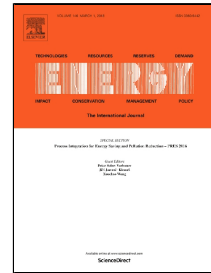


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Impact of the phase out of French nuclear reactors on the Italian power sector

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## 9 **Abstract**

10 The present paper proposes an analysis concerning the impact of the reduction of the net electricity  
11 flow between France and Italy due to the phase out of French nuclear power plants. The analysis is  
12 performed by using a bid stack model which offers an approximate, but reliable representation of  
13 the Italian power system, as shown by extensive validation on historical data.

14 The study takes into account sixteen scenarios given by the combination of different assumptions on  
15 the operating life of French nuclear reactors, fuel price, renewables development and demand level.  
16 Furthermore, a Business As Usual scenario is implemented as reference case.

17 The results have shown that some scenarios determine tight conditions for the Italian power market  
18 and provoke an increase of the clean spark of 13 €/MWh with respect to the Business As Usual  
19 scenario. At the same time, an increase of the load factor of gas turbines from 0.5% to 4% is also  
20 detected. This situation requires substantial interventions in order to re-balance the system.

21 On the contrary, scenarios which imply a more aggressive development of renewables and low  
22 increase of the demand, even in the case of a relevant phase out of nuclear capacity in France, do  
23 not determine tight conditions on the Italian power market, therefore it is not necessary to adopt  
24 particular measures.

25

26 *Keywords: power market; nuclear reactors phase-out; energy planning; electricity sector; scenario*  
27 *analysis*

28

## 29 **Nomenclature**

30 C cost, €/MWh<sub>t</sub>

31 VC variable cost, €/MWh<sub>e</sub>

32 VOM variable operating and maintenance cost, €/MWh<sub>e</sub>

33 *Greek Symbols*

34  $\varepsilon$  emission factor, t/MWh<sub>t</sub>

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