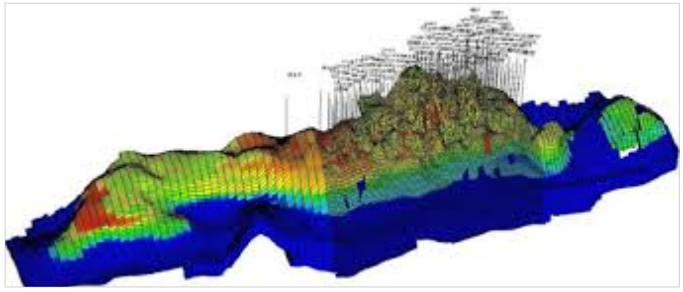
NAKASAWA

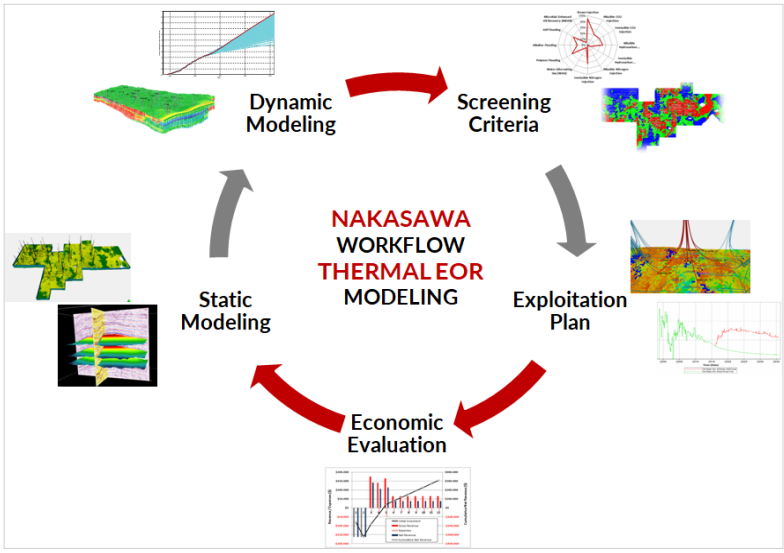
RESERVOIR MODELING: THE KEY TO SUCCESS IN THERMAL EOR

RESERVOIR SIMULATION OVERVIEW



Simulation of the reservoir includes a description of the physical properties of reservoirs and fluids saturating them, consideration of the technological process for the productive layers, creation of reservoir mathematical model and the actual computer simulation. All this allows one to predict the behavior of the reservoir and the oil extraction under various operating conditions. The need for reservoir modeling is justified by the need of oil companies for the most accurate prediction of reservoir development indicators under various operating conditions. Thus allows the operators **take the suitable decision about**, when and how they are going to **maximize or optimize the values** of their assets or fields, **reducing technical and commercial risks**.

THERMAL EOR MODELING WORKFLOW



Modeling of hydrocarbon fields for Thermal EOR mainly consists of static modeling, dynamic modeling, screening criteria, and the exploitation plan. The static model includes the geological model of the field. The geological model is a framework of a field divided into millions of cells, where each cell contains all the petrophysical and reservoir-filtration parameters of a given field. A dynamic model is a hydrodynamic model of a field. Data on a three dimensional geological model, perforation, production, formation effects and other dynamic data are loaded into the hydrodynamic model. This allows for detailed forecasting based on the field development history. Consequently, the screening criteria is one of the most sensitive stages, since according to the reservoir characteristics, resources availability, surface facilities, technology maturity, it can be generated an index which might indicate the optimum method or technology for the reservoir, highlighting Steam Flooding, Cyclic Steam Stimulation, SAGD, HASD, VAPEX, IN SITU COMBUSTION, THAI. The fourth stage consists in the establishment of the exploitation plan where it will be forecasted different scenarios by modifying several parameters and measuring their impact over the final cumulative oil production, such as: Number of Wells, Well Spacing, Soak Time, Heat Injected, Different Wells Patterns and Steam Quality as the main ones. Once the technically feasible cases are defined, they are subjected to a thorough economic evaluation process to finally determine the feasibility and profitability of the case that would go to the implementation phase.