

# **ASSESSING THE ENVIRONMENTAL IMPACT OF DECARBONIZING THE ELECTRICITY SYSTEM**

27<sup>TH</sup> MARCH 2023

81<sup>ST</sup> INTERNATIONAL SCIENTIFIC CONFERENCE OF THE UNIVERSITY OF LATVIA 2023:  
TOWARDS CLIMATE NEUTRALITY: ECONOMIC IMPACTS, OPPORTUNITIES AND RISKS



# Agenda

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**01** **INTEGRATED NATIONAL ENERGY AND CLIMATE PLAN (PNEC) 2030**

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**02** **Overall IMPACT assessment**

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**03** **Results**

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**04** **Possible Solutions**

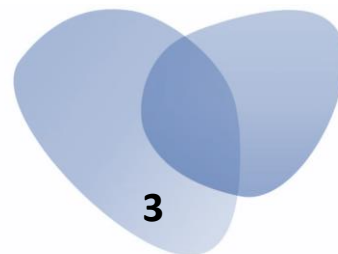
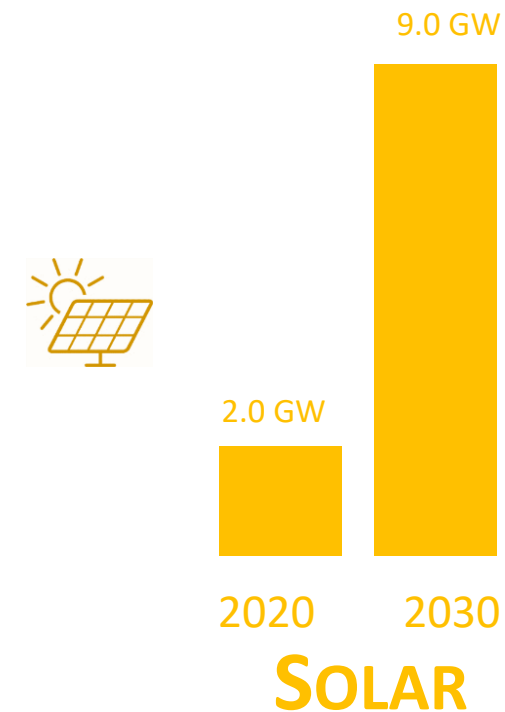
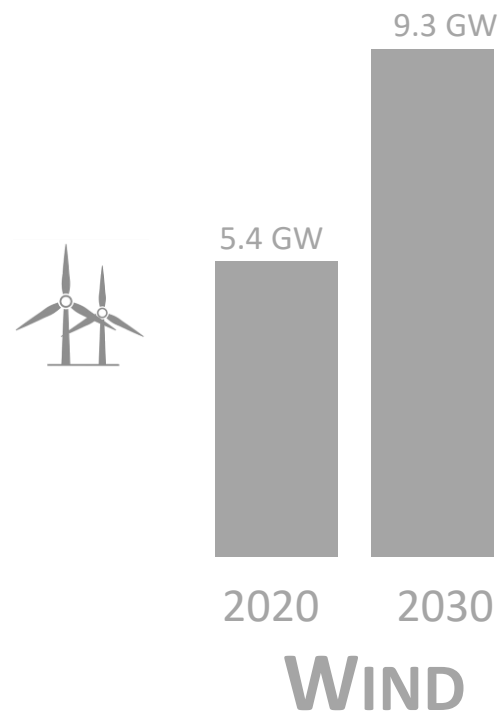
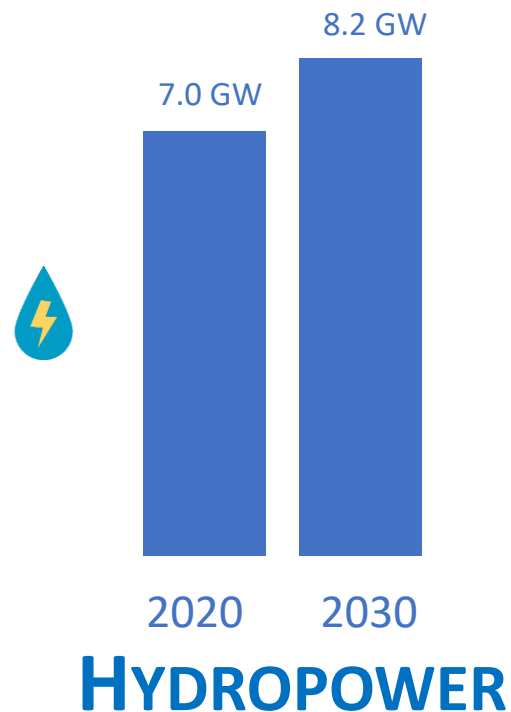
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# INTEGRATED NATIONAL ENERGY AND CLIMATE PLAN (PNEC) 2030

## Prospects for the evolution of installed renewable capacity for electricity production

PNEC envisions a solid electrification boost of consumption, related with the decarbonization of energy production, by reinforcing the exploitation of the renewable sources potential, focusing on solar and wind technologies.

The perspective of electricity production evolution by technology, in particular, hydro, wind and solar, is the following:



# OVERALL IMPACT ASSESSMENT

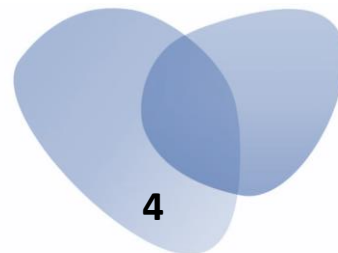
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## Methodology

Life Cycle Assessment (LCA) was used to estimate all the impacts of PNEC 2030 goals.

The following impacts are outlined:

- Global warming [kgCO<sub>2</sub>/MWh]
- Scarcity of fossil resources [kg pet.eq./MWh]
- Scarcity of mineral resources [kg Cu.eq./MWh]
- Land use [m<sup>2</sup>eq./MWh]
- Water consumption [m<sup>2</sup>eq./MWh]



# OVERALL IMPACT ASSESSMENT

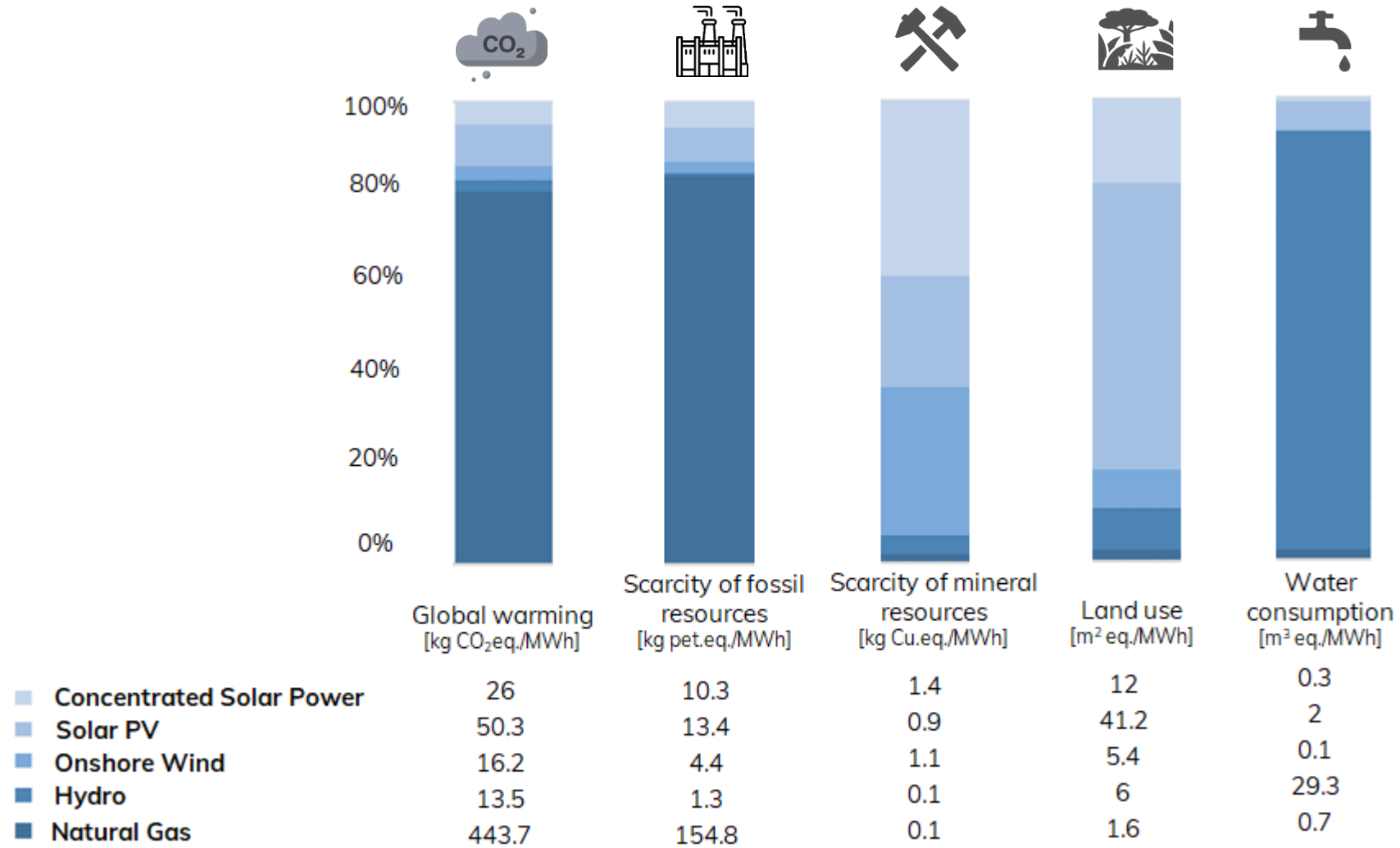
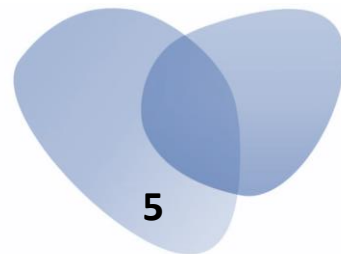


Figure 1 | Environmental impact per MWh of electricity produced



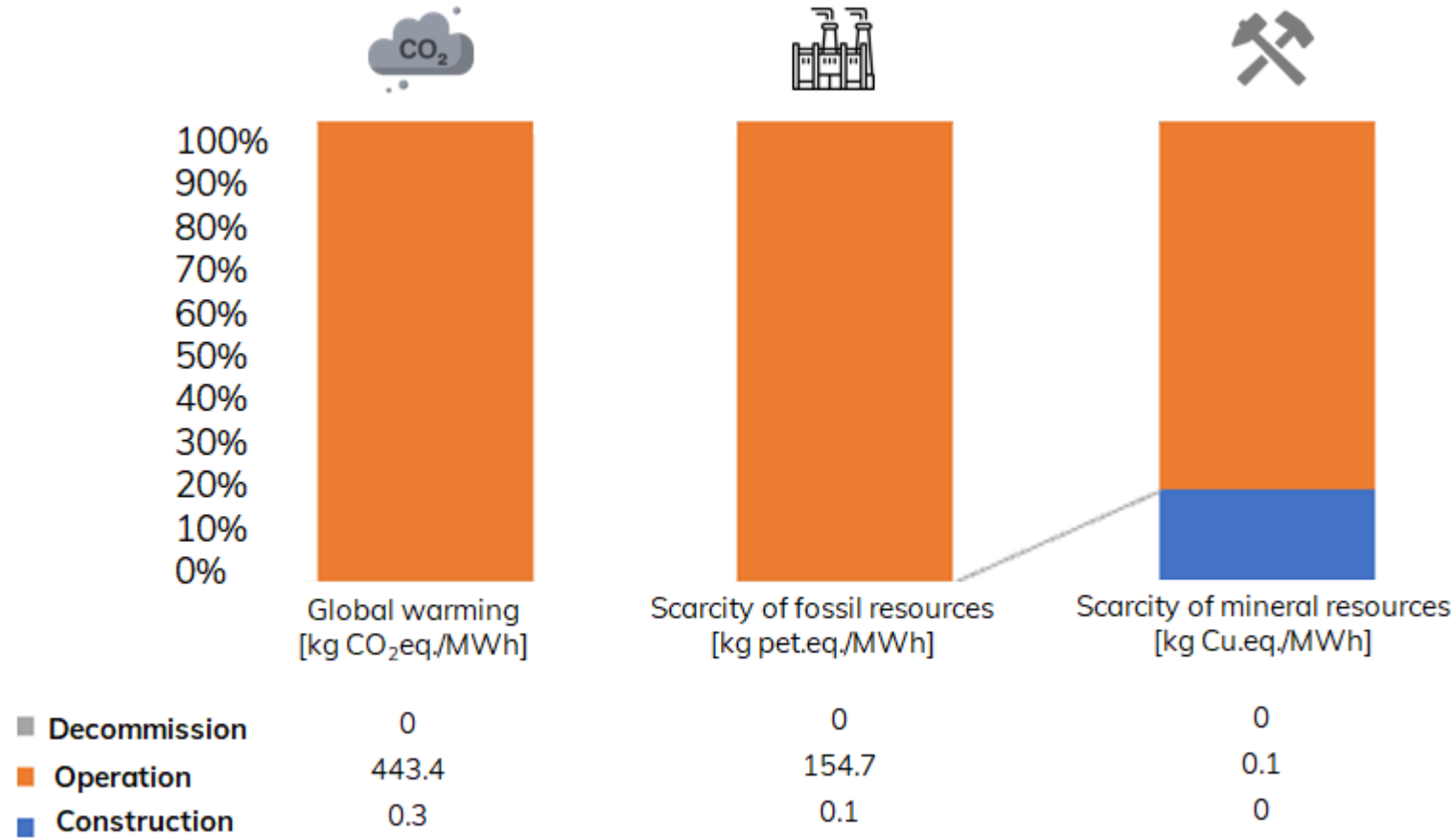


Figure 2 | Impact of **natural gas** technology for electricity production, in the 3 phases of the life cycle (construction, operation and decommissioning), per MWh produced



# HYDROPOWER

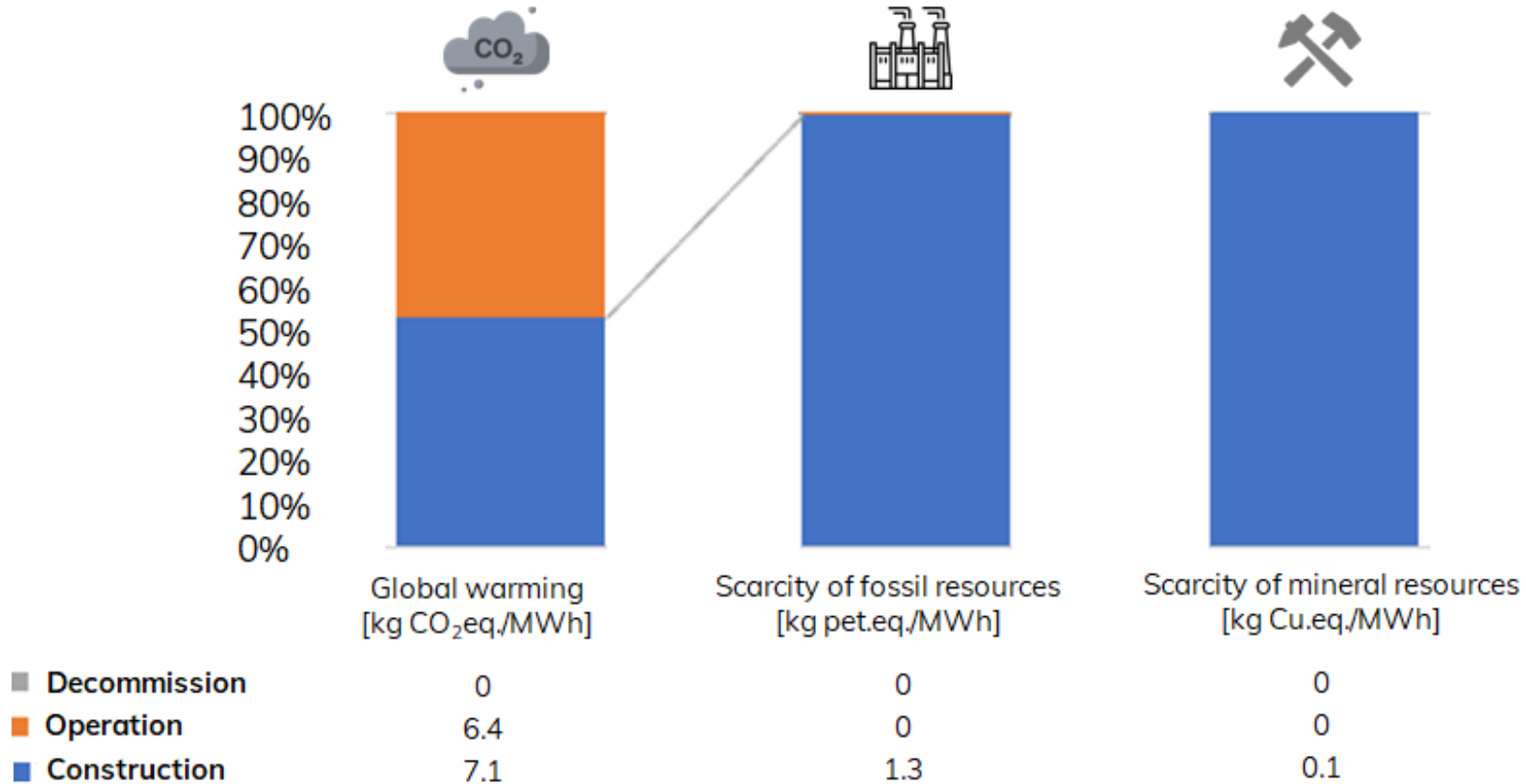
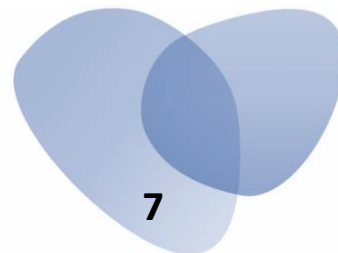


Figure 3 | Impact of **hydropower** technology for electricity production, in the 3 phases of the life cycle (construction, operation and decommissioning), per MWh produced



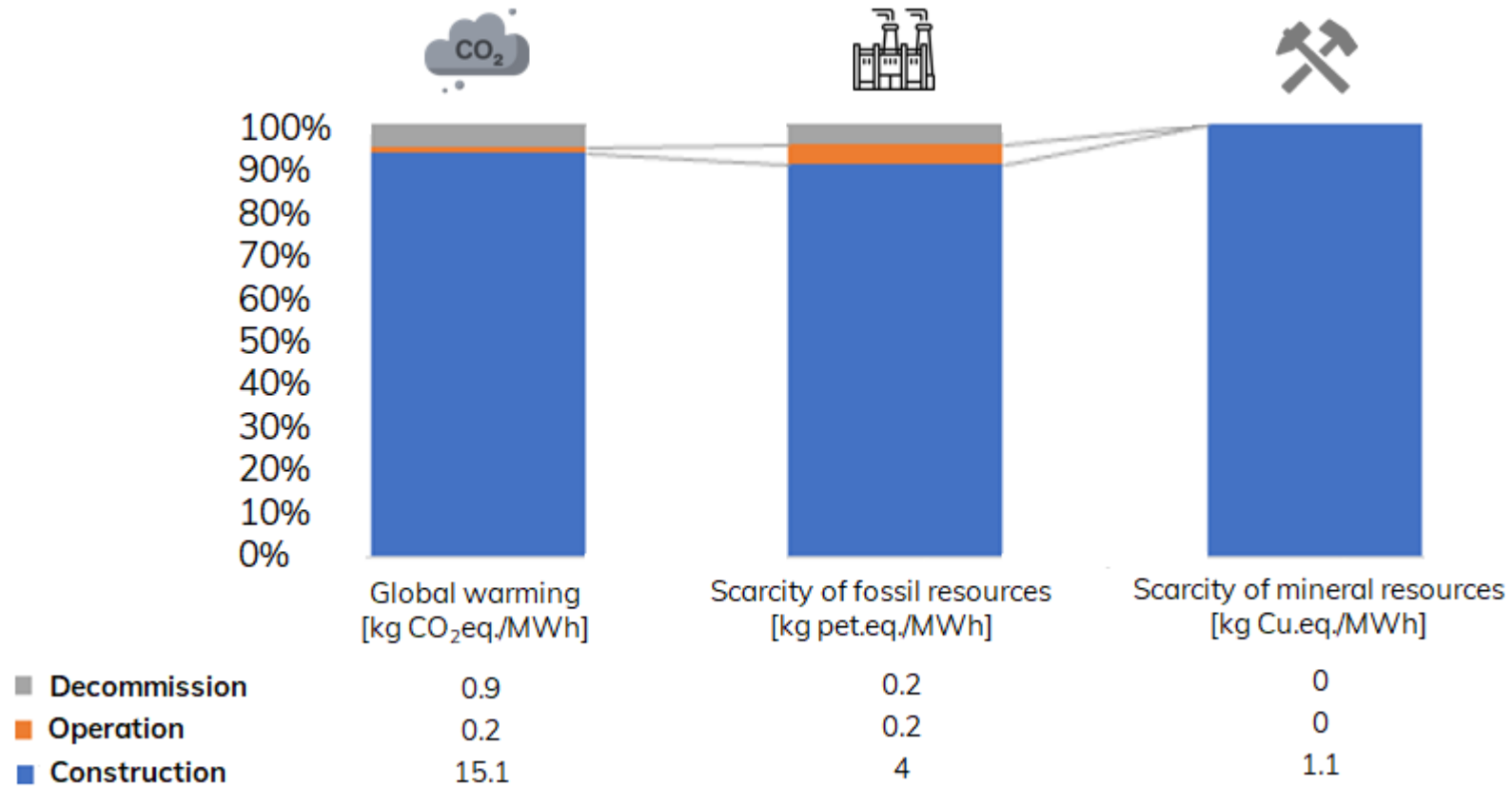


Figure 4 | Impact of **onshore wind** technology for electricity production, in the 3 phases of the life cycle (construction, operation and decommissioning), per MWh produced





# PHOTOVOLTAIC PANELS

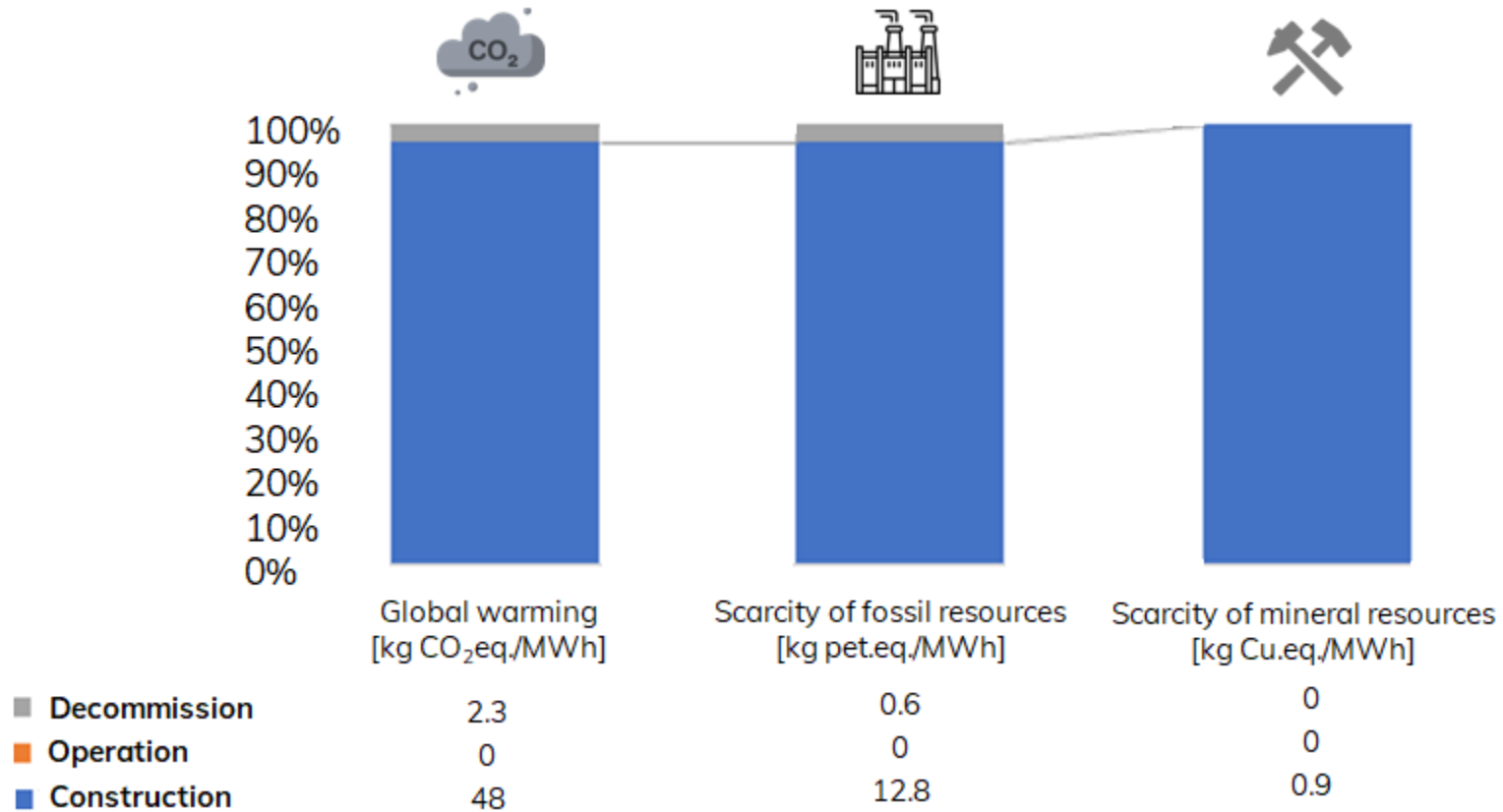
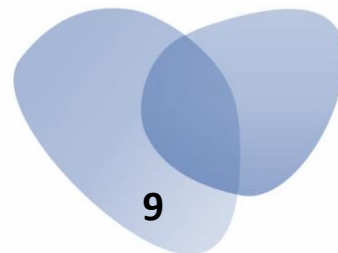


Figure 5 | Impact of **photovoltaic panels** technology for electricity production, in the 3 phases of the life cycle (construction, operation and decommissioning), per MWh produced





# CONCENTRATED SOLAR POWER

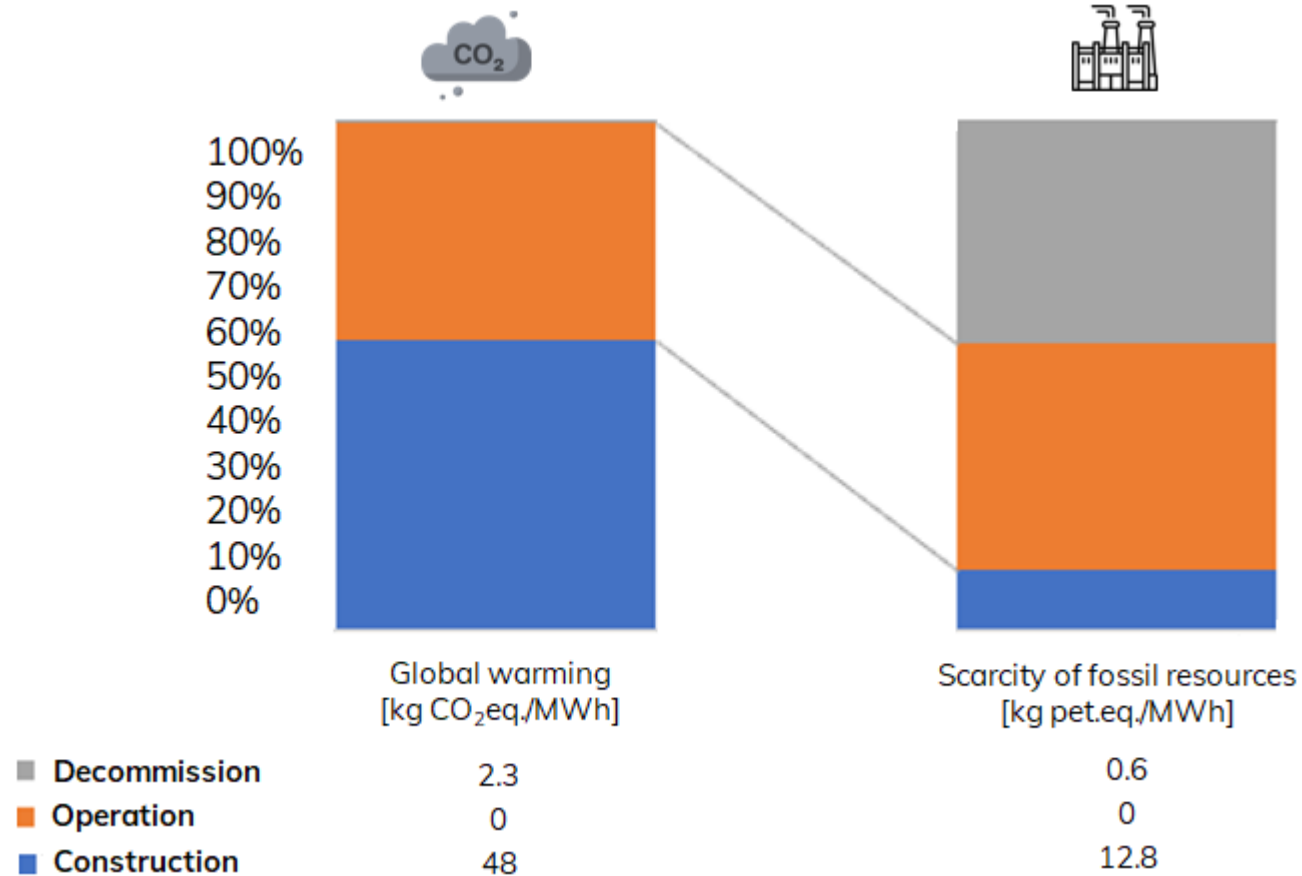
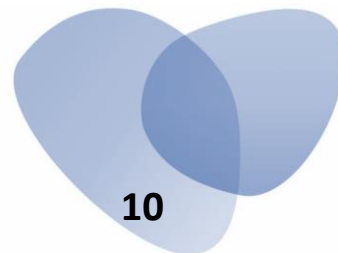


Figura 6| Impact of **Concentrated Solar Power** for electricity production, in the 3 phases of the life cycle (construction, operation and decommissioning), per MWh produced



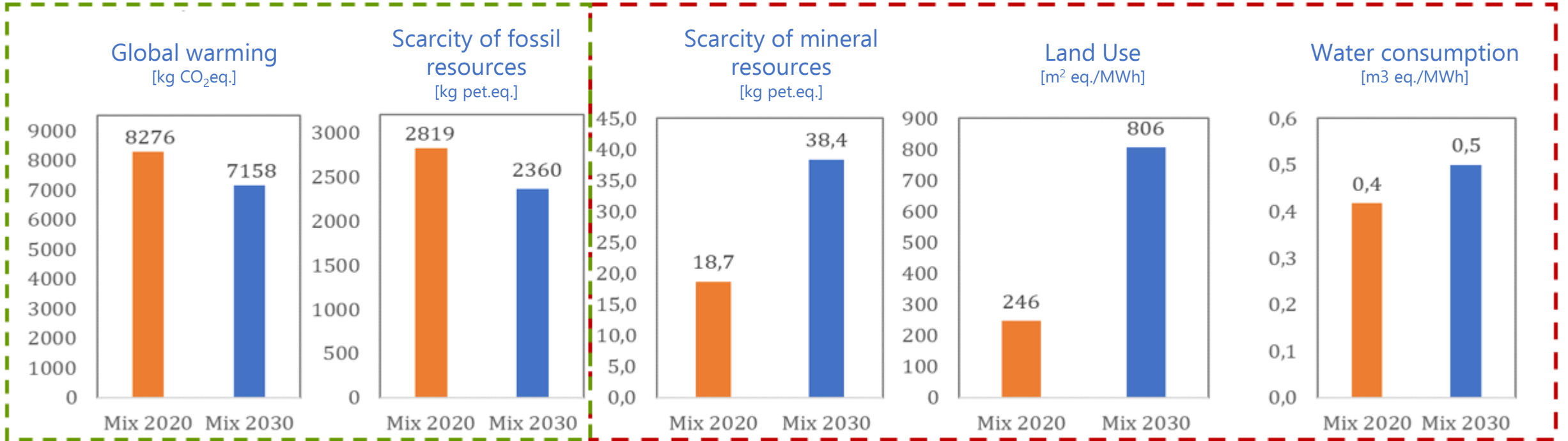


Figura 7| Total impacts for the 2020 and 2030 energy mix

## Impact Category



Figura 8| Potential environmental consequences, based on the targets set in PNEC 2030 vs 2020



## POSSIBLE SOLUTIONS



**Solution 1** – Integration of photovoltaic production in buildings; prioritization of non-productive lands; implementation in agricultural lands with specific crops compatible with shading and allowing some periods of sun when necessary.



**Solution 2** – Hybridization of energy production systems, in particular hydropower and floating photovoltaic, in a symbiosis which reduces evaporation and avoids the use of soil for the allocation of photovoltaic panels.



**Solution 3** – Development of material recovery programs during the decommissioning stage, thus increasing the external independence of raw materials and supporting inspection measures and social responsibility in the mineral extraction.



**Solution 4** – Implementation of energy efficiency strategies in the several stages of technology's life cycle.

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