Studi optimasi dan analisa keekonomian modifikasi condensate extraction plant di lapangan X = Optimization study and economical analysis of condensate extraction plant modification in X field

Khemas Titis Adhitya, author

Abstrak

ABSTRAK
Kondisi krisis harga minyak dunia yang terjadi sejak akhir tahun 2014 memberikan dampak yang signifikan terhadap kebijakan perusahaan minyak dan gas bumi dalam mengembangkan lapangan. Lapangan X memiliki reservoir dengan kandungan Gas Oil Ratio (GOR) yang tinggi. Hal ini mengindikasikan terdapat potensi kondensat untuk dapat diekstraksi dari gas alam sebelum gas dijual menuju konsumen. Condensate Extraction Plant dikembangkan di Lapangan X sejak tahun 2011 dengan kapasitas handling total sebesar 27,5 mmscfd. Seiring dengan penurunan produksi minyak dan gas bumi secara alamiah, diperlukan penyesuaian mode operasi sehingga aset yang dimiliki oleh Lapangan X dapat memberikan efisiensi yang lebih baik dibandingkan kondisi sebelumnya. Simulasi proses modifikasi plant dilakukan dengan 5 alternatif skenario proses yaitu Metode Mechanical Refrigeration Mode Operasi Seri dengan Media Pendingin Chilled Water, Metode Mechanical Refrigeration Mode Operasi Pararel dengan Media Pendingin Propana, Metode Mechanical Refrigeration Mode Operasi Seri dengan Media Pendingin Propana, Metode JT-Valves, dan Metode Turbo Expander. Evaluasi teknis dilakukan dengan simulasi menggunakan perangkat lunak Unisim, sedangkan analisa keekonomian dilakukan dengan metode levelized cost. Selain itu, dilakukan juga analisis sensitivitas keekonomian terhadap komponen harga gas, harga kondensat, CAPEX, dan OPEX. Berdasarkan hasil simulasi proses dan perhitungan keekonomian, empat alternatif proses skenario secara teknis dan ekonomis dapat dipilih untuk meningkatkan produksi kondensat. Alternatif proses skenario yang paling optimum adalah metode Mechanical Refrigeration Mode Operasi Seri dengan Media Pendingin Chilled Water karena memberikan nilai NPV dan IRR yang terbesar serta Pay Out Time tercepat. Berdasarkan perhitungan sensitivitas NPV dan IRR, parameter yang berpengaruh paling besar terhadap NPV dan IRR skenario proses tersebut adalah harga gas, OPEX dan harga kondensat sedangkan CAPEX memberikan pengaruh terkecil.
<hr />
ABSTRACT
The condition of oil price crisis that occurred since the end of 2014 gave significant impact to the policy of oil and gas company in term of planning the development of their field. X field has reservoir that contains high Gas Oil Ratio GOR. It indicates that condensate has its potency to be extracted from natural gas prior to sales to the consumer. Condensate Extraction Plant first developed in 2011 with 27.5 mmscfd capacity of handling. Along with the naturally declining of oil and gas production which is occurred in X Field, the adjustment of operation mode is needed to be carried out. Hence production facilities asset can be operated with higher efficiency rather than previous mode. Process simulation of plant modification is carried out using 5 alternatives of process scenario i.e. Mechanical Refrigeration with Series Operation Mode using Chilled Water, Mechanical Refrigeration with Pararel Operation Mode using Propane, Mechanical Refrigeration with Series Operation Mode using Propane, JT Valves, and Turbo Expander.Technical

evaluation is simulated using Unisim Software, while Economical Analysis is evaluated using Levelized Cost Method. As a comprehensive evaluation, sensitivity analysis also being conducted using 4 input variable i.e., gas price, condensate price, CAPEX, and OPEX. The result of technical and economical evaluation showed that 4 alternatives can be choosen because provide higher production volume of condensate and feasbile to be executed. The most optimum scenario is Mechanical Refrigeration with Series Operation Mode using Chilled Water as its coolant media. This scenario gives the highest NPV and IRR, it also gives the fastest Pay Out Time. Sensitivity analysis concluded that the most impactful input variables that effected on NPV and IRR are Gas Price, OPEX, and Condensate Price, then the less impactful variable is CAPEX.