ECOSENS

Economic and Social Considerations for the Future of Nuclear Energy in Society

ECOSENS must be seen in the context that generated it. The effects of climate change, increasingly present throughout Europe, and the energy crisis triggered by the war in Ukraine require urgent solutions contributing to the reduction of greenhouse gases, on the one hand, and ensure energy security, on the other.

An energy mix with renewables and nuclear could be the ideal solution, from the point of view of specialists in energy scenarios, but:

- is public acceptability more favorable to nuclear energy today, given the current context and the new proposed technologies (SMRs, Ales, Gen IV)?
- is nuclear energy a sustainable energy source throughout its cycle?
- can new economic models be proposed to make investments in nuclear projects more attractive?

ECOSENS is committed to answering these questions by bringing together specialists in the humanities, energy and nuclear policies, and economics, as well as a significant number of stakeholders with a wide range of specializations and experiences, in a platform for an open exchange of information and opinions, collaborations and multi-disciplinary dialogue.

project duration
1 October 2022 - 30 September 2025

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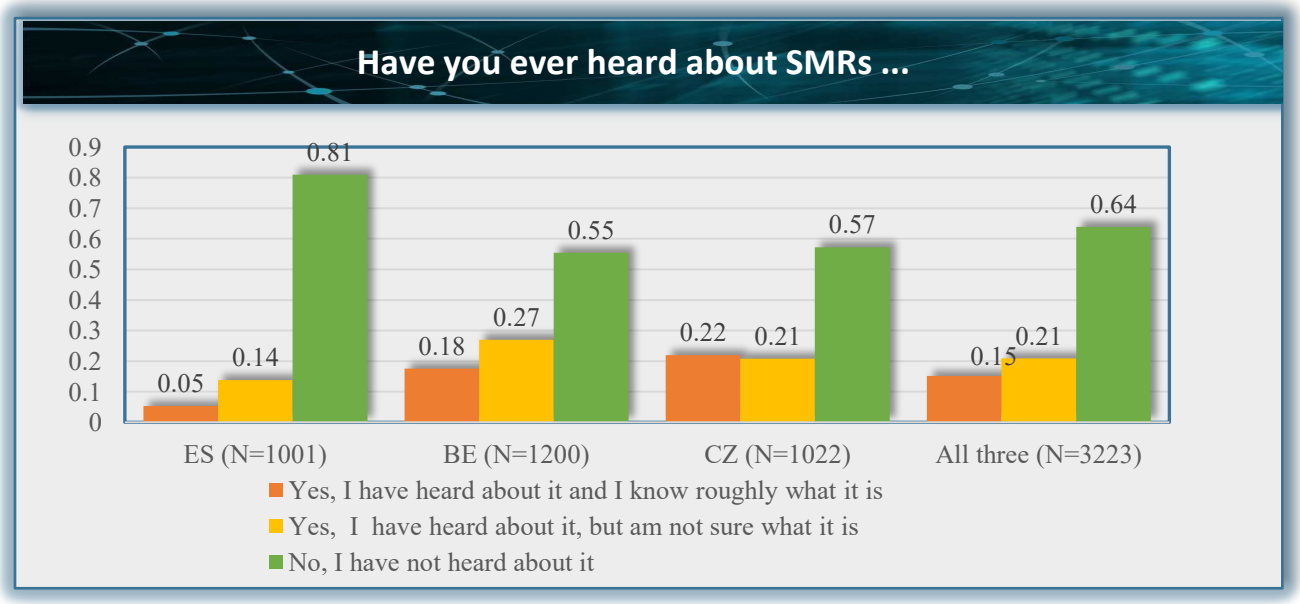
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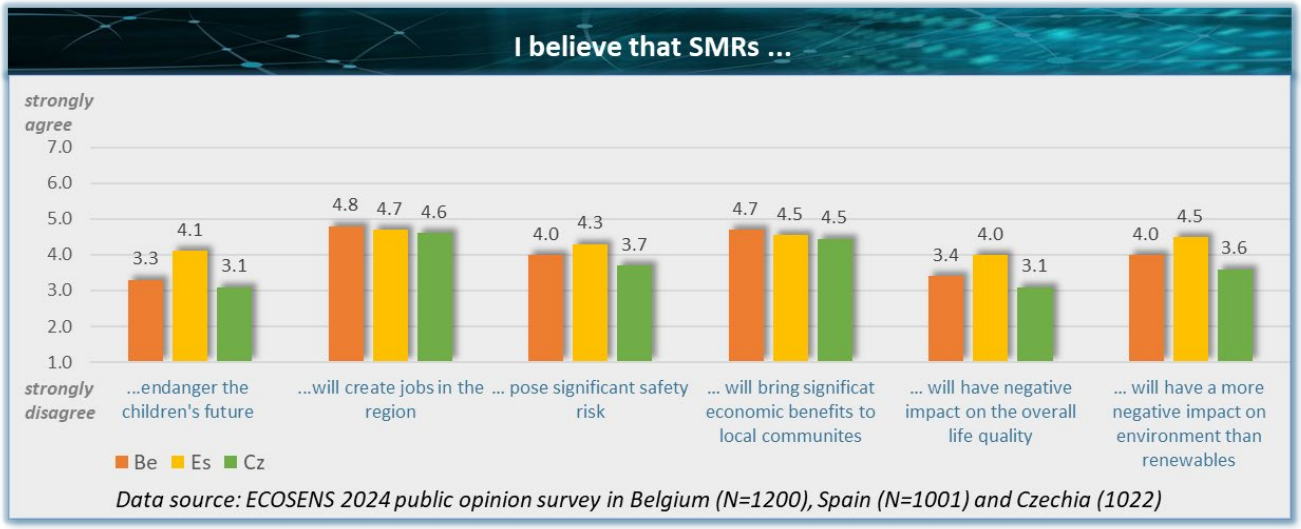
What has been achieved at the end of three years of activity, on each of the three proposed directions?

An up-to-date public perception on SMRs

First of all, we have an up-to-date radiography of public perception in the EU regarding the construction of SMR reactors, based on a comprehensive literature review and three national survey, in countries with different nuclear policies. In depth investigations to understand these perceptions resulted from six focus groups and 6 case studies. In parallel, a set of recommendations on stakeholders' engagement has been elaborated, which, followed, could smooth the path of nuclear in the future energy mix. All these confirm the validity of the principles underlying the success of a nuclear project: trust in authorities and decision-makers, transparency, early information and communication of policies and projects in the field, constant and effective involvement of civil society.

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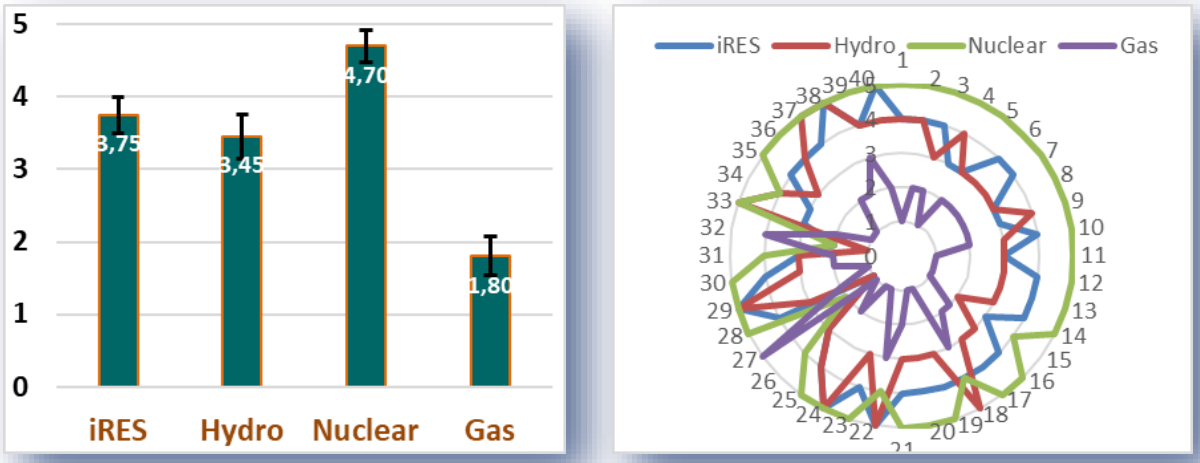
Survey data on public perception on SMRs

A new assessment of nuclear energy sustainability based on a methodology discussed with a large variety of stakeholders

The second target, the central one, was the assessment of the sustainability of nuclear energy. Such assessments have also been previously carried out within the IAEA, NEA/OECD, JRC. However, the ECOSENS assessment brings some novelties:

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- it integrates the entire life cycle of nuclear energy, from uranium extraction to the final disposal of all radioactive waste generated.
- it was designed and discussed with a wide range of stakeholders, taking into account the diversity of social values and images of future energy markets
- it assesses the sustainability of nuclear energy not in isolation, but in parallel with renewables, hydropower and gas.
- the assessment itself is the result of the involvement of both respondents familiar with nuclear energy and respondents without such concerns.



Assessment result for Indicator 1.1 - Carbon Emissions.

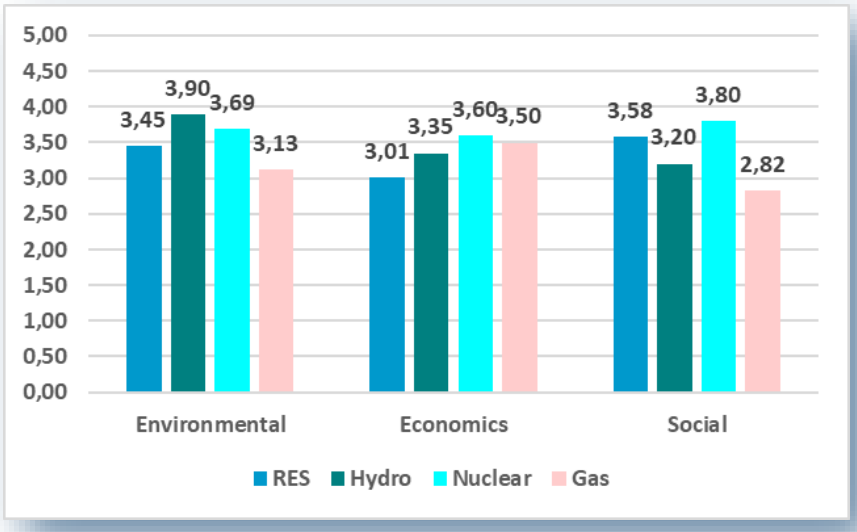


Figure of merit for the three pillars (Environmental, Economics, Social) of the assessed technologies

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The proposed method - not perfect, but perfectible - is undoubtedly a useful tool both for those deciding on the energy policies, and for those representatives of civil society/the public wishing to make their own assessments.

A novel economic approach for nuclear investment

The third target - the economic one, aimed at providing a new economic model, which brings a different approach to the one applied so far in nuclear investments. The model proposed by specialists from two Italian universities, Polimi, and Cassino, offers a much broader perspective in which a nuclear project or investment fits in. Starting from the characteristics of the System of Provision, this model represents a second ECOSENS tool that can be used by politicians in assessing the opportunity of initiating, developing or expanding a nuclear program.

Stakeholders network

More than 70 stakeholders ….

active participation and valuable contribution in design, construction and application of sustainability assessment method

- Workshops& webinars
  - The art and science of imagining energy futures
  - Decarbonizing Europe's energy system: Checking and choosing indicators for a sustainability assessment
  - Decarbonizing Europe's energy system 2: Clarifying non-linear assumptions about energy demand to 2050
  - 2050 Here & Now Scenario Workshop
  - Sustainability Assessment of Nuclear Power: Checking Contentious Indicators
- Scientific Events
- ECOSENS conference
- devoted time, shared experience, provided recommendations, reviewed our work

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Advisory Board Members

Markku Juani Lehtonen, University Pompeu Fabra –Spain
Alexis Geisler-Roblin, NTW
Luc Van Wortswinkel, VITO, Belgium
Manuel Martin Ramos, JRC, Petten



ECOSENS Partners and Stakeholders at the Final Conference, 8-9 September 2025, Milan Italy

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