A new field in offshore Abu Dhabi is currently being developed by ADMA-OPCO by combining the production from six distinct carbonate reservoirs, each of which has different characteristics. The production and injection streams from all the reservoirs will be mixed and processed using common surface facilities (Offshore Super Complex).

The development scheme was optimized based on the integration of the available geological, seismic, petrophysical, and dynamic reservoir data into six separate reservoir models. The optimized development plan was defined for each reservoir using its corresponding individual simulation model, where all reservoir models are compositional with similar pseudo-components.

Because the field will be developed as a gas self-sufficient field with no gas export line, all the produced gas from the six reservoirs has to be managed within the field. After removing the fuel gas, part of the total produced gas is used for gas lift; whereas, the remaining gas is compressed and re-injected into reservoirs D, F, and G to ensure full gas balance.

The facilities are shared by all reservoirs, so to further enhance field-development optimization modeling, especially with gas-recycling requirements, an integrated, multi-reservoir model with surface network was constructed. In this model, the six reservoirs were fully coupled with a single surface network, including wellhead towers, production/injection pipelines, and the Super Complex layout. This was accomplished by using a next-generation simulator that allows both surface and subsurface equations to be solved simultaneously.

This paper addresses the steps followed and the challenges encountered and then summarizes the main outcomes. In addition, it provides a comparison with the results obtained from the single-reservoir models when run individually.

The results obtained from the integrated model were slightly different when compared to those of the individual models because of the newly developed surface EOS model and the impact of the network on the individual reservoir’s performance. The integrated reservoir model (IRM)
proved its advantages, especially for gas recycling, by eliminating the previous iterative runs performed to achieve the field gas balance and by its ability to make the most effective usage of both water and gas plans to maximize recovery.