

Configuration and economic evaluation of a cogeneration refinery in Saudi Arabia.

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Abstract

One alternative that totally converts refinery residue and at the same time complies with environmental restraints is the gasification or partial oxidn. process. This alternative is one of the noncatalytic options for the utilization and conversion of unmarketable high-sulfur heavy residues to a range of value-added products such as elec. power, steam, hydrogen and/or synthesis gas for chems. prodn. For the Kingdom of Saudi Arabia, the rapid increase in the demand for elec. power (10% per yr) and the surplus of heavy residues justify the addn. of a cogeneration plant within the refinery which itself has a significant elec. power requirement. The residue gasification option will partly contribute to enhancing the existing power capacity in the Kingdom which stands at .apprx.23 000 MW and will have to reach 28 000 MW by the year 2000 and 59 000 MW in 2050, according to some industrial analysts. This situation provides the motivation for the present paper which provides configuration and economic anal. of a cogeneration plant in a medium-conversion refinery. The plant is designed to generate 800 MW elec. power for internal use and for export as well as 500 ton/h HP steam. Economic evaluation was made for this cogeneration plant using 24 000 b/d (3800 m³/d) visbreaker tar. The results of our economic anal. show that the investment needed is relatively high at \$808 million, however, the payback period is reasonable within 4.7 yr.