

SPE 140625 Using Integrated Production Modeling (IPM) as an Optimization Tool for Field Development Planning and Management

E. A. Agoh, SPE, A. Adegoke, O. J. Uzoh, SPE, Shell Nigeria E & P

A subsea tie-back development was carried out for the Bonga North Deepwater field and the best timing for bringing this development on stream as well as its impact on the host field production and recovery were to be analysed.

The Bonga asset contains two subsea tie-backs as well as an injection system which presents the following challenges:

- Managing the pressure loss in the production system
- Managing flow assurance issues
- Handling combined flowstreams of dissimilar fluids
- Production optimisation of the overall system against the common system constraints

The modelling approach to addressing the challenges faced by this system involved linking MoReS and GAP on the RESOLVE platform for the following modelling capabilities:

- Explicit modelling of the water injection network
- Seamless integration of well models into the network model
- Fluid blending functionality in GAP
- Smart well modelling functionality
- Ease with which a GAP model is built
- Easy access to support from PETX when needed

Having built the production network to include smart wells and the injection system in GAP, a validation of the system was carried out to verify the accuracy and functionality of the model by comparing the history matched production against the simulated data over the same period of time and a good agreement was observed. This provided confidence in the results to be obtained for future scenarios such as the development options for which production profiles and forecasts were run so that the project economics could be evaluated for NPVs and VIRs. An investigation into the possible requirement of riser base gas lift was also carried out and determined that it would be necessary if a water cut of 40% was reached.

Conclusion

- The Bonga GAP-MoReS IPM system proved to be an effective and robust tool for development planning and management of complex systems
- The model helped in the selection of the most profitable development scenario
- The overall integrated workflow across tools and software encourages cross-functional ownership
- Allows injection system to be modelled explicitly
- Smart wells could be robustly and easily modelled