HoNESt History of Nuclear Energy and Society

Policy Brief II

Engagement futures for nuclear energy in Europe

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Highlights

- Nuclear energy has a contentious future in Europe – from programmes of nuclear new build to the phasing out of existing power stations.

- Nuclear power is deeply political – it involves engagement with a diverse array of civil society and industry stakeholder voices.

- Understanding how engagement has changed over time, and how it will change in the future is essential to developing a democratically legitimate industry.

- The History of Nuclear Energy and Society (HoNESt) project assessed stakeholder perspectives in deliberative workshops across Europe (held in Barcelona, London and Munich).

- HoNESt developed a novel backcasting methodology to assess desirable future scenarios.

- HoNESt found that engagement is dependent upon *scale* – both of the technology and of governance, that education on energy system transitions and broader environmental values is necessary, that engagement itself must be trustworthy and free of misinformation through 'fake news', and that upstream engagement on new technologies (such as 4th generation, small modular reactors, thorium and fusion technologies) is a primary concern for future energy policy and research spending.

Background

Nuclear power remains a contentious political issue for low carbon energy transitions. Globally there are 453 operating nuclear reactors, providing nearly 400,000 MW of net installed electricity capacity, with 55 reactors currently under construction [1]. Nuclear energy is expected to expand globally. The International Energy Agency's 2018 *World Energy Outlook* reports the 'New Policies Scenario' for installed nuclear capacity growth of 25% from 2016 (about 414 GWe) to 2040 (about 518 GWe). The IEA's WEO New Policies Scenario expects about $1.1 trillion of investment in nuclear power by 2040 (and increase in nuclear energy production of 46%), though this is heavily concentrated in East Asia (93% of the net production increase accounted for by two countries: China and India) [2].

In Europe, however, there is a complex and mixed picture for the future of this industry. Finland and France are renewing their nuclear capacity, though set-backs and cost over-runs have led to delays in construction and operation, and growing nuclear decommissioning costs in France threaten the financial viability of state-owned EDF. In the UK, despite a political commitment to renewed nuclear build to match Finnish and French competitors, recent high-profile withdrawals of investment from Toshiba (NuGEneration) and Hitachi have slowed progress. In Germany, eight of the seventeen operating reactors were permanently shut down, and a phase out of nuclear was instigated following a political review in the wake of the Fukushima incident in 2011. The future of the technology in Europe is characterized by socio-political challenges, competing stakeholder demands and a rapidly shifting technological landscape in the energy industry and within policy networks.

The Problem

Nuclear energy is intensely political. Societal engagement with the technology is necessary, in order to understand the socio-economic, cultural, political, health and environmental effects at different stages of the nuclear fuel and technology cycle (from research and development of nuclear technologies, uranium mining and enrichment, plant siting, decommissioning and radioactive waste management). Different stakeholders therefore engage with nuclear energy at different stages of technology development and implementation, in different places and at different times.

Crucially, they will often engage in conflicting ways. As a low carbon energy source, nuclear energy is, to some, a central pillar of a technological solution to climate change [3]. To others, highly publicized nuclear risk events (including Chernobyl and Fukushima), new build cost implications and negative environmental impacts (such as those associated with long-term radioactive waste disposal) have stimulated political opposition to nuclear new build - thus halting or slowing the nuclear renaissance in many European countries [4, 5].

The Problem

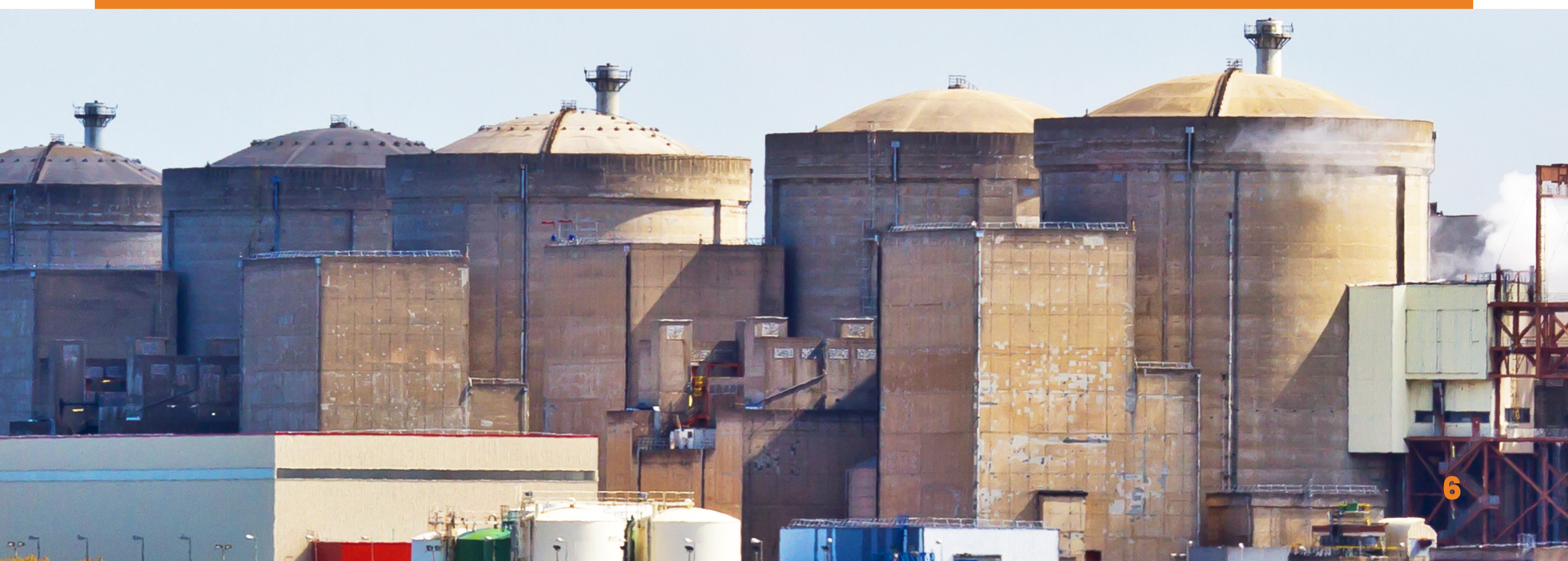
The History of Nuclear Energy and Society (HoNESt) project undertook research on the historical, contemporary and future engagement practices in the nuclear energy sector. In work package 5 of the HoNEST research project, researchers examined the political, socio-economic and perceptual dimensions of the history and future of nuclear power in Europe. We construed the challenge of nuclear energy as one of *engagement* – which refers to the capacity of stakeholders including members of the public to become actively involved in decision-making towards nuclear energy futures [6]. This can be both through formal processes to include stakeholders in decisions, and to facilitate the collection or integration of their views (invited engagement), or through formal and informal networks of stakeholders acting to influence policy from the outside (uninvited engagement) [7].

In both cases, engagement is a means to bring diverse social, psychological, ethical and aesthetic values into the technical processes of nuclear technology management and policy. Given the highly politicized nature of the nuclear policy processes, understanding the myriad dimensions of nuclear engagement in history and future industry development is essential to energy policy success.

In HoNESt work package 5 we ask the question: *what should the future of engagement with nuclear energy look like?*

Box 1. Futures studies

Our project involves *futures studies* research. Futures studies is concerned with developing an understanding of what is likely to continue, and what could plausibly change within a given time frame [8]. This involves postulating either *possible*, (scenarios that are most likely to happen), 'possible' (but not likely) or 'preferable' (most desirable or ethical). The discipline of futures studies, concerns abstract, inter-dependent and 'fuzzy' systems - the aim is to understand the interrelated complexities between technological design, policy, and civic engagement. In this project we developed a novel backcasting method to work with a diverse array of stakeholders to assess *preferable* futures and how they might be achieved. Our backcasting approach involves setting policy goals and then determining how those goals might be met. It is a methodological tool to examine the complexity of nuclear engagement futures by projecting desired futures and then working backwards towards the present to imagine how they might be realised. Backcasting allows visionary images of futures at different temporal scales, and this can stimulate an accelerated movement towards achieving certain goals.



Research approach

The research in Work Package 5 (D5.3) involved a *deliberative experiment*[9] in backcasting nuclear engagement futures (see box 1). We designed the methodology to be consonant with the focus upon nuclear engagement *history*, and harnessed historical thinking. We ran a series of deliberative workshops in 2017 and 2018, in Barcelona, London and Munich. Deliberative research brings together members of the public with key civil society stakeholders from industry, journalism, regulatory agencies, non-governmental organisations, lobby groups and scientific institutions[10, 11]. The deliberative workshop is a facilitated conversation on a topic that may be familiar to some - but not all - participants. In this workshop we employed three sessions, each using a different method (See box 2).

Box 2. Workshop methods

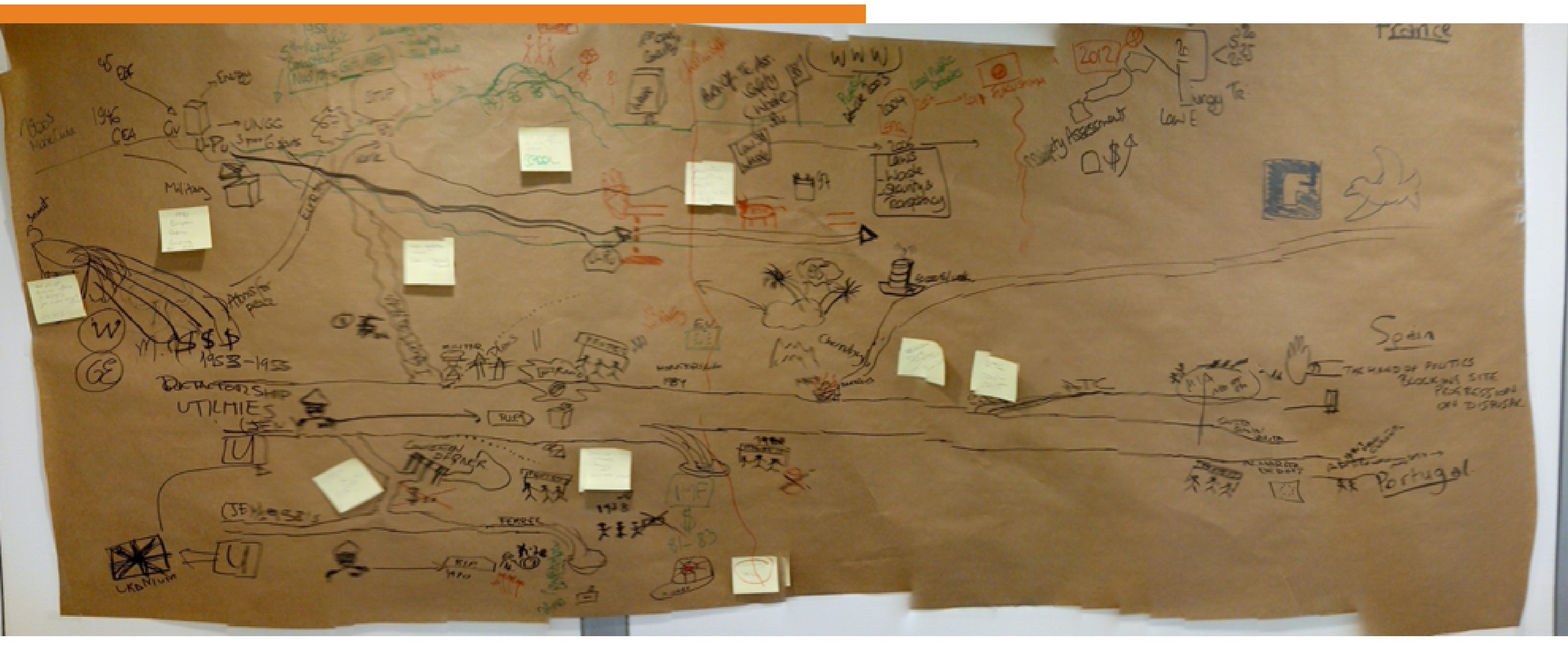
The workshops were designed to identify five elements of nuclear engagement futures:

1. To imagine and identify key characteristics of nuclear engagement histories for the respective geographic region
2. To predict likely engagement futures
3. To identify and delineate desirable engagement futures
4. To analyse the steps required to achieve these futures
5. To present potential policy/practice recommendations for achieving desirable futures.

We developed three sequential workshop sessions using different methods:

1 Nuclear histories - The River of Life method

- The River of Life is a visual narrative method used to help participants to discuss the past, present and future of nuclear energy and society. The aim is to build a shared view compiled from differing stakeholder perspectives. It is a group facilitation technique that uses the visual narrative of a river to help people tell the story from their own perspective. Participants articulate their perspectives on the proposal using visual metaphors pertaining to water. These could be the surrounding landscape, different types of water bodies (lakes, canals, tributaries, dams, waterfalls etc.), or systems/objects such as dams or boats. For example, a river could be drawn with channels "branching-out" if two different technologies were developed at a particular time, or if there was a change of government and a change of policy. Each is annoted with 'milestones' to represent key events.



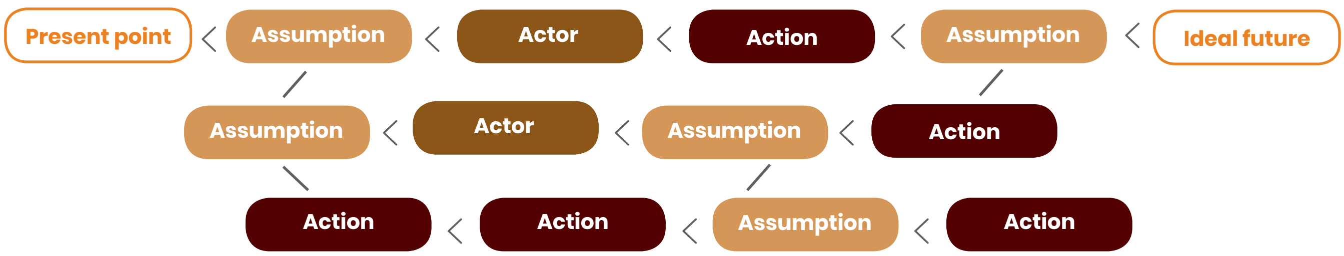
2 Nuclear engagement futures - A backcasting method

- We set a future end point of 2050 and asked participants to imagine elements of their ideal nuclear engagement future on Post-it ™ notes. These were then grouped together to form a set of collective ideal futures. Participants then had to consider three elements of each future working from right to left to map out how the ideal future could be realised:

i. ***Actions*** – e.g. new policies, new designs or technologies, ideas, protests, anything that people can do to make the ideal future happen.

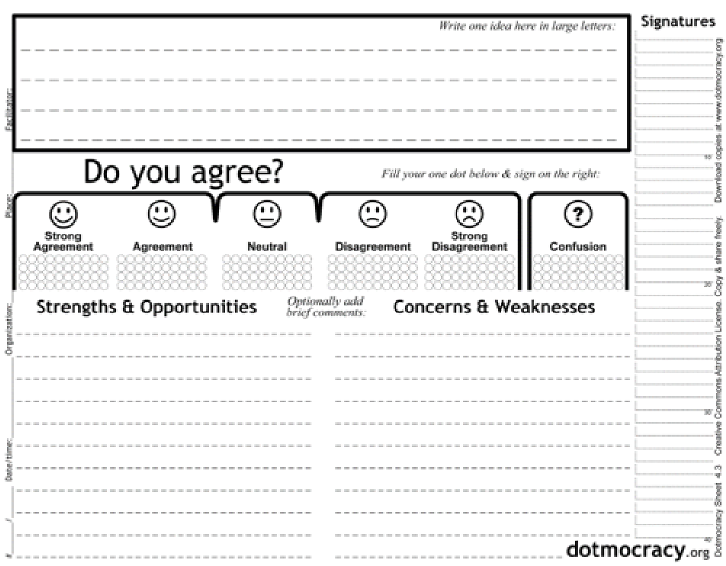
ii. Actors - i.e. individuals (inventors, politicians, representatives of non-governmental or civil society organisations), or organisations with a specific purpose, like government departments, companies or charities.

iii. Assumptions – these are the contextual factors that influence what actors can and can't do, and how they do it. For example, these could be assumptions about the state of the economy, about the availability of certain resources, the political climate in which decisions are taken, etc.



3 Action planning - Dotmocracy™ for policy perspectives.

- The last session used Dotmocracy ™ – participants came up with brief action plans to stimulate a move towards the ideal futures identified in stage 2. These were then vote don using dot stickers or marks with a marker pen to create cumulative voting on the preferred options [12].



End of box 2

Key Findings

The perceptions of stakeholders involved are briefly summarised below:

Nuclear engagement histories

- Engagement practice within the nuclear energy sector in Europe has multiple dimensions at different scales of governance.
- There are clear similarities and differences between nuclear energy emergent under authoritarian regimes and under democratic regimes – however, there similarities and differences cannot be defined solely by the regime under which they operate.
  - Similarities
    - Early nuclear industry development was construed as emerging under the actions of 'heroic' scientists and engineers who had considerable power in shaping energy technology choice at the policy level.
    - Nuclear energy was popular as a tool for post-War economic reconstruction. Nuclear energy carried soft power from technology transfer and prestige, as well as the *hard power* of economic and military benefits.
    - Engagement of the public with policy choice was limited either because of the top-down nature of the political regime (in authoritarian countries – Soviet Union and its satelites and former-fascist states), or because of Cold War-era secrecy (UK, France, USA). Yet the behavior of society with respect to nuclear energy cannot be simply classified according to the prevailing political system.
  - Differences
    - The impact of nuclear accidents (notably Chernobyl and Fukushima) was state-specific and not universal across all nuclear energy producing countries.
    - In democratic nations, scientific reporting (key scientific reviews) had a powerful effect in shaping policy.

Key Findings

Nuclear engagement futures

- Technological futures were imagined by the participants in the workshops at very different scales. Nuclear energy had no universally accepted or defined future. A key finding was that business as usual nuclear development was perceived as an unlikely future scenario. Falling costs of renewable energy meant that nuclear either needed to "scale up" to power a pan-European supergrid, or "scale down" through application of small modular reactors, or molten salt (thorium) reactors to meet off-grid needs. This requires flexibility of governance scale – from multi-scalar European governance for energy sharing across Member States, to stronger planning regulations for small scale nuclear projects.
- Energy engagement requires transformation in sustainable values – a greater public awareness of the impacts of different energy technology and resource use choices (not just nuclear-powered electricity production, but heating, transport and land use). It was commonly argued that future energy demand gaps can only be filled by greater awareness of energy use and accompanying demand reduction measures – more nuclear energy would not be enough to fill the gap.
- Education about energy technologies, their socio-economic and climate change impacts is needed for better informed democratic decisions. Social values around energy were deemed to be poorly thought through. Effective future engagement requires good quality information and knowledge systems for sharing information about nuclear energy benefits, risks and costs.

Key action and policy priorities

- Participants in the workshops considered future energy technologies include small modular reactors, thorium and fusion reactors. Yet engagement research and policy development has focussed upon down-stream engagement on established technological designs (such as the European Pressure Water Reactor EPR). Policy makers should investigate 'upstream' engagement processes for small-modular and 4th generation reactors and fusion technologies, so that societal values can be assessed and integrated into future technology design and implementation.

Key action and policy priorities

- Engagement requires education initiatives that combine understanding of diverse environmental values, the socio-economic and environmental impacts of energy technology choices and the capacity building for the democratic involvement of citizens in nuclear energy policy decisions. Concern was raised that uninformed or misguided decision-making might occur under conditions where public decisions are made in an era of 'fake news' – misinformation and untrustworthy information sources would undermine effective democratic engagement. Key policy recommendations are that environmental education needs to be broad and comprehensive, that online engagement platforms must be trustworthy (i.e. well-regulated and policed to remove contributions from outside interference, bots, trolls etc..), and that authentication is necessary (technologies such as blockchain are worth investigating in the design of online engagement platforms to engage with citizens on nuclear energy technology and policy choice).

- Nuclear waste management and site decommissioning require long-term engagement commitments with communities over long time-frames – decisions should not be singular when it comes to nuclear repository siting – a stewardship model that maintains active and ongoing facilitated dialogue between communities and radioactive waste management organisations is advocated. Communication strategies for risk/hazard information over long time-frames is also a high priority in nuclear waste management policy.

Footnotes

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