Power Flow Studies of PDO - MHEW Interconnected Power System

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Abstract

The Ministry of Housing, Electricity & Water (MHEW) and Petroleum Development Oman (PDO) have decided to interconnect their power systems via a 132kV tie line between Nizwa and Nahada substations. Both parties are aiming to get the two systems fully integrated by the end of year 2001. Preliminary electrical concept studies have highlighted major advantages of having an integrated network. Subsequently, detailed system studies became necessary to have an in-depth analysis of the system response under steady state as well as under dynamic and transient conditions. In this study, the aspects associated with the static response of the interconnected system will be presented. In agreement with MHEW and PDO, the two independent systems are modeled as per the year 2001 projected configuration. The 2001 peak forecasted loads along with generation summer capacity are taken as the base case. The system is simulated utilizing the power system analysis computer software (EDSA - 2.95). Upon completing the EDSA models for MHEW and PDO isolated systems, both models were tested to assess how true they represent the actual systems using year 2000 measured data as a test case (generation and loads). The output trend (bus voltages and feeder power flows) generated by the EDSA models closely resembles that of the actual condition. In addition to the year 2001 base case power flow scenario, the interconnected system power flow was observed in response to various contingency conditions such as outage of generating units and transmission lines. The results of all simulated scenarios are summarized in Table 4.1. It can be concluded that in the short-term, the PDO-MHEW interconnection is mainly to the benefit of PDO. However, there will be certainly potential advantages to both parties following the planned transmission and generation expansions in both systems.