Harmony

The global nuclear industry's vision for the future of electricity

The Harmony goal

To meet the growing demand for reliable, affordable and clean electricity, we will need a mix of low-carbon energy sources working together and delivering 24/7. Achieving this means nuclear energy generation must triple globally by 2050. The nuclear community needs to meet this challenge and Harmony provides a framework for action, working with key stakeholders so that barriers to growth can be removed.

25%

of global electricity supplied by nuclear in 2050

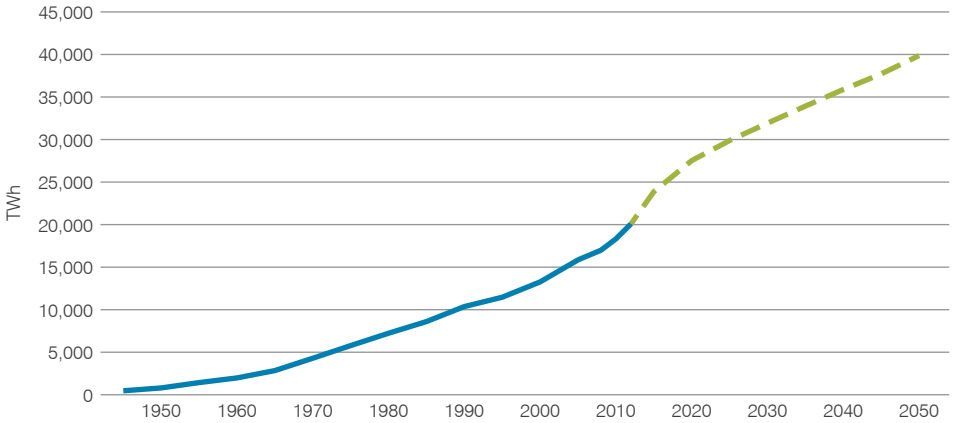
1000 gigawatts

new nuclear capacity by 2050

Why we need Harmony

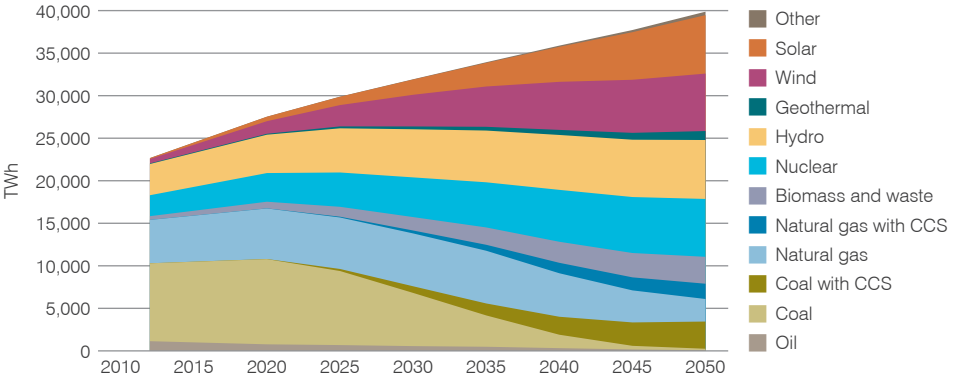
Access to electricity and the need for clean air are vital. Electricity consumption continues to rise but air pollution and greenhouse gas emissions must fall. The Harmony goal is developed to support climate change mitigation efforts to limit warming below 2˚C. This requires a large increase of all low-carbon energy sources, of which nuclear is an important part.

Electricity consumption growth in a low carbon scenario



Source: 1945-1979, IEA databases and analysis
1980-2012, Energy Information Administration
2013-2050, IEA Energy Technology Perspectives 2016

IEA 2°C Scenario: Nuclear to provide a significant contribution to global electricity in 2050



Source: IEA Energy Technology Perspectives 2016


An increased share of low-carbon sources, as well as a greatly reduced level of fossil fuels, work together in harmony to ensure a reliable, affordable and clean future energy supply is delivered 24/7.

Nuclear is an important part of the energy mix

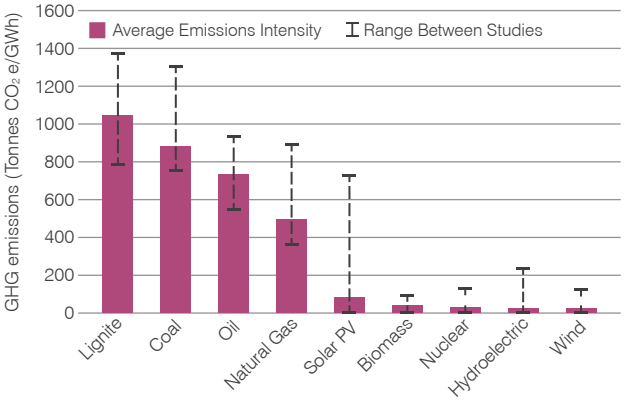
The international community recognizes the urgent need to decarbonize our electricity generation to protect people and the planet from the dangers of air pollution and climate change.

7m

7 million premature deaths are linked to air pollution every year[1].

Nuclear energy is proven, available today and can be expanded quickly - making it an important part of the solution to air pollution and climate change.

Nuclear energy is low-carbon. It ranks among the best when considering whole life-cycle emissions.

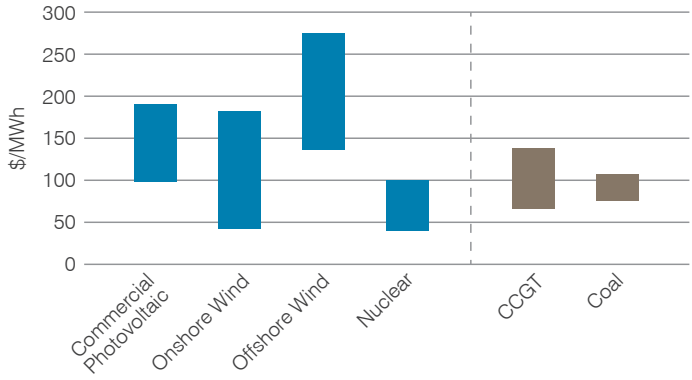


Source: World Nuclear Association meta study, incl. IPCC 2014

[1] Data published by the World Health Organisation, Department of Public Health, Environmental and Social Determinants of Health, 2014

Nuclear power remains one of the most cost-effective low-carbon options for generating electricity.

Levelized cost of electricity ranges (at 7% discount rate)



Source: Projected Costs of Generating Electricity - 2015 Edition, International Energy Agency and OECD Nuclear Energy Agency

Nuclear generation is a cost-competitive low-carbon generation option according to the IEA World Energy Outlook 2016. The cost per unit of electricity produced from wind or solar PV is stated to be 22-40% higher than that from nuclear generation, even without counting the additional costs of adapting the grid and providing the back-up generation required to compensate for their intermittent supply.

The challenges

There are currently several barriers standing in the way of achieving the Harmony goal.

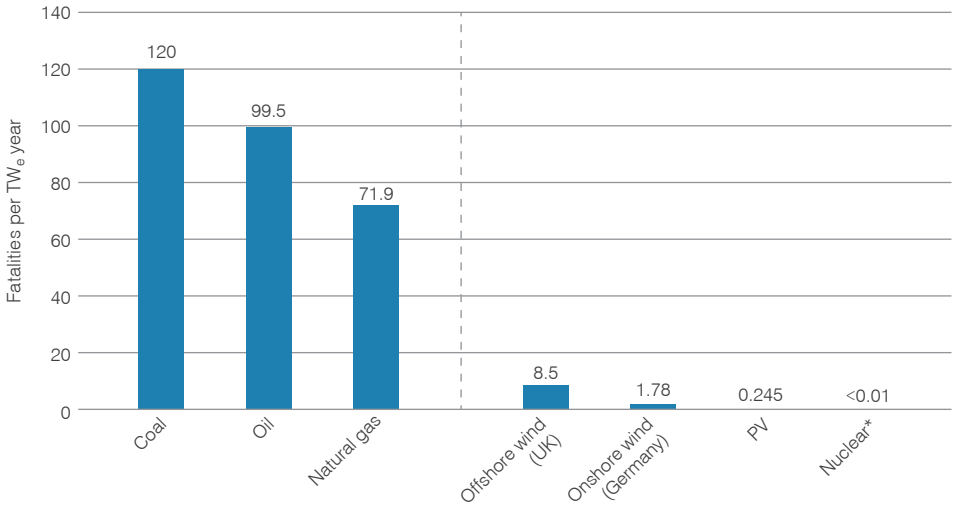
1 Electricity markets are failing to recognize the full costs and benefits of different forms of electricity generation. Even where carbon pricing is implemented, it does not represent the true long-term costs of climate change. There is no credit given for the reliable, long-term, 24/7 generation supplied by nuclear energy or recognition of the cost of back-up generation for intermittent sources.

2 Multiple regulatory barriers from diverse national licensing processes and safety requirements are limiting global civil nuclear trade and investment. A lack of international standardization places unnecessary regulatory burdens on nuclear activities and delays in the licensing of new designs hinders innovation.

3 The current energy system fails to consider safety from a holistic society perspective. The health and environmental benefits of nuclear energy are not valued on an equitable basis with alternative energy sources.

The current nuclear debate focuses on nuclear safety alone, ignoring other factors such as economics, industrial development, societal needs, public health and the environment.

Energy accident fatalities for OECD countries



** Gen II PWR, Swiss*

Source: Paul Scherrer Institut. Data for nuclear accidents modified to reflect UNSCEAR findings/recommendations 2012 and NRC SOARCA study 2015

Actions for success

The global nuclear industry needs to work on removing the barriers to the growth of nuclear energy. Three objectives are key to achieving the Harmony goal:

1. Establish a level playing field for all low-carbon energy technologies, valuing not only health and environmental qualities, but also reliability and grid system costs.
2. Ensure harmonized regulatory processes in order to provide a more internationally consistent, efficient and predictable nuclear licensing regime, to facilitate significant growth of nuclear capacity and timely licensing of innovative designs.
3. Create an effective safety paradigm focusing on genuine public wellbeing where the health, environmental and safety benefits of nuclear are better valued when compared with other energy sources.

"Nuclear sector aims to build 1000 GW of new reactors by 2050."

Reuters

"I think the Harmony vision is correct and it is in our hands to achieve it."

Robert Davies, COO, China General Nuclear UK

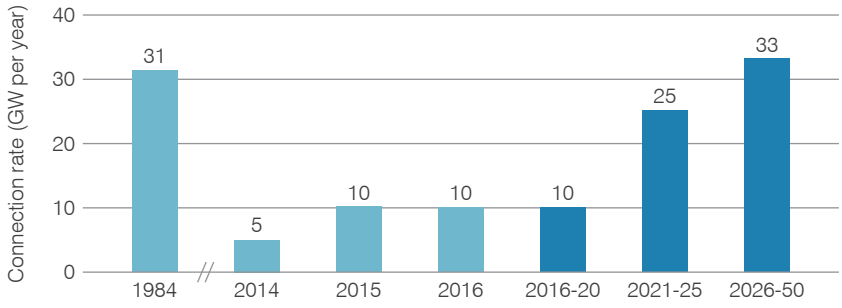
"I've been really energised by how galvanized the industry is at the moment with the Harmony goal."

Brandon Munro, CEO, Bannerman Resources

Today, with the experience and knowledge it has gained, the nuclear energy industry is in a strong position to deliver on the Harmony goal. This is an ambitious programme, but the rate at which new reactors will have to be built is no higher than what has been historically achieved.

The build rate required to meet the Harmony goal of 1000 GWe of new nuclear capacity by 2050 is:

- 10 GWe per year between 2016 and 2020
- 25 GWe per year between 2021 and 2025
- 33 GWe per year between 2026 and 2050



Roadmap

The Harmony goal is ambitious but crucial for the world to meet the energy challenge. It has been established in 2016 by the World Nuclear Association and is gaining traction in the global energy arena.

Achieving 1000 GWe of new nuclear build by 2050 will require a cooperative effort by the whole nuclear community - from industry to research, governments, and regulators - to focus on demolishing the real barriers to growth.

Harmony provides the framework for action for the nuclear industry to deliver its potential. The World Nuclear Association is leading the way in identifying the solution-oriented measures that need to be put in place, and getting support from key stakeholders to ultimately deliver the Harmony goal.

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