

Co-optimisation of power-gas networks connected to industrial energy hubs with high penetration of storage systems

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Abstract-

With proliferation of gas-fired generators and increase in the number of interconnected power-gas networks, co-optimisation of power-gas nexus has become a hot research area. Energy hubs (EHs) are efficient and reliable multi-carrier power system has been used as case study and the studied EH includes boiler, combined heat and power unit, battery and electric system cost and gas network cost is investigated and the optimal connection points are determined. According to the results, about 49.4 % of total cost belongs to electric system and the remaining 50.6 % belongs to gas system and a large portion of electric system cost belongs to demand shed cost. According to the results, the electric system is severely congested. At some buses and some hours, due to demand shed, the shadow price of electricity soars 10,000\$/MWh which equals value of lost electric load.

Index Terms- Power-gas nexu; Energy hub; Combined heat and power; Electricity storage; Thermal storage; Demand response

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