

# Assessing the social benefits of probabilistic criteria for electric power system security management

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For many years, the secure operation of power systems is achieved by the deterministic N-1 criterion [1]. Such criterion imposes that the system has to be protected against the failure of any single component (*i.e.*, generating unit, transmission line *etc.*). To-date, this approach has been effective due to the limited uncertainty in the operation of thermal generation and the relatively recent state of the transmission network infrastructure. With the increasing uncertainty induced by the growth of renewable generation and the ageing of the network infrastructure, the need for the adoption of probabilistic security criteria is gradually recognized. In this context, the research unit in Systems and Modeling of the Department of Electrical Engineering and Computer Science of the University of Liège (Institut Montefiore) is currently engaged in a broad international collaborative research effort with the objective to evolve security management methodologies towards probabilistic ones. A significant barrier to progress in this task is the lack of an assessment of the social benefits of moving away from the N-1 practice [2].

## Project Description

The objective of this project is to assess the socio-economic impacts of the adoption of probabilistic security criteria for the real-time operation of power systems. To this end, the first step will be the implementation of several security management alternatives within the generic real-time security management framework proposed in [2]. Subsequently, this work will focus on the identification of suitable schemes to settle the security provision costs and payments between the network users, amongst proposals in the literature (see for instance [3,4]). The final step involves analyzing the societal benefits arising from the adoption of all the considered alternatives, with respect to the current N-1 practice. This part of the work will consider the allocation of revenues and costs (both in terms of payments for the supply of electricity and in terms of the consequences of a potential supply interruption) along the principles of [5–7]. The scope for the analysis will concern relative comparisons amongst different end-users and different control areas of an interconnected system, thanks to computer simulations.

## Profile

- Student in Electrical Engineering, or Computer Engineering, or Electromechanical Engineering
- Knowledge and/or Interest in Probabilistic Methods and Optimization.
- Knowledge and/or Interest in Basics of Power System Physics and Economics.

## Contact

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