



**КМГ**  
ИНЖИНИРИНГ

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

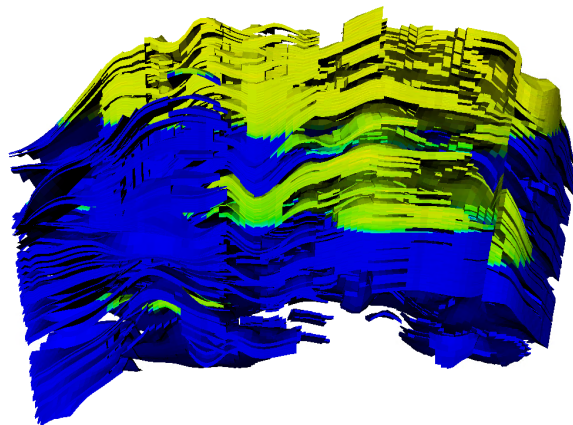
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- ☐ Assess the impact of multiple reservoir and reservoir to surface coupling on prediction results of Uaz Central & East fields
- ☐ Evaluate the interaction between reservoir wells and surface network
- ☐ Set the vision of approaches and the way of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

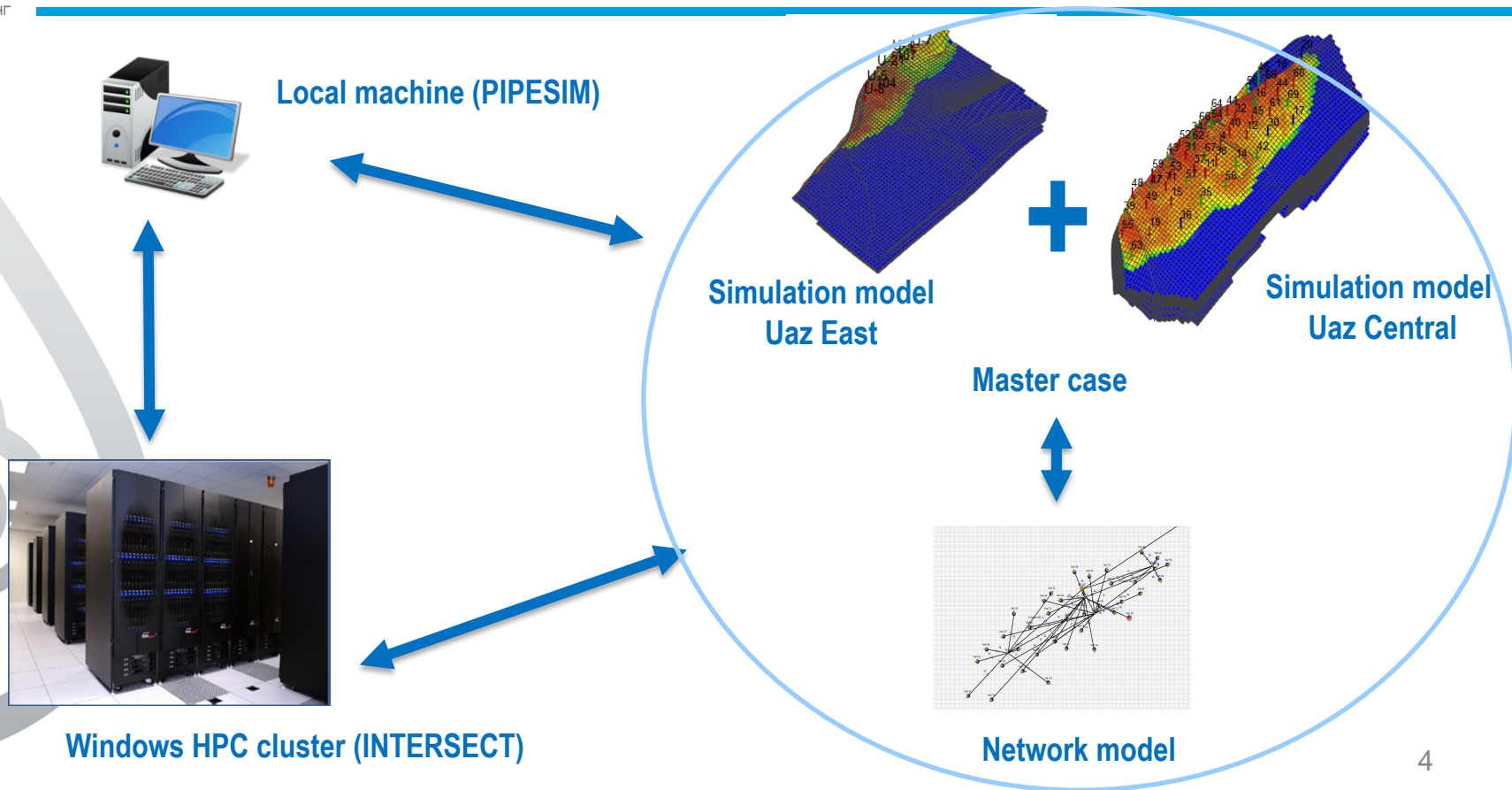
## Reservoir Simulation model

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



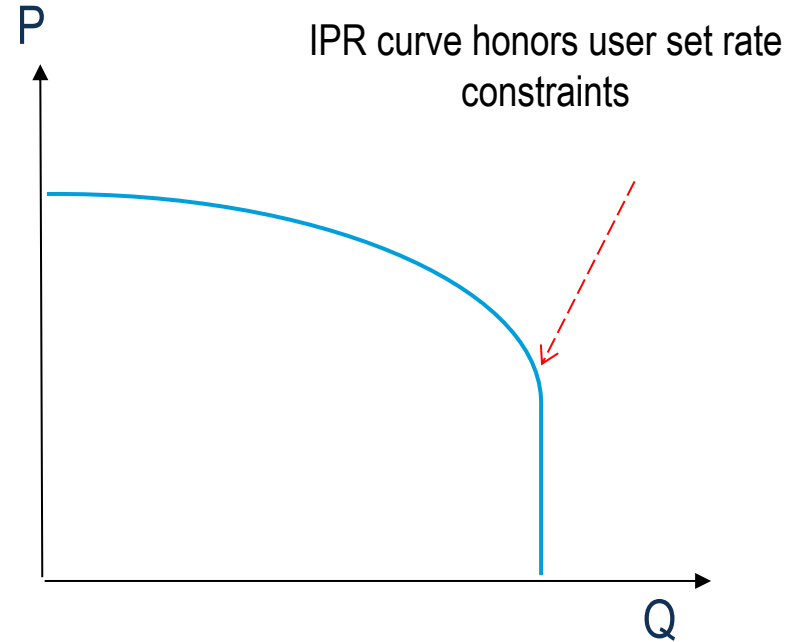
## Surface Production Network model

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



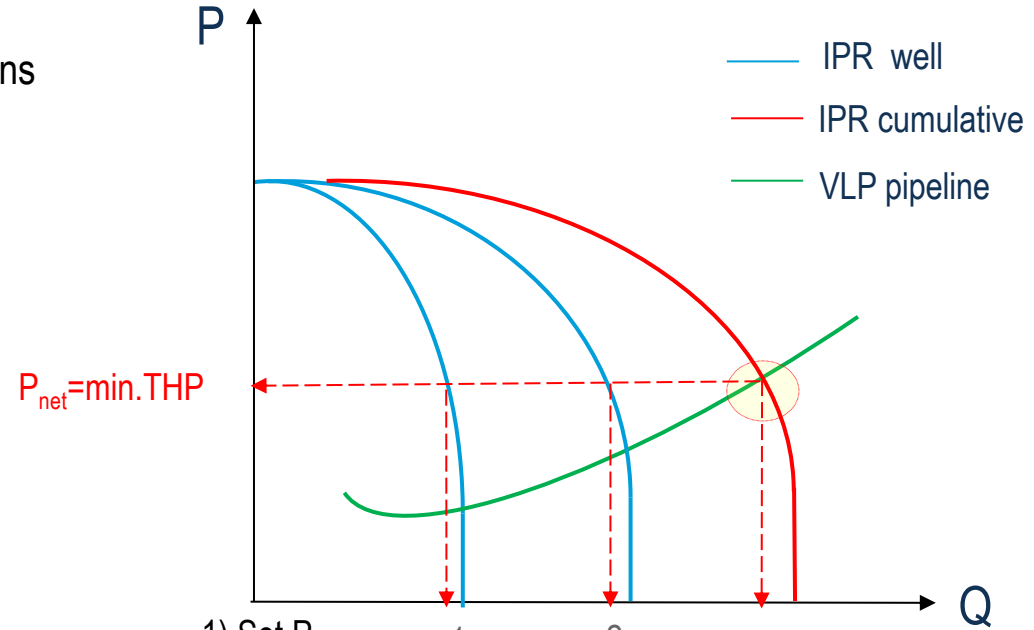
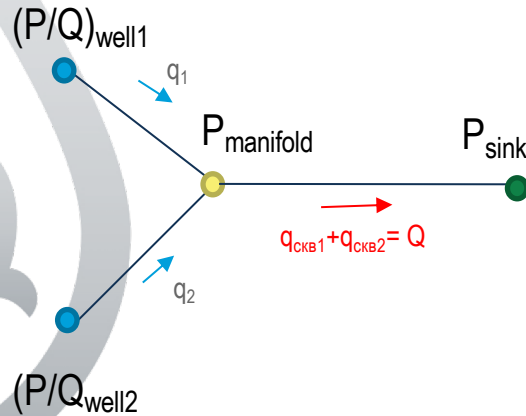
## Combining network balancing with group constraints

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



# Combining network balancing with group constraints

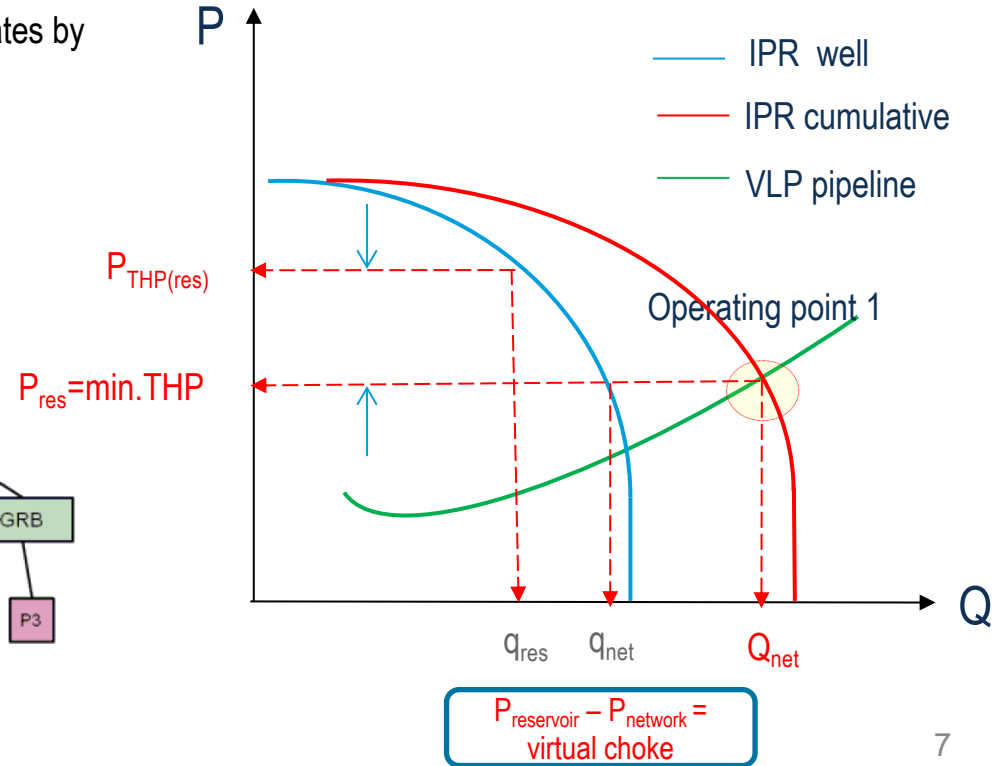
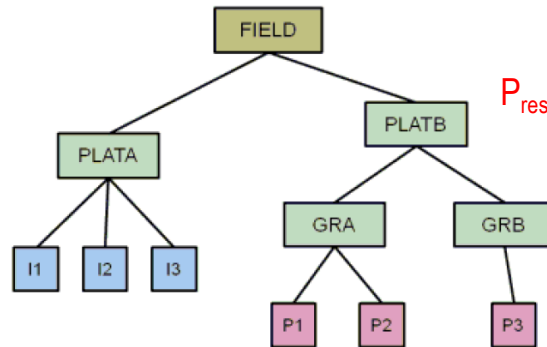
2. PIPESIM solves the network and returns operating point 1



- 1) Set  $P_{\text{manifold}}$
- 2) Having defined  $Q_{\text{well1}} + Q_{\text{well2}} = Q_{\text{manifold}}$  and  $P_{\text{sink}}$   
PIPESIM solves  $P_{\text{manifold}}^*$
- 3) Check for convergence  $P_{\text{manifold}}^* = P_{\text{manifold}}$

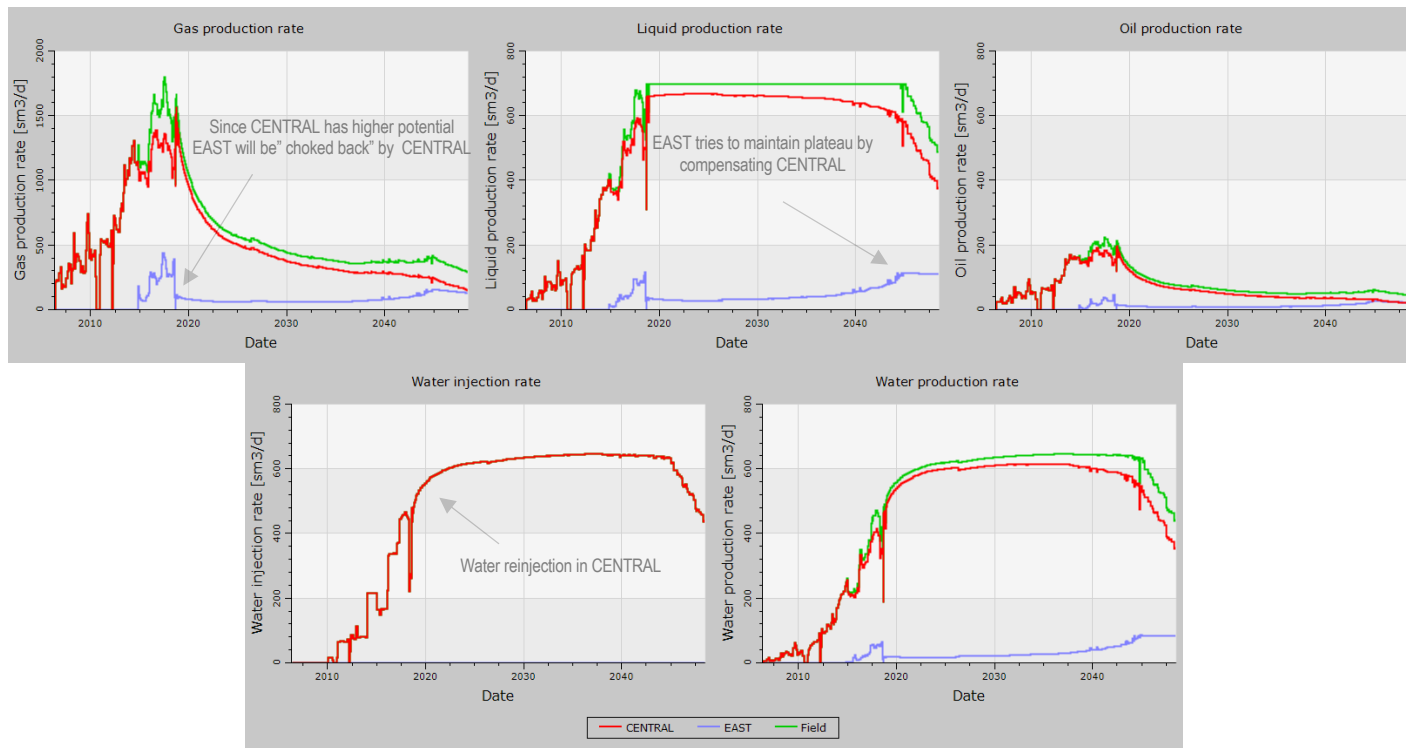
# Combining network balancing with group constraints

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



# Impact of the Multiple Reservoir Coupling

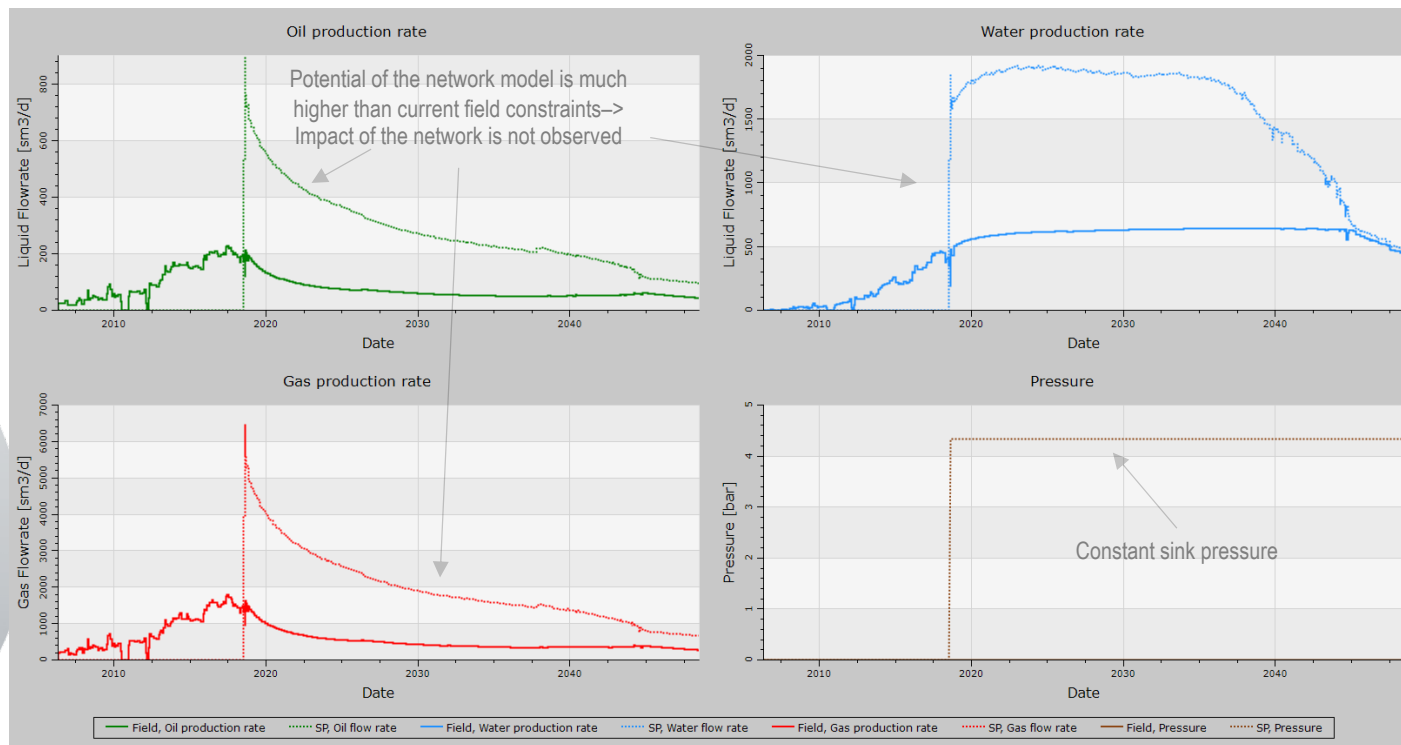
## Production profiles between Uaz Central and East





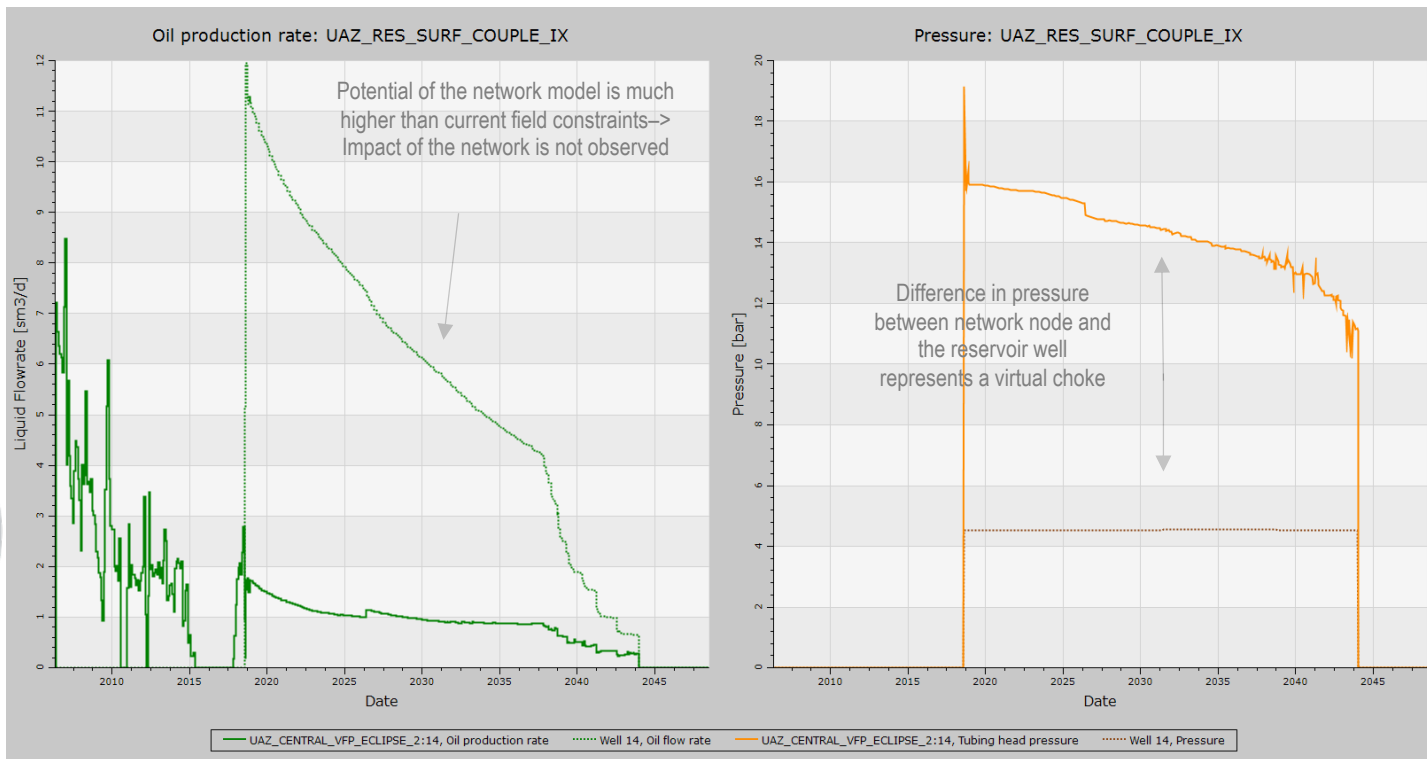
# Impact of the Multiple Reservoir to Surface Coupling

## Production profiles between Reservoir and Surface Network – Field level



Dotted line – Network results

Solid line – Reservoir Simulation results

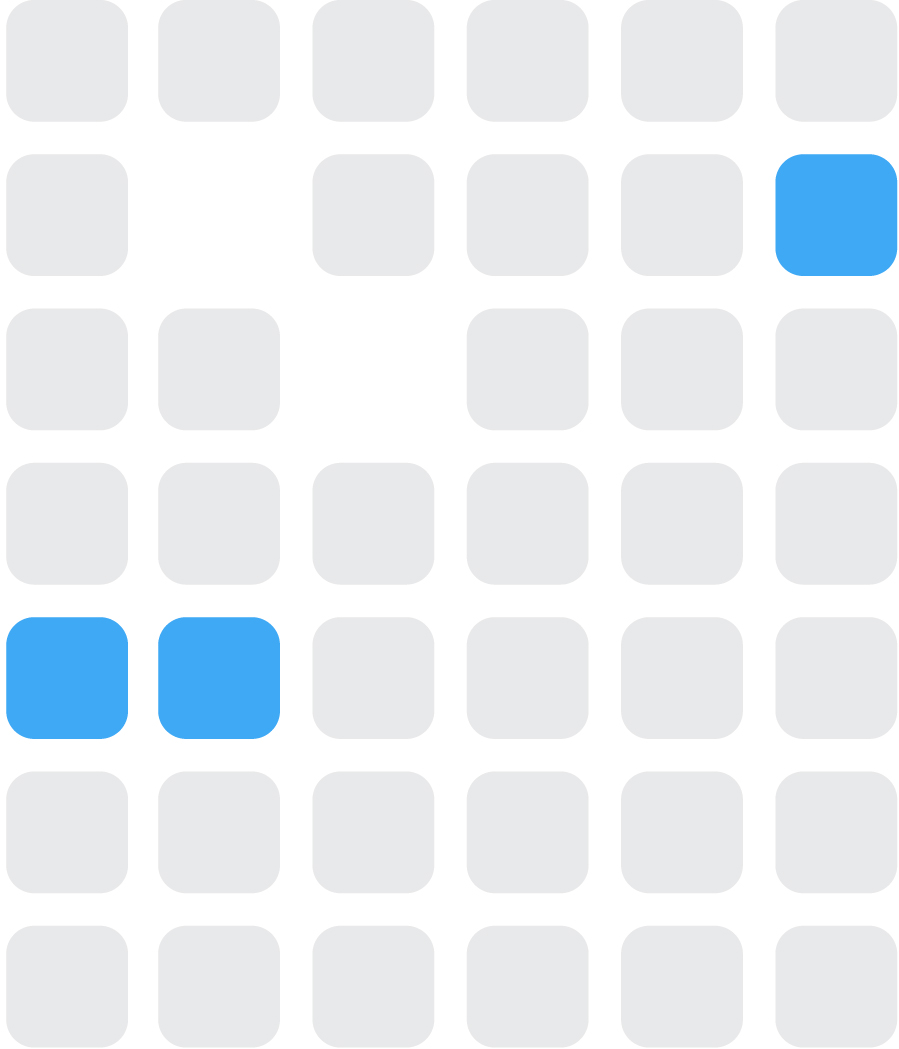


Dotted line – Network results

Solid line – Reservoir Simulation results

# Conclusions

- 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!

