

- 1) **Li Sun**, Chang Liu, Boiler System Retrofit and Operation Optimization, The 7th International Conference on Applied Energy -ICAEE2015, Abu Dhabi, United Arab Emirates, 28 - 31 March, 2015

The retrofit methodology has been developed to explore modifications to the boiler system accounting for changed duties, equipment failures, and cost reduction. The existing boiler system is initially analyzed to assess steam generation at different retrofit conditions, in particular considering cases involving equipment failure and variation of the system demands. Retrofit measures are proposed including operation adjustments of modifying boiler operating load and switching boiler operating modes, and the introduction of extra equipment to add redundancy to the system with spare capacity. The system modification in order to compensate for steam production deficits due to equipment failures and flexible utility demands is optimized based on system configuration, individual equipment failure characteristics, and equipment operation modes and mode transfer time. A mixed integer linear programming (MILP) model is formulated with the aim to achieve the minimum retrofit costs considering system penalty costs in the model due to boiler failures. A case study illustrates the proposed retrofit methodology.