Grid-connected distributed energy generation system planning and scheduling

W.S. Ho, H.Y. Chin, K.C. Wong, Z.A. Muis, H. Hashim*

Process Systems Engineering Centre (PROSPECT), Faculty of Chemical Engineering, Universiti Teknologi Malaysia, 81310 Skudai, Johor, Malaysia
Tel. +60 7 5535478; Fax: +60 7 5588166; email: haslenda@cheme.utm.my

ABSTRACT

Conservation of fossil fuel energy, energy management (peak shaving), energy economic and pollution of energy sector has been among the recent topics of discussion. This paper examines possibilities of achieving the said topics through an integrated energy system also known as distributed energy system (DES) consisting of renewable energy and energy storage devices. With aim to minimise system cost while abiding to carbon footprint reduction target and pollutant emissions limit, a mixed integer linear programming model is developed for optimisation and planning of a DES. Universiti Teknologi Malaysia, in planning to become an eco-campus, is taken as a case study for this research work. The model reveals that with a target of 40% carbon footprint reduction and 30 tonne of total nitrogen oxides emissions (in a year), an annual cost of 5,687,000 $/y is required, achieving a reduction of 17.3%.

Keywords: Distributed energy system (DES); Energy storage (ES); Carbon footprint; Nitrogen oxides (NO_x); Renewable energy (RE); Mixed integer linear programming (MILP)

*Corresponding author.