

# AI based Market Model for Renewable Energy Communities with Storage Sharing

View full workplan:



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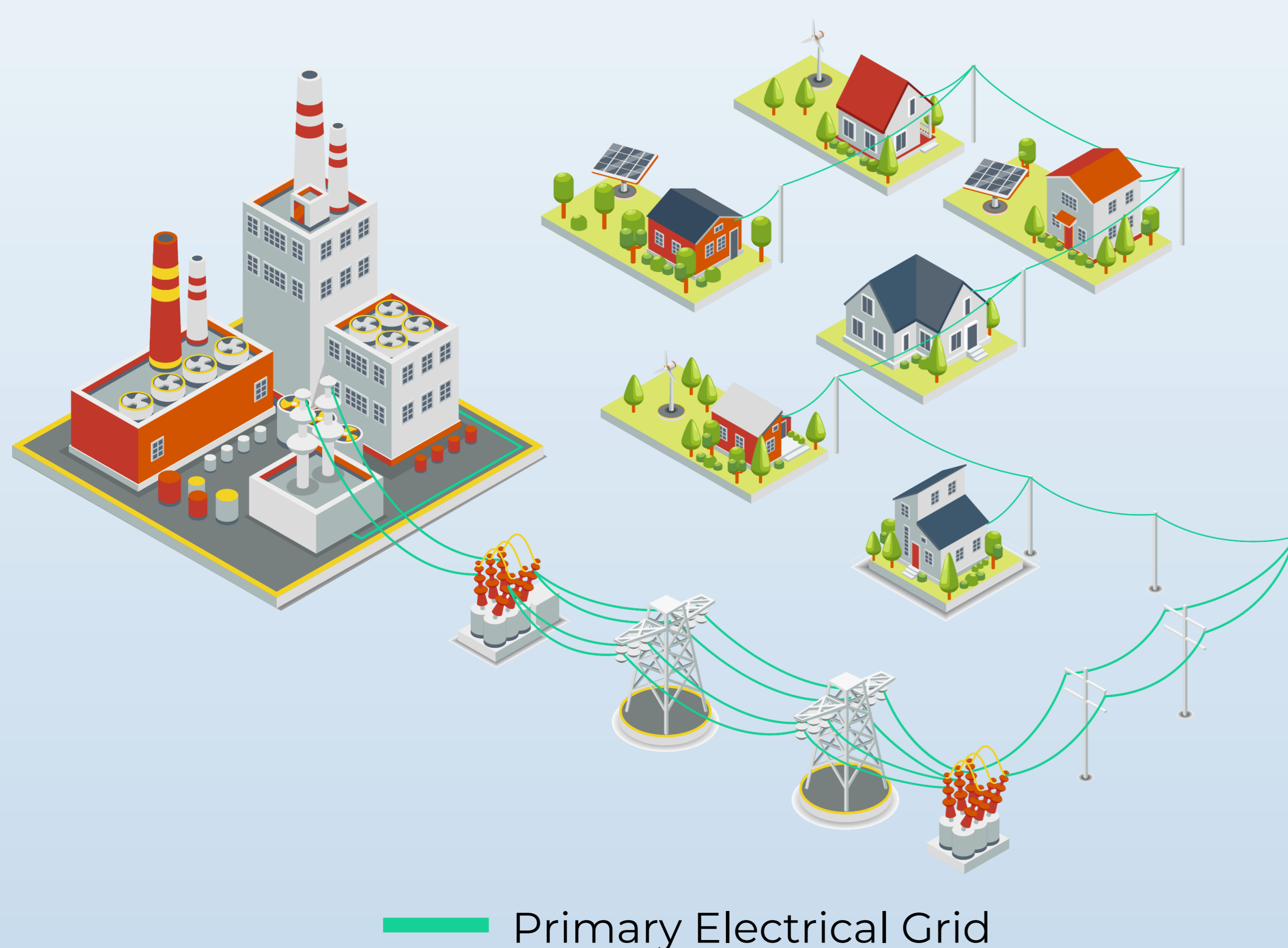
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**Abstract:** This work proposes an innovative Market Model suited to the new concept of a renewable energy community, in which its members can interact through Energy Sharing and share, among themselves, the storage capacity of their stationary batteries or electric vehicles. In order to obtain an optimum energy planning for the community, the proposed multi-agent Market Model uses Artificial Intelligence (AI), with a hierarchical control structure, and bases the decisions on technical and economic aspects such as the community load demand, the renewable energy production and other operational parameters.



**Figure 1** – Conventional electrical grid topology.

## Problem

Recent public policies, encourage renewable energy production, and stimulate consumers to become prosumers (consumer and producer). However, despite being advantageous for the environment, the large scale integration of this distributed renewable productions in the electrical power grid poses new challenges:

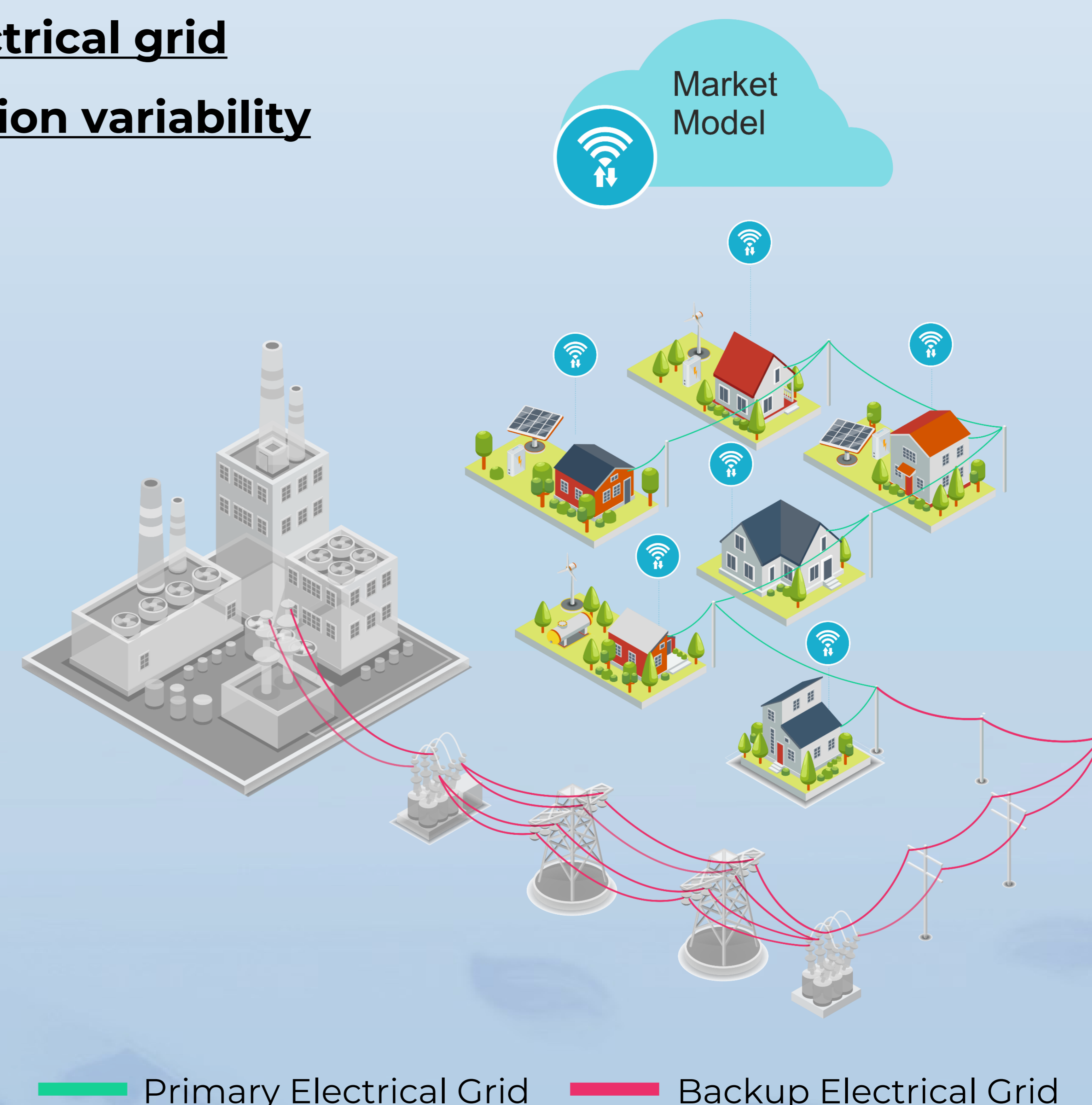
- × **Unstable electrical grid**
- × **High production variability**

## Proposed Solution

To answer these challenges, this work presents a disruptive energy Market Model based on AI that combines Renewable Energy Communities (REC) with Energy and Storage Sharing. This new concept, presented in Figure 2, allow community members to optimally transact energy among themselves and share the storage capacity of their electric vehicles or stationary batteries.

As a result, REC members will benefit from a:

- ✓ **Maximization of their production systems profitability**
- ✓ **Minimization of the dependence on the electricity grid**
- ✓ **More robust electrical grid**



**Figure 2** – Proposed solution

## Expected Outcomes

It is expected that with this new concept it will be possible to promote the large-scale dissemination of REC's, contributing to achieve the goals defined in the Portugal National Energy-Climate Plan for the horizon 2021-2030, namely, a 47% share of energy from renewable sources in 2030, according to Portugal's ambition and determination to be at the forefront of the sustainable energy transition.

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