The objectives of the basin modeling part of the South East Abu Dhabi (SEAD) charge evaluation study were twofold:
(1) to reconstruct the charge history and explain the known hydrocarbon accumulations including distribution of various oil families
(2) to provide a framework for the charge risking in ADCO’s exploration portfolio.

The basin model was constructed in ADCO’s offices in Abu Dhabi, using the modeling software PetroMod®. Key input for the model were 29 regional depth maps and 10 associated erosion maps constructed based on the latest 2 and 3D seismic. Isopach maps of the Middle Cretaceous and Base Tertiary tectonic events were created to allow accurate modelling of the basin tilt, which drives the hydrocarbon migration. The model was calibrated with temperature data from available 46 wells and pressure data from 15 wells. The Bab and Hanifa/Jubaila Formations were identified as the main source intervals, with additional contributions from 2nd order source rocks in the Thamama dense zones. Oil and gas migration from these source rocks and the filling of accumulations in the Hanifa, Habshan, Asab, Thamama and Bab reservoirs were all modelled in an integrated way.

The model clearly demonstrates that the formation of the Oman foredeep and the tilting of the basin are the main drivers behind the oil generation and migration to SEAD. The migration of the oil generated by the Hanifa/Jubaila source interval in the North is largely lateral until the oil reached the main east-west trending fault zone in SEAD, where vertical leakage along the fault planes took place with most of the oil accumulating in the shallow Thamama reservoirs. The model accurately explains the distribution of various oil families, all discovered accumulations and their phase, as well as the temperature and maturity profile of the basin. New model allowed ADCO to update its existing charge risking matrix and strategy towards de-risking prospects in SEAD.