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ABSTRACT

Biomass in the energy transition of regions. The case of Andalusia, Spain.

Climate change is currently one of the greatest challenges facing all countries and regions on our planet. One of the latest reports by the Intergovernmental Panel on Climate Change (IPCC) on the consequences of a 1.5°C rise in global temperature calls on all countries and regions to implement policies to combat climate change. Furthermore, the objectives of the 2030 Agenda, especially those related to climate change, sustainability and the energy system, have a key role to play in the regions in order to be achieved.

Thus, the communication presents the results of the project "Andalusian energy system and energy outlook for 2050. Analysis of energy policies and climate change mitigation measures in Andalusia", which was carried out between 2022 and 2025 and whose main objective was to study the Andalusian energy system from the perspective of the energy metabolism of the regions and to analyse the relationships between GHG emissions, energy generation and consumption in order to assess their future contribution to the energy transition and the fulfilment of the SDGs, and to establish recommendations for decision-making at regional level.

To this end, data on energy behaviour in Andalusia has been collected and its energy model has been processed using the LEAP (Low Emissions Analysis Platform) methodology. An energy outlook study has been carried out to estimate future energy consumption and GHG emissions, to analyse decarbonisation trajectories in Andalusia and to measure its situation with respect to the targets set for 2030 in both the SDGs and the Paris Agreement, and with respect to the 2050 horizon.

Andalusia has a large biomass wealth, mainly from olive cultivation and related industries, which is enabling it to replace fossil fuels and achieve greater self-sufficiency and energy diversification. In 2021, the increase in renewable energy production in the region, especially solar photovoltaic and biomass energy, has raised the degree of energy self-sufficiency to 22.3%. It is noteworthy that biomass and solar thermal energy together accounted for 68.3% of total production, consolidating their fundamental role in the regional energy mix.

In the scenario developed, by 2030, the region of Andalusia is expected to significantly increase its commitment to renewable energies for electricity generation, achieving a more prominent share than in the trend scenario, with an estimated total of 36,500 MW installed. Most of this installed capacity will come from solar photovoltaic energy and biomass energy. In addition, another scenario has been designed for the region in 2050, which is based on the linear extrapolation of the measures implemented in the efficient scenario for 2030.

In terms of energy sources consumed, this scenario is expected to achieve neutrality in fossil fuels such as coal and fuel oil. Significant reductions are projected in the use of fuels such as diesel and petrol, with decreases of 78% and 18%, respectively. A 13% reduction in natural gas consumption is also anticipated. On the contrary, electricity consumption is expected to increase by 12.3%, along with a notable increase in demand for solar energy, which is projected to double compared to the base year. Growth is also observed in other renewable energy sources, such as biomass, which plays a fundamental role with an increase of 27%, and biodiesel or bioethanol, with increases of up to 25%.

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