

# **Gas-electricity coordination in competitive markets under renewable energy uncertainty**

P. Dueñas, T. Leung, M. Gil, J. Reneses

**Abstract—** As climate concerns, low natural gas prices, and renewable technologies increase the electric power sector's dependence on natural gas-fired power plants, operational and investment models for gas and electric power systems will need to incorporate the interdependencies between these two systems to accurately capture the impacts of one on the other. Currently, few hybrid gas-electricity models exist. This paper reviews the state of the art for hybrid gas-electricity models and presents a new model and case study to illustrate a few potential coupling effects between gas and electric power systems. Specifically, the proposed model analyzes the optimal operation of gas-fired power plants in a competitive electricity market taking into consideration gas purchases, gas capacity contracting, and residual demand uncertainty for the generation company due to renewable energy sources.

**Index Terms—** Electric power market, natural gas market, optimization model, renewable energy integration, risk averseness

Due to copyright restriction we cannot distribute this content on the web. However, clicking on the next link, authors will be able to distribute to you the full version of the paper:

[Request full paper to the authors](#)

If you institution has a electronic subscription to IEEE Transactions on Power Systems, you can download the paper from the journal website:

[Access to the Journal website](#)

**Citation:**

*Dueñas, P.; Leung, T.; Gil, M.; Reneses, J.; "Gas-electricity coordination in competitive markets under renewable energy uncertainty", IEEE Transactions on Power Systems, vol., no., pp.-. , .*