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Acid Gas Removal System for Tangga Barat Cluster Gas Development - Case Study

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Abstract

This paper discusses challenges in developing high CO₂ gas fields based on project execution of Tangga Barat Cluster, the very first high CO₂ gas cluster being developed offshore Peninsular Malaysia by PETRONAS Carigali. Discussion focuses on the intricacy and challenges specifically on designing offshore facilities to accommodate one of the largest Acid Gas Removal System (AGRS) offshore. It addresses steps and considerations in decision making, reaching the most advantageous solutions, in designing the AGRS as well as the overall facilities which involves the required supporting utilities. Data from well tests, FORGAS simulations, and process model from HYSYS among others shall be woven in the discussion.

The discussions on the executed design strategy shall benefit future high CO₂ gas fields projects by providing at the very least, a design guidance. The paper highlights the modus operandi in ensuring the final gas specifications of 8 mole% CO₂ is met while accommodating different AGRS technology provider utilities requirements.

The membrane technology was identified for the bulk CO₂ removal of 35% down to 8% CO₂ in sales gas. Due to distinctive differences in the technology provider's removal processes, several factors were considered in designing the process utilities, electrical, mechanical and structural aspect of the system. The overall project economics for hydrocarbon losses in both single and two stage systems were assessed to reach a decision with acceptable losses. The operating conditions of the AGRS were optimized through the analysis of the reservoirs pressure and the booster compressor optimization.

In view of the high development costs associated with these acidic fields, it is the author's intent to contribute, to some degree, lessons learnt in the planning, design and execution for future acidic field developments. It is aspired that through costs, time and resources optimization, the overall project economics can be improved.