



Contribution ID: 8

Type: not specified

Life cycle assessment of renewable energy sources towards climate neutrality

The National Energy and Climate Plan 2030 (PNEC 2030) is the most recent instrument defining the Portuguese decarbonisation strategy. In a 2030 horizon, it sets ambitious targets for reducing greenhouse gases, incorporating renewable energies, improving energy efficiency, and increasing energy security.

This study compares renewable energy sources (RES) and natural gas' environmental impacts in electricity generation. To such an end, a Life Cycle Assessment (LCA) was performed to understand how the construction, operation, and decommissioning stages will affect several environmental indicators. The assessment focused on hydroelectric power, onshore wind, solar photovoltaic, and concentrated solar. The study evaluated potential global warming, fossil and mineral resources use, land occupation, and water consumption. The impacts on the 2020 energy mix were compared with PNEC2030's projections.

The results show that, with the increase in RES, global warming impacts and the use of fossil resources will decrease considerably. In contrast, land use and mineral resources usage are expected to increase. While the natural gas impacts are primarily associated with the operation stage, renewable sources impacts are predominant in the construction, with little expression in the operation and dismantling stage. Despite the renewable nature of the new production plants' resources, their impact on the environment is not negligible, revealing the importance of the LCA.

The relevance of the LCA lies in enabling the understanding of the potential consequences of the decarbonisation strategy outlined for 2030, allowing to speed up the decision-making process regarding pollution prevention and optimisation of the use of resources for a broader horizon.

Keywords: Life Cycle Assessment (LCA), Renewable Energy Sources (RES), PNEC 2030

Primary authors: Mrs SOUSA, Ana (FELPT and CERENA, University of Lisbon - IST, Portugal); Mr HENRIQUE SANTOS, Bruno (FELPT and 3Faculty of Engineering, University of Porto); Mr CARLOS, Francisco (FELPT); Dr POMBEIRO, Henrique (FELPT); Mr GRAÇA GOMES, João (FELPT; Sino-Portuguese Centre for New Energy Technologies (Shanghai) Co., Ltd.; Shanghai Investigation Design and Research Institute Co., Ltd.); Ms GONÇALVES, Margarida (Low Carbon & Resource Efficiency, R&Di, Instituto de Soldadura e Qualidade); Mrs ITEN, Muriel (FELPT); Mr CARVALHO, Nuno (FELPT); Mr FRADE, Pedro (FELPT); Mr FERREIRA, Pedro (FELPT)

Presenter: Mrs SOUSA, Ana (FELPT and CERENA, University of Lisbon - IST, Portugal)