9 manifolds
- 56 branches
- 1 terminal node



1. IX builds IPR curve
(the relationship between THP and rate)



2. PIPESIM solves the network and returns operating point 1



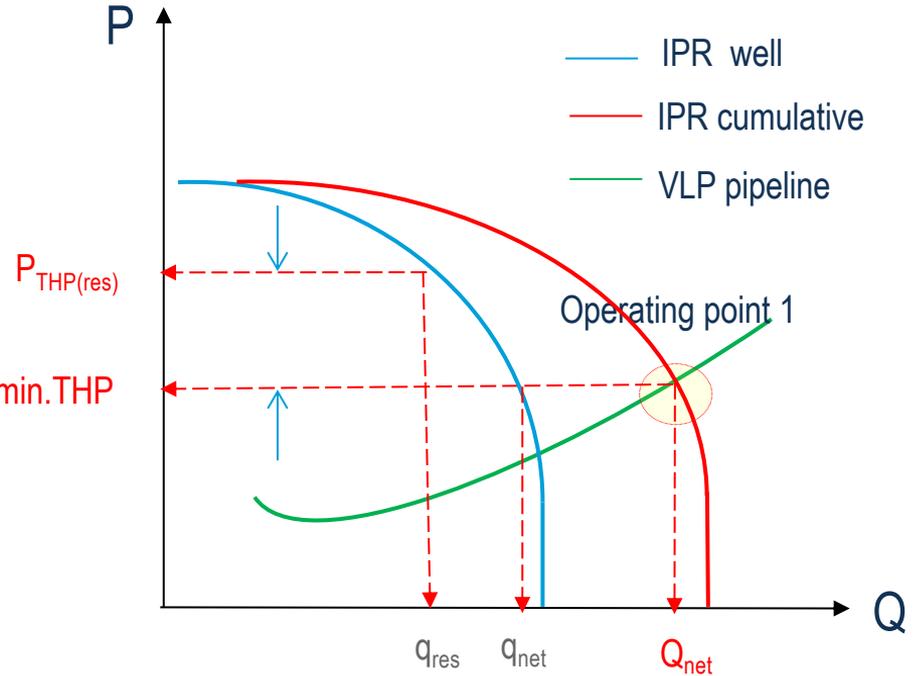
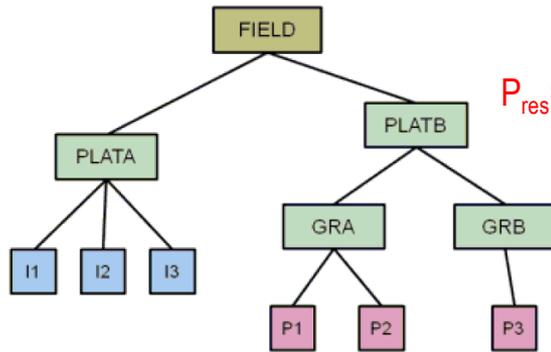
- 1) Set $P_{manifold}$
- 2) Having defined $Q_{well1} + Q_{well2} = Q_{manifold}$ and P_{sink}

PIPESIM solves $P^*_{manifold}$

- 3) Check for convergence $P^*_{manifold} = P_{manifold}$

Combining network balancing with group constraints

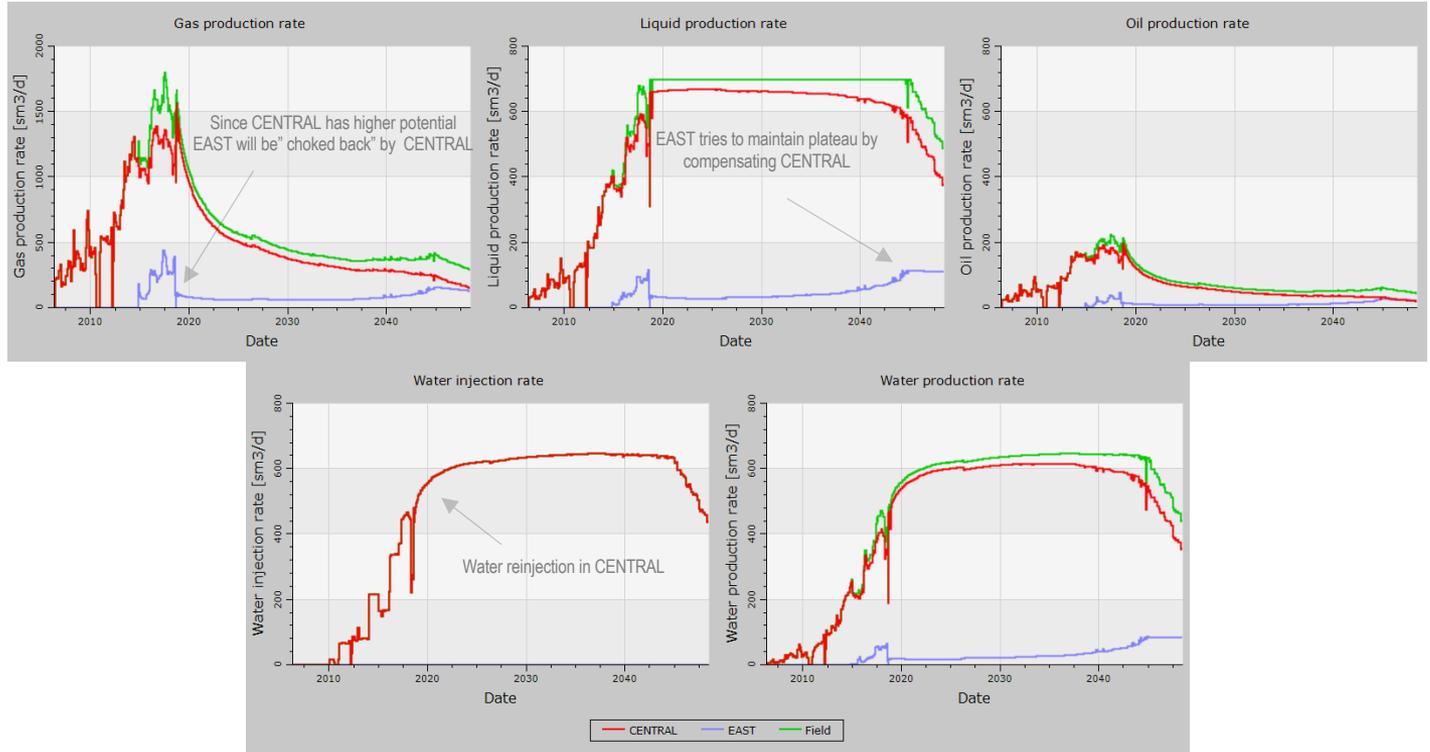
3. Guide Rate Balancing in IX allocates well rates by honoring network constraints

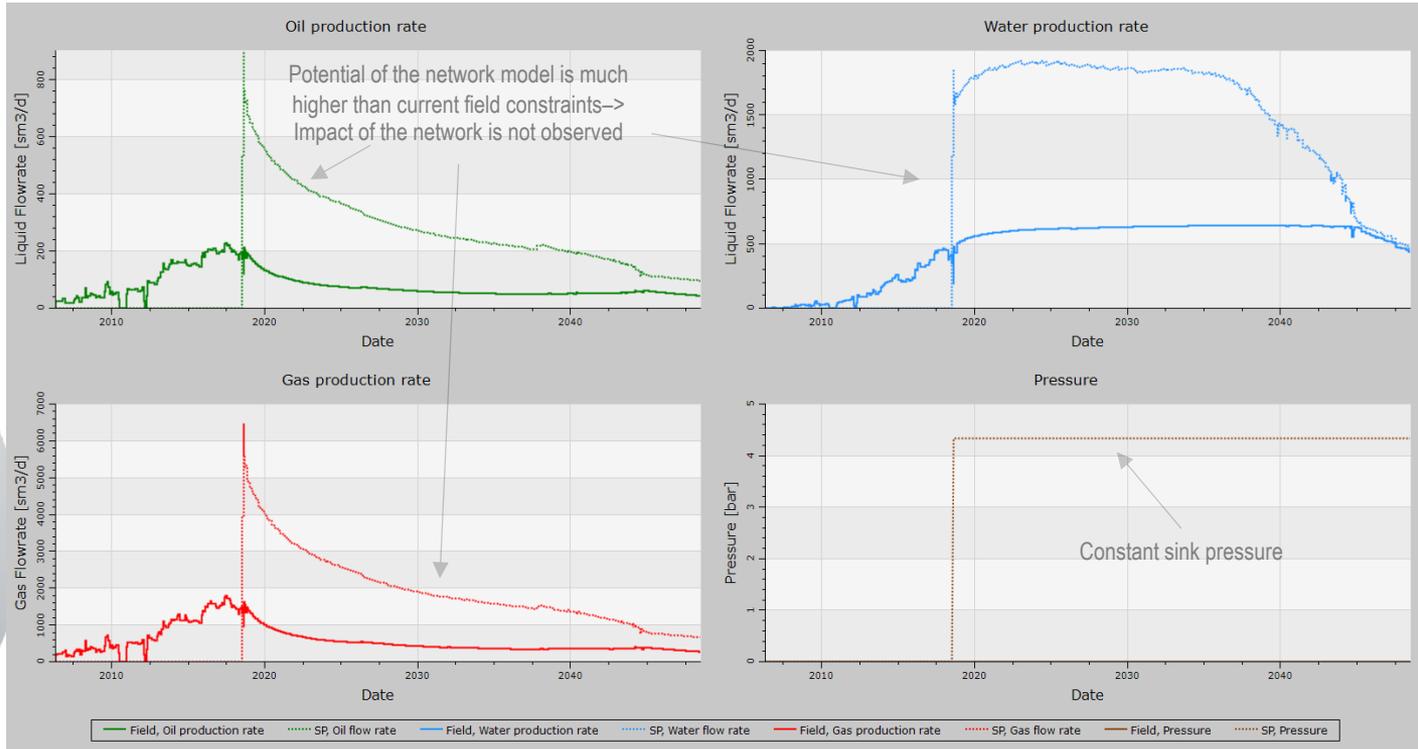


$$P_{reservoir} - P_{network} = \text{virtual choke}$$

Impact of the Multiple Reservoir Coupling

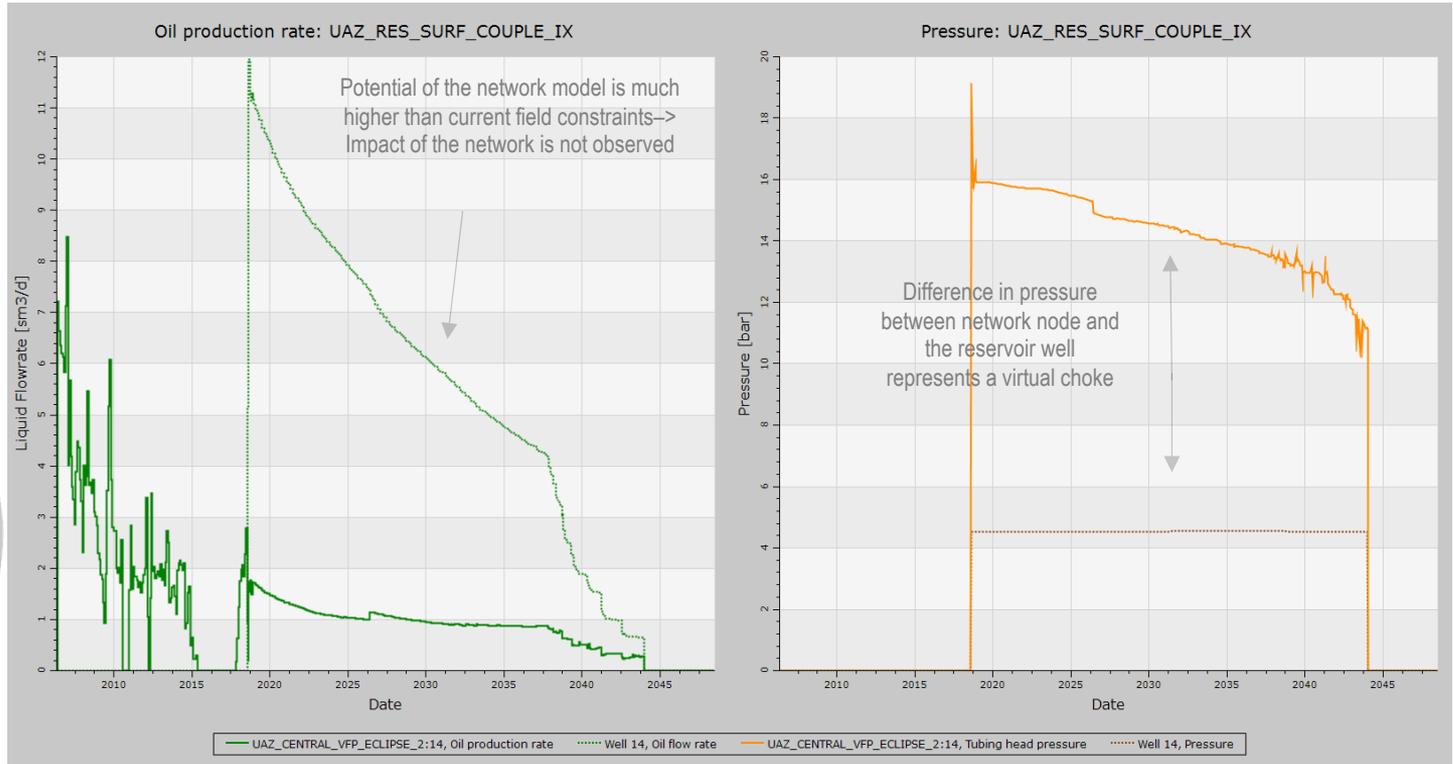
Production profiles between Uaz Central and East





Dotted line – Network results

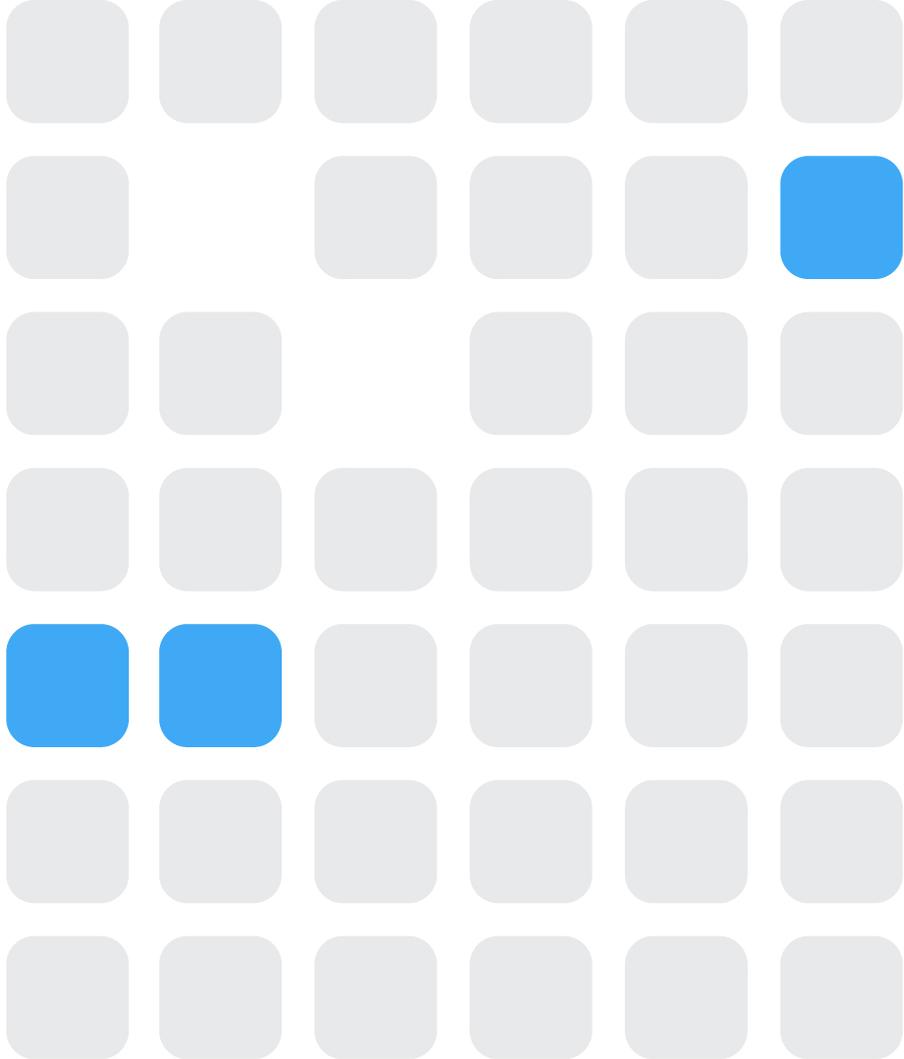
Solid line – Reservoir Simulation results



Dotted line – Network results

Solid line – Reservoir Simulation results

- Multiple reservoir coupling shows that:
 - At the beginning of the field development, Uaz Central being a high potential group (field) dominates the production and “chokes back” the Uaz East
 - By the end of prediction, Uaz East starts to compensate production to maintain plateau
- Reservoir to surface coupling shows that:
 - Potential of the surface network model is much higher than the current field constraints imposed into the simulation model
 - Back pressure from the surface network therefore is not observed



Thanks for your attention!

