The study explores how different topologies of distributed wind power impact on nodal electricity prices. Production costing models are used to forecast the expected amount of electricity produced by different distributed wind power topologies on nodal electricity prices using a model of the power system operated by the ISO-NE. PLEXOS, a commercial software, is used to represent the production cost model of the ISO-NE power system by simulating the day-ahead (DA), an intraday 4 hours-ahead (4HA) and real-time (RT) markets.

A multi-objective problem with conflicting objectives has been formulated. This study presents a case study on the power system in Independent System Operator New England (ISO-NE). PLEXOS, a commercial software, is used to model the power system operated by the ISO-NE. The ISO-NE generation mix, lowering Total Generation Costs and reducing Coal and Gas consumptions (Exhibit 7)

Conclusions
• An approach to apply multi-objective evolutionary optimisation for evaluating high penetration of wind has been proposed providing meaningful insights in previous uncertainties
• Different wind topologies impact on nodal prices. RT mean price in 2010 was 49.58 $/MWh. This study proposes optimal wind topologies for reducing ISO-NE RT prices in up to 13%
• Large penetration of wind (up to 32%) will impact on ISO-NE generation mix, lowering Total Generation Costs and reducing Coal and Gas consumptions (Exhibit 7)
• In this study, there are no interconnections with neighbouring regions. It would be valuable as future work to analyse prices with those interconnections to incorporate electricity exchange revenues in the cost analysis of different wind topologies

References