



Achieving a Social License for Fusion Energy

Technical Meeting on Synergies Between Nuclear Fusion
Technology Developments and Advanced Nuclear Fission
Technologies

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Hoedl, Seth A. "Social License and Ethical Review of Fusion: Methods to Achieve Social Acceptance." NRC Public Meeting, March 30, 2021. available at <https://www.nrc.gov/docs/ML2109/ML21090A288.pdf>



The Social Acceptance Challenge

Examples and Consequences of a Lack of Social Acceptance

- Examples of technologies that face this risk:

1. Genetically modified food¹
2. Facial recognition
3. Vaccines²
4. Fission³

- A lack of acceptance increases capitals costs, litigation costs and risks, and regulatory burdens⁴

Risk-reducing technical solutions, regulatory compliance, and better “communication” or “education” are unlikely, on their own, to alleviate a lack of social acceptance^{5,6}

1. Devos Y, Maesele P, Reheul D, et al. “Ethics in the Societal Debate on Genetically Modified Organisms: A (Re)Quest for Sense and Sensibility.” *Agricultural and Environmental Ethics* 21:29–61 (2008). <https://doi.org/10.1007/s10806-007-9057-6>
2. Robbins, R., Tavernise, S., Otterman, S., “Cash, Breakfasts and Firings: An All-Out Push to Vaccinate Wary Medical Workers” *NY Times*, Jan 14, 2021, <https://www.nytimes.com/2021/01/14/business/covid-vaccine-health-hospitals.html>
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4. Gunningham N, Kagan RA, Thornton D, “Social license and environmental protection: why businesses go beyond compliance,” *Law & Social Inquiry* 29:307–341 (2004).
5. Otway HJ, Maurer D, Thomas K, “Nuclear power: The question of public acceptance,” *Futures* 10:109–118 (1978). doi: 10.1016/0016-3287(78)90065-4
6. Kaslow, J., Brown, M., Hirsch, R. *et al.* Criteria for practical fusion power systems: Report from the EPRI fusion panel. *J Fusion Energy* 13, 181–183 (1994). <https://doi.org/10.1007/BF02213958>

A Cautionary Fission Example: The Muria Nuclear Power Plant

- In July 2006, Indonesian government proposed four 1 GW reactors¹
- The Nahdlatul Ulama, the largest ‘traditionalist’ Islamic organization in Indonesia, determined that the reactors were forbidden under Islamic jurisprudence:
 1. Radioactive waste & local impacts (fish)
 2. Business model
 - Profits transferred abroad, while Indonesia bore the risk and expense of decommissioning
 - Ongoing dependence on foreign expertise and materials

Neither fusion-based power plant nor “outreach”/education would have likely been persuasive

1. Tanter R., “Nuclear fatwa: Islamic jurisprudence and the Muria nuclear power station proposal.” Nautilus Institute for Security and Sustainability, <https://nautilus.org/apsnet/nuclear-fatwa-islamic-jurisprudence-and-the-muria-nuclear-power-station-proposal/> (2007).

The Social Acceptance Opportunity for Fusion

Fusion has an opportunity to distinguish itself from other energy technologies, not just in how it uses physics, but also in how it approaches social acceptance

Established and Emerging Methods to Facilitate Social Acceptance

1. A “Social License”¹
2. Ethical Review Committees²
3. Responsible Research and Innovation³ (emerging)

A combination may be very useful for fusion

1. Gunningham N, Kagan RA, Thornton D, “Social license and environmental protection: why businesses go beyond compliance,” *Law & Social Inquiry* 29:307–341 (2004).
2. UNESCO, *National bioethics committees in action*. (2010); Watts G, “Novel techniques for the prevention of mitochondrial DNA disorders: an ethical review.” Nuffield Council on Bioethics.(2012); Warnock M, “Report of the Committee of Inquiry into Human Fertilisation and Embryology.” U.K. Department of Health & Social Security, London. (1984) <https://www.hfea.gov.uk/media/2608/warnock-report-of-the-committee-of-inquiry-into-human-fertilisation-and-embryology-1984.pdf>.
3. Stilgoe, J. and Owen, R. and Macnaghten, P. (2013) 'Developing a framework of responsible innovation.', *Research policy.*, 42 (9). pp. 1568-1580; R. Owen, P. Macnaghten and J. Stilgoe. (2012), “Responsible research and innovation: From science in society to science for society, with society.” *Sci. and Pub. Pol.*. Vol. 39(6):751-760. DOI: 10.1093/scipol/scs093; Teunis Brand & Vincent Blok (2019) Responsible innovation in business: a critical reflection on deliberative engagement as a central governance mechanism, *Journal of Responsible Innovation*, 6:1, 4-24

Social License

Social License Background

- Represents “society’s consent” to a particular project or endeavor:
“the demand on and expectations for an [activity] that emerge from neighborhoods, environmental groups, community members, and other elements of [...] civil society”¹
- A **process** that opens expertise to new questions and perspectives
- Applied to extractive projects, ecological research, genetic engineering research, etc.¹

Valuable to fusion as applied to research, new technologies, and nuclear waste siting

1. Gunningham N, Kagan RA, Thornton D, “Social license and environmental protection: why businesses go beyond compliance,” *Law & Social Inquiry* 29:307–341 (2004).
2. Jason A. Delborne, Adam E. Kokotovich & Jeantine E. Lunshof (2020): Social license and synthetic biology: the trouble with mining terms, *Journal of Responsible Innovation*

Features of the Social License Method

A two-way **process** that opens expertise to new questions and perspectives:¹

- More than “education,” public relations, or “letting the public see the experts at work”²
- Project proponents have to learn from and **meaningfully** consider input from non-experts
- Addresses what people actually worry about, rather than what they “should” worry about
- Creates a sense of “procedural justice,” even for opponents of a particular activity³
- Acts as a form of peer review that generally improves outcomes for proponents and society⁴

Far more than a legal license or permit⁵: successful examples see regulatory compliance as only a starting point for social acceptance⁶

1. Stilgoe, J, *The received wisdom: opening up expert advice*. Demos, London, 2006. <https://www.demos.co.uk/files/receivedwisdom.pdf>; Grunig J.E., & Grunig L.S., Toward a Theory of the Public Relations Behavior of Organizations: Review of a Program of Research, *Public Relations Research Annual*, 1:1-4, 27-63, DOI: [10.1207/s1532754xjpr0101-4_2](https://doi.org/10.1207/s1532754xjpr0101-4_2)
2. Raman, S, Mohr, A, “A social license for science: capturing the public or co-constructing research?,” *Social Epistemology* 28:258-276 (2014).
3. Ottinger, G. “Changing Knowledge, Local Knowledge, and Knowledge Gaps: STS Insights into Procedural Justice.” *Science, Technology, & Human Values* 38:250 (2013).
4. Reed, MS, “Stakeholder participation for environmental management: A literature review.” *Biological Conservation* 141:2417-2431 (2008).
5. Rooney, D., Leach, J., Ashworth, P., “Doing the Social in Social License.” *Social Epistemology* 28:209-218 (2014).
6. Gunningham N, Kagan RA, Thornton D, “Social license and environmental protection: why businesses go beyond compliance,” *Law & Social Inquiry* 29:307–341 (2004).

Four Key Elements of a Social License

1. Engendering Trust¹
2. Transparency^{1,2}
3. Meaningful Public Engagement^{1,2,3}
4. Protecting Human Health and Safety⁴

1. Rooney, D., Leach, J., Ashworth, P., “Doing the Social in Social License.” *Social Epistemology* 28:209-218 (2014); Hall, N., Lacey, J., Carr-Cornish, S., Dowd, A-M., “Social licence to operate: understanding how a concept has been translated into practice in energy industries.” *Journal of Cleaner Production* 86:301–310 (2015); National Academies of Sciences, Engineering, and Medicine, “Gene Drives on the Horizon: Advancing Science, Navigating Uncertainty, and Aligning Research with Public Values,” National Academies Press (2016).
2. Coglianese C, Kilmartin H, Mendelson E “Transparency and public participation in the federal rulemaking process: Recommendations for the new administration.” *Geo Wash L Rev* 77:924 (2008); Long JC, Scott D “Vested Interests and Geoengineering Research” *Issues in Science and Technology* 29:45–52 (2013).
3. Institute of Medicine “Oversight and Review of Clinical Gene Transfer Protocols: Assessing the Role of the Recombinant DNA Advisory Committee.” National Academies Press (2014).
4. Gunningham N, Kagan RA, Thornton D, “Social license and environmental protection: why businesses go beyond compliance,” *Law & Social Inquiry* 29:307–341 (2004).

Case Study 1:

Pulp Mills in North America, Australia and New Zealand

Traditional Process

1. Design a new plant
2. Seek legal approval
3. Inform the public regarding plans
4. Build new plant

Social License Process

1. Seek public input
2. Design new plant in light of public concerns
3. Seek legal approval
4. Build new plant

Putting the community's interests first through two-way, meaningful conversation reduced civil litigation, accelerated build, and improved the result for community

1. Gunningham N, Kagan RA, Thornton D, "Social license and environmental protection: why businesses go beyond compliance," *Law & Social Inquiry* 29:307–341 (2004).

Case Study 2: Nuclear Waste Siting in the U.S., Sweden and Finland

U.S. Process¹

1. Yucca Mountain designated by Congress
2. DOE evaluated safety
3. NRC/EPA confirms evaluation
4. DOE builds repository

U.S. repository is stalled

Swedish²/Finish³ Process⁴

1. Invited communities to participate in a study
2. Evaluated geology in participating communities
3. Undertook a competition between communities
4. Selected a community
5. Build a repository

Repositories are under construction

1. Cotton T “Nuclear Waste Story: Setting the Stage.” In: Macfarlane A, Ewing RC (eds) Uncertainty Underground: Yucca Mountain and the Nation’s High-level Nuclear Waste. MIT Press (2006); Stover, D., “The “scientization” of Yucca Mountain,” Bulletin of the Atomic Scientists. <https://thebulletin.org/scientization-yucca-mountain> (2011).
2. Lidskog R, Sundqvist G, “On the right track? Technology, geology and society in Swedish nuclear waste management.” Journal of Risk Research 7:251–268 (2004); Swedish Nuclear Fuel and Waste Management Company, Application for license under the nuclear activities act, <http://www.skb.com/future-projects/the-spent-fuel-repository/our-applications/> (2011); SKB, “How Forsmark was selected,” <https://www.skb.com/future-projects/the-spent-fuel-repository/how-forsmark-was-selected/> (2021); SKB, “The Government approves SKB’s final repository system,” <https://www.skb.com/news/the-government-approves-skbs-final-repository-system/>
3. Curry, A., “What Lies Beneath,” The Atlantic, <https://www.theatlantic.com/magazine/archive/2017/10/what-lies-beneath/537894/> (2017); McEven, T., Aikas, T., “The Site Selection Process for a Spent Fuel Repository in Finland – Summary Report,” Posiva Reports 2000-15 (2012); “Posiva is granted construction licence for final disposal facility of spent nuclear fuel,” https://www.posiva.fi/en/index/news/pressreleasesstockexchangereleases/2015/posiva_is_granted_construction_licence_for_final_disposal_facility_of_spent_nuclear_fuel.3225.html (2015).
4. M. Kari et al., “Role of the host communities in final disposal of spent nuclear fuel in Finland and Sweden,” Progress in Nuclear Energy 133, 103632 (2021).

Key Lessons for Fusion and Next Steps

Key Lessons for Fusion

Fusion is more likely to be socially accepted, worldwide, if the fusion community begins the process of achieving social acceptance **now** (regulatory approval will not be sufficient)

- Three key steps to start **today**:
 - Build trust
 - Identify future public concerns, especially concerns in developing countries, which will be different than US or Europe¹
 - Adjust technology and business models to address those concerns

1. Smith J, High MM (2017) Exploring the anthropology of energy: Ethnography, energy and ethics. Energy Research & Social Science 30:1–6

Final Thoughts

“[Decarbonization removes] the fundamental limit on human flourishing imposed by dependence on fossil fuels. The dream of a planet of almost 8bn people all living in material comfort will be unachievable if it is based on an economy powered by coal, oil and natural gas.”

-- *Economist*, October 30, 2021



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