Optimizing energy system Italy

How to improve the Italian energy strategy?
Some of the authors of the present work have proposed a method for improving the Italian energy strategy in order to achieve the target of at least 55% greenhouse gases GHG (greenhouse gases) emission reductions by 2030 [45], by applying the EnergyPLAN software.

What is a simplified model of the Italian power sector?
A simplified model of the Italian power sector is implemented with only batteriesas new energy storage option. Moreover,the model period is set from 2021 to 2040. These two simplifications have been made to limit the model's complexity and avoid excessive computational effort.

Is the Italian energy system decarbonised?
As a case study, the decarbonisation of the Italian energy system has been analysed. The inputs for the H2RES model have been considered by converting the EnergyPLAN model developed in Ref. [49] and also applied in Ref. [50].

What resources does Italy use to produce electricity?
The Italian context At present,the Italian electricity supply strongly relies on fossil power plants,which exploit resources such as coal,oil,natural gas and non renewable industrial and municipal waste[41].

Are batteries and Hy-Drogen promoting a progressive decarbonization of the Italian power sector?
Both batteries and hydrogen are introduced as electrical energy storage systems. The role of VRES and storage facilities (batteries and hy-drogen) in promoting a progressive decarbonization of the Italian power sector is then explored from an economic and environmental perspective.

How much electricity does Italy need a year?
The annual electricity demand in Italy was about 319.9 TWhin 2021,with a higher load in the summer season,as shown in Fig. 1. An increase in the electricity demand is assumed from 2021 to 2030 based on the Italian National Trends [63].

"This work provides a comprehensive model of the Italian power system with high spatial (7 zones) and temporal (hourly) resolution. It analyzes the pathway towards full decarbonization and power self-sufficiency for Italy. It evaluates where it"s most cost-efficient to implement new generation and storage technologies on a regional level.

This article presents a model of the Italian power system realized employing the open energy modelling framework Oemof. A Linear Programming Optimization is implemented to evaluate how to minimise system costs at decreasing CO2 emissions in 2030.

The Italian National Energy and Climate Policy (NECP) presented numerous ambitious energy transition policies and strategies to achieve the 2050 net-zero CO 2 emission goals, such as financing the renewable sector, narrowing the energy prices gaps, and phasing out the coal energy [8].

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The model of the Italian power sector needs to be validated before being employed to test European policies. The Italian Energy system in 2019 is identified as a validation case study since it does not show the impact of the COVID-19 pandemic, which could cause anomalies due to the atypical energy and electricity usage trend.

TEMOA-Italy is a model instance for the optimization of the Italian energy system developed within an extended version of the TEMOA (Tools for Energy Modeling Optimization and Analysis) modeling framework. The model is maintained by the MAHTEP Group at Department of Energy of Politecnico di Torino.

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The novel simulation tool has been applied to a scenario for the Italian energy system in 2030. The energy scenario reduces CO 2 emissions by 55% compared to 1990, showing a strong development of non-programmable renewable energy sources and the first hydrogen applications in end-use sectors (0.5 Mtoe, with a flat hourly profile set in the input).

The findings reveal the technical and economic feasibility of a 100% renewable Italian energy system, with Power-to-X technologies playing a pivotal role in balancing intermittent generation.

Using a holistic approach within a techno-economic optimisation, this study aims at analysing quantitatively the effect of different possible energy pathways employing hydrogen, taking the Italian ...

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