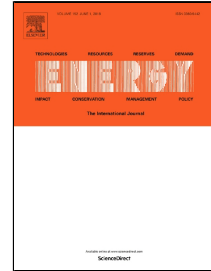


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Assessing security of supply in a largely hydroelectricity-based system: The Colombian case

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ABSTRACT

One of the primary challenges of the power industry, worldwide, is making the capacity investment appropriate for the achievement of security of supply. This challenge is becoming even more relevant as power generation is increasingly based on renewables that are intermittent and seasonally dependent. In this context, policy makers and regulators implement capacity mechanisms that seek to overcome the intrinsic shortcomings of renewables. Failing to do so, given the uncertainty and complexity involved, means either that excessive overcapacity will become persistent and remain idle, or that under-capacity will prompt blackouts and high electricity prices. To help manage the uncertainty and complexity, this paper contributes to a better understanding of the effects of the capacity mechanism on electricity markets with a high share of hydropower – by using a system dynamics modelling approach applied to Colombia. In the past, though the capacity mechanism induced large reserve margins, the system has been at serious risk of experience blackouts and has resulted in extremely high electricity prices over a prolonged period. In the future, worse scenarios are possible: historically-familiar events – when backup plants were not available – may recur when new capacity is delayed, posing an even greater threat to the system

Key Words: Security of supply; capacity mechanisms; electricity markets; simulation.

1. Introduction

Since the liberalisation of electricity markets in the early nineties, researchers have been investigating the effectiveness and efficiency of policy that promotes power-capacity investment. While effectiveness refers to the ability to provide uninterrupted power to the system, efficiency entails its attainment at low cost through technology diversification and risk reduction[1,2]. Liberalised electricity was supposed to provide clear and sufficiently forward-looking economic signals for proper capacity investment to attain security of generation by means of an adequate technology matrix. Nonetheless, electricity markets have often required much help from regulation to guarantee

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