Public Risk Perceptions and Nuclear Energy in Britain

Professor Nick Pidgeon

Director, Understanding Risk Research Group
School of Psychology, Cardiff University

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UNDERSTANDING RISK

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Overview

- **Nuclear Discourses and 'Reluctant Acceptance' in the UK 2000-2010?**
- **Local Nuclear Communities**
- **Engaging publics with Energy System Change**
- **Beliefs about Climate Change**

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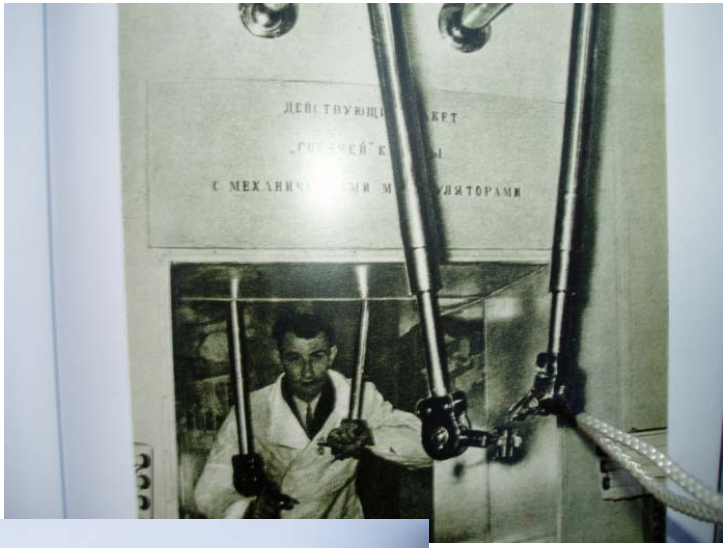
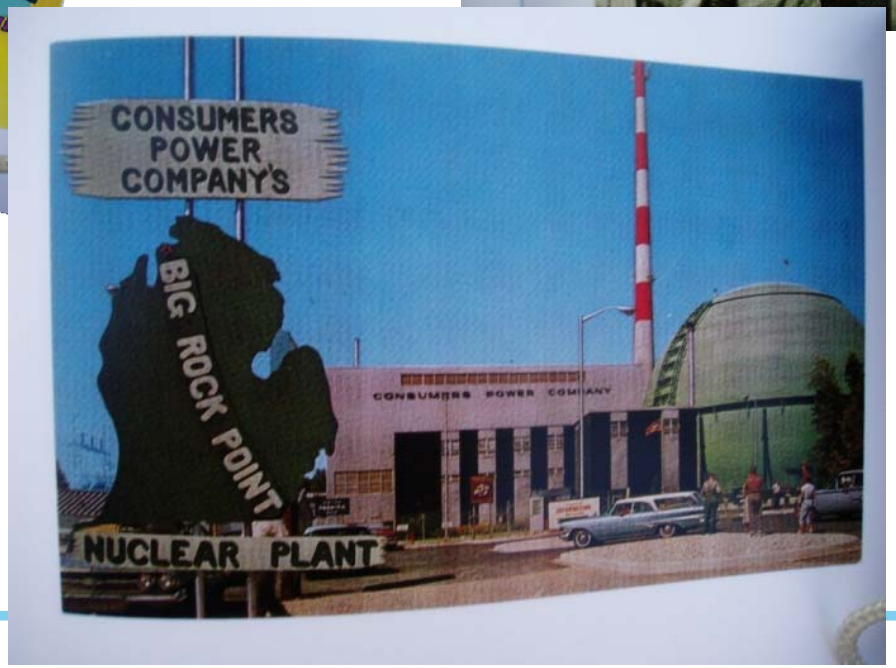
Past Images (circa 1950s)

(source J. O'Brian (2012) *Atomic Postcards*. Intellect Press.)





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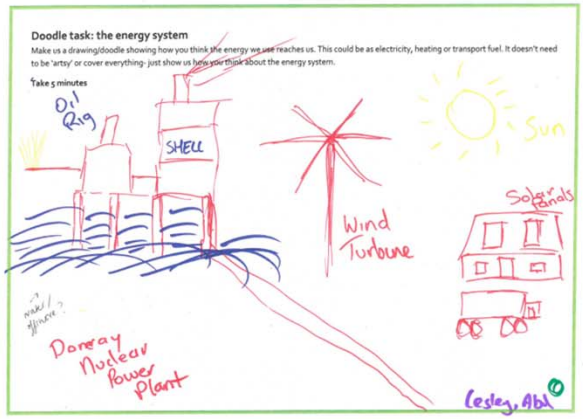
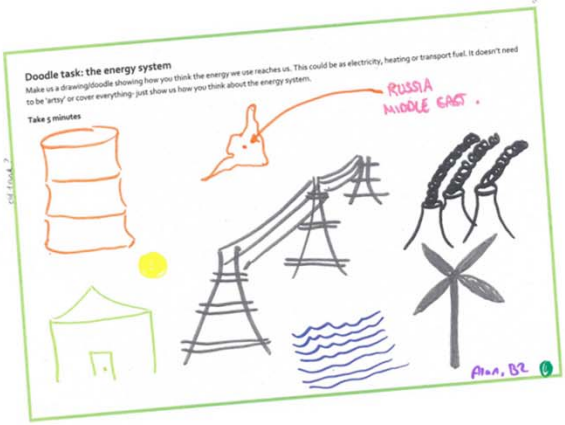
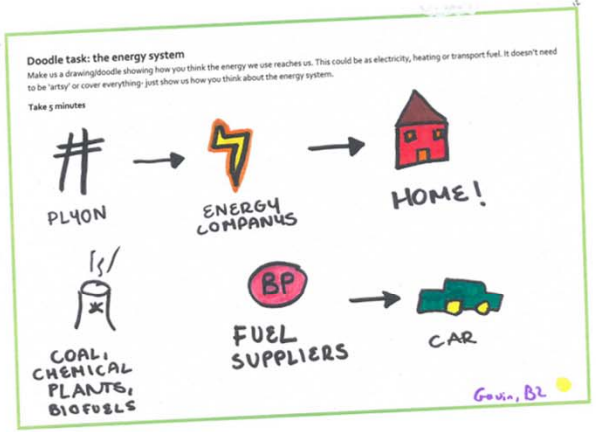
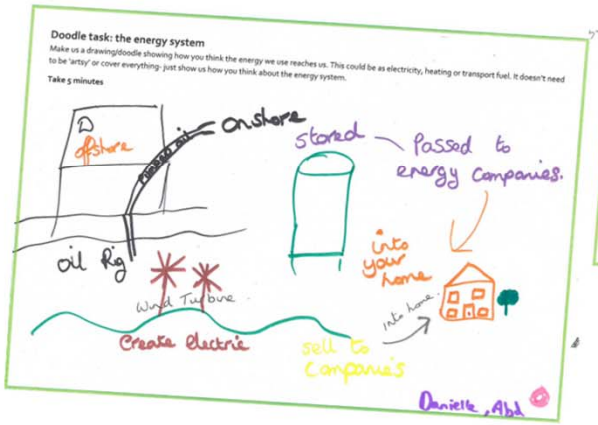
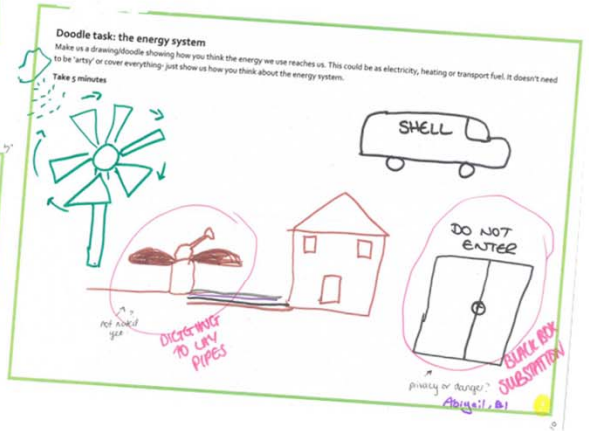
Tacit publics(s) knowledges of energy sources











RESTLESS
Realising Energy Storage Technologies in Low-carbon Energy Systems

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Attitudes to Nuclear Power – 1986-2000

- **Following the TMI and Chernobyl disasters, very high levels of opposition to nuclear power in USA and many European Countries (up to 80% in European polls).**

- **The associations with atomic weapons, radioactive waste, contamination, cancer & accidents lead to unique worries about nuclear power.**

- **Unacceptability of nuclear power also related to distrust of those who manage/regulate it.**

- **Perceived (local and national) benefits also matter!**

- **No one 'public attitude' to nuclear – demographics and values, contexts/conditions, and issue framing all matter.**

- **Shifting Nuclear Discourses and 'Reluctant Acceptance' in the UK 2000-2010?**

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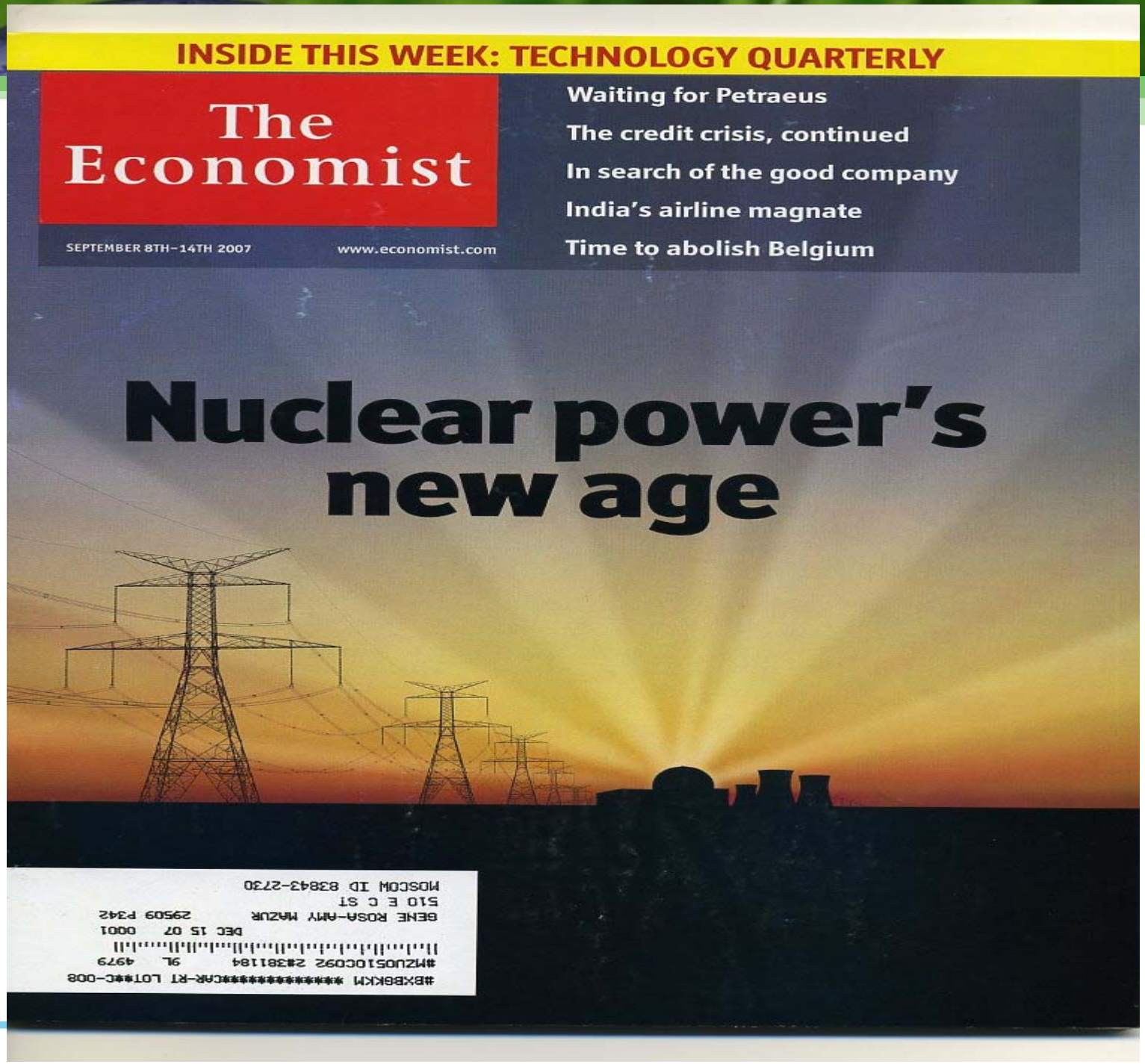
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Reframing Nuclear Power in the UK: 2000-2010

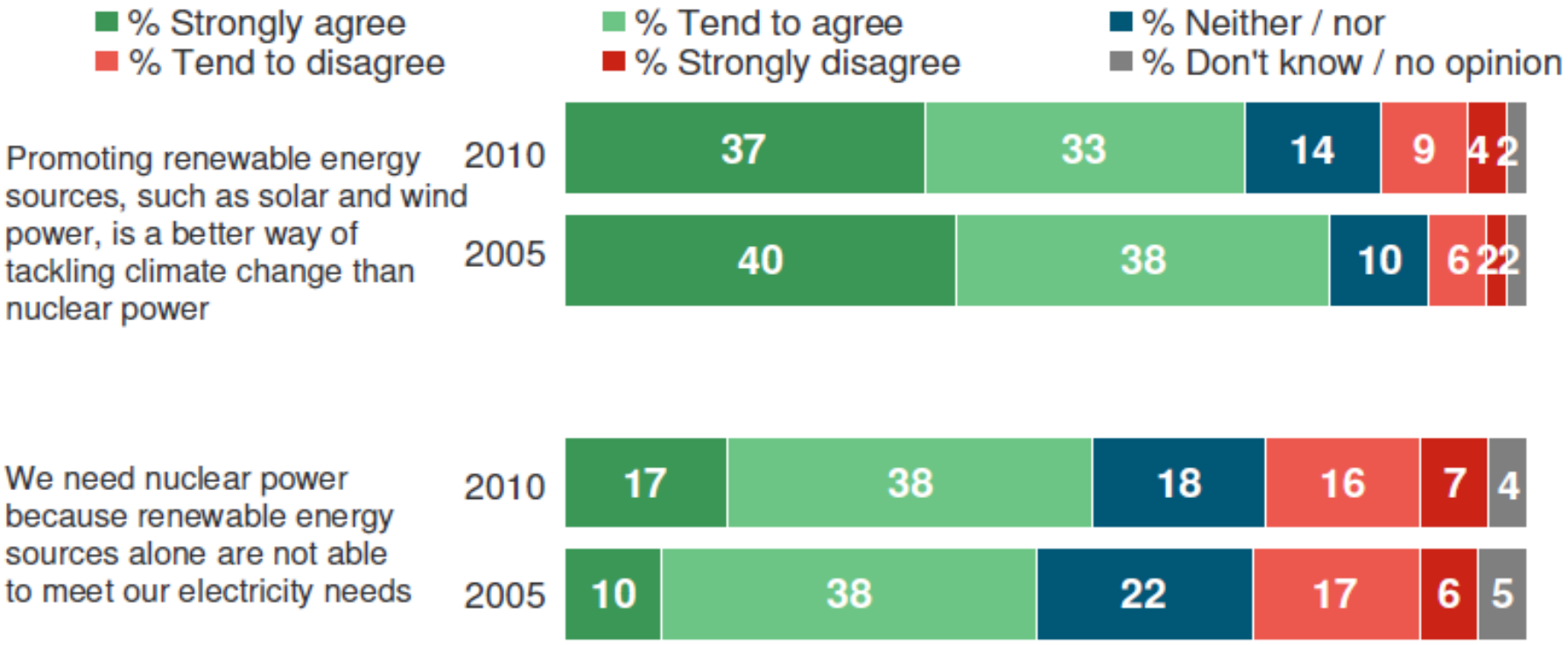
Over the period 2000-2010 Nuclear Power was reframed by various UK policy actors as a part "solution" to Climate Change and Energy Security concerns

- **Renewable sources will not be sufficient to meet future electricity needs (and natural gas stocks running down)**
- **Nuclear power brings reliability (of uranium supplies and in operation)**
- **A 'low carbon' energy source in operation, although construction/decommissioning carbon costs larger**
- **Impacts of this effort was detectable in UK national surveys of beliefs**
- **But culture and values also matter to beliefs**

- Taylor (2016) *The Fall and Rise of Nuclear Power in Britain: A History*. Cambridge, UIT Press;
- Bickerstaff et al (2008) Re-framing nuclear power in the UK energy debate: nuclear power, climate change mitigation and radioactive waste. *Public Understanding of Science*, 17, 145-169
- Corner et al (2011) Nuclear power, climate change and energy security: exploring British public attitudes, *Energy Policy*, 39, 4823-4833.
- See also for USA data - Greenberg and Truelove (2011) Energy choices and risk beliefs. *Risk Analysis*, 31(5), 819-831.

Question 'Framing' Conditions

To what extent do you agree or disagree with the following statements?



Base: 1,822 British adults, aged 15 and over, 6th January-26th March 2010;
1,491 British adults, aged 15 and over, 1st October – 6th November 2005

Ipsos MORI

Source: Cardiff University / Ipsos MORI

Reframing Nuclear Power – A Reluctant Acceptance?

Proposed Climate Change benefits held some traction with some people – but typically a 'Reluctant' or 'Conditional' Acceptance expressing an essential ambivalence about both – all quotes 2002

Paula: It sounds to me like a bunch of people decided to start out this nuclear power thing and it's like, well it's like the Homer Simpson thing isn't it? You are putting it in the hands of these people and they have no idea what the consequences of it are—they are not even gonna be around. And yet we are playing around with it like you know it's jelly and ice cream or something. (Heysham, radioactive waste)

Martin: Yes, I mean they've [fossil fuel and nuclear power] both got their issues haven't they. They've both got their fundamental problems … Obviously, with the storage of the nuclear waste and obviously with the greenhouse effect. (Cromer, risk–risk trade-off)

Mark: You know, having a head-on [collision] with a truck or a tree … the best option is possibly the tree but I still wouldn't want to do it. (Norwich, risk–risk trade-off)

- **Source: Bickerstaff, Lorenzoni, Pidgeon, Poortinga, Simmons (2008) Re-framing nuclear power in the UK energy debate: nuclear power, climate change mitigation and radioactive waste. *Public Understanding of Science*, 17, 145-169.**

- **Local Nuclear Communities**

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Living with Nuclear Risk Study (2003-2008)

Venables, D., Pidgeon, N.F., Henwood, K.L., Parkhill, K. and Simmons, P. (2012) Living with nuclear power: sense of place, proximity and risk perception in local host communities. *Journal of Environmental Psychology*, 32, 371-383.

Parkhill, K.A., Pidgeon, N.F., Henwood, K.L., Simmons, P. and Venables, D. (2010) From the familiar to the extraordinary: local residents' perceptions of risk when living with nuclear power in the UK. *Transactions of the Institute of British Geographers*, NS 35, 39-58.

Henwood, K.L., Pidgeon, N.F., Sarre, S., Simmons, P. and Smith, N. (2008) Risk, framing and everyday life: methodological and ethical reflections from three sociocultural projects. *Health, Risk and Society*, 10, 421-438

Venables, D., Pidgeon, N.F., Henwood, K.L., Simmons, P and Parkhill, K.A. (2009) Living with nuclear power: a Q-method study of local community perceptions. *Risk Analysis*, 29, 1089-1104.

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Cardiff Living with Nuclear Risk Study, UK (2003-2008)

- **Each existing nuclear site is subtly different in social, economic and historical terms**
- **In general more support for nuclear (and new build) than in national samples – but complex and not just pro- or anti-**
- **Benefits (economic and other), familiarity, and trust in local managers are all important**
- **But – ANXIETIES ABOUT SAFETY ALWAYS EXIST below the surface**
- **Concerns about waste**
- **Desire for full consultation**

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Interviews (n=61) Theme 1: Making Risk Ordinary

- Familiarisation
  - **The power station fading into the landscapes**
    "[…]it's just there and that's it, it's just part of the landscape" (Sophie, Oldbury)
  - **Benign constructions of the power station (eg symbolising 'home')**
    "*I don' know why, it used to be a pleasant site if you were at sea, you had a bit of a rotten voyage, you could see that power station and [think/say] 'thank god we're nearly home'*" (Trevor, Bradwell)
  - **Social connections with nuclear power station staff & knowing something about working practices**
    "[…]from what I know of them on a surface basis they're a good bunch of people doing their job properly, on the same basis that I go to work[…and…] from what I see there are a lot of failsafe procedures in effect to stop accidents" (Francesca, Oldbury)

A taken for granted presence

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Parkhill, Pidgeon, Henwood, Simmons, Venables (2010) ***Trans. Inst. Brit. Geog.*****, NS 35, 39-58.**

Interviews (n=61) Theme 2: Noticing the Extraordinary (risk, threat and anxiety as part of everyday life)

- Intersection of risk and biography (as primers of anxiety)

"No not about the area but I have thought many times you know when there were terrorist bombs in London and other places, I have thought the most obvious place for a nuclear, for a terrorist attack would be a nuclear power station and that made me really quite scared" (Sara, Oldbury)

An 'extraordinary risk' or 'nuclear uncanny' (after Joe Masco 'Nuclear Borderlands')

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Parkhill, Pidgeon, Henwood, Simmons, Venables (2010) ***Trans. Inst. Brit. Geog.*****, NS 35, 39-58.**

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July 2008 Oldbury and Hinkley Nuclear Community Survey, Predictors of Support for Local New Build (Cardiff University: n=1,326)

Table 6

Factors predicting attitude to new nuclear build at the existing local site.

Variable	Beta (std)	S.E. of Beta	Sig.
PSSoP-sense of place	0.36	0.01	<0.001
Acceptability	0.28	0.02	<0.001
Concern about nuclear power	−0.21	0.03	<0.001
Trust (in government, nuclear industry and local operators)	0.16	0.00	<0.001
Affiliation (personal)	−0.07	0.07	<0.001
Gender	−0.07	0.05	<0.001

Model: $R^2 = .70$; Adj $R^2 = .70$; df = 1073; $f = 220.38$; $p < .001$. Collinearity statistics ranged from .43 (VIF = 2.35) (Trust) to .93 (VIF = 1.08) (Gender). SoP did not contribute significantly to the model and was therefore excluded from it, along with perceived risks, perceived benefits, affiliation (family and friends), age and concern about radioactive waste.

Venables, D., Pidgeon, N.F., Henwood, K.L., Parkhill, K. and Simmons, P. (2012) Living with nuclear power: sense of place, proximity and risk perception in local host communities. *Journal of Environmental Psychology*, 32, 371-383.

- **Putting Nuclear in Context – Engaging Publics with Energy System Change**

Is there a ‘social contract’ for change?

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Creating a national citizen engagement process for energy policy

Nick Pidgeon[a,1], Christina Demski[a], Catherine Butler[b], Karen Parkhill[c], and Alexa Spence[d]

[a]Understanding Risk Research Group, Tyndall Centre and Climate Change Consortium of Wales, School of Psychology, Cardiff University, Wales CF10 3AT, United Kingdom; [b]Geography Department, The University of Exeter, Exeter EX4 4RJ, United Kingdom; [c]School of Environment, Natural Resources, and Geography, Bangor University, Wales LL57 2UW, United Kingdom; and [d]Horizon Digital Economy Research and School of Psychology, The University of Nottingham, Nottingham NG7 2TU, United Kingdom

Edited by Baruch Fischhoff, Carnegie Mellon University, Pittsburgh, PA, and accepted by the Editorial Board June 12, 2014 (received for review December 11, 2013)

This paper examines some of the science communication challenges involved when designing and conducting public deliberation processes on issues of national importance. We take as our illustrative case study a recent research project investigating public values and attitudes toward future energy system change for the United Kingdom. National-level issues such as this are often particularly difficult to engage the public with because of their inherent complexity, derived from multiple interconnected elements and policy frames, extended scales of analysis, and different manifestations of uncertainty. With reference to the energy system project, we discuss ways of meeting a series of

Public VALUES for Energy System Change

Source: ***Transforming the UK Energy System: Public Attitudes and Acceptability: Synthesis Report*****. UK Energy Research Centre (2013)**

Reducing the use of finite resources

Reducing overall levels of energy use

Avoiding waste

Efficient

Capturing opportunities

Environmental protection

Naturalness and Nature

Availability and Affordability

Reliability

Safety

Social Justice

Fairness, Honesty & Transparency

Long-term trajectories

Interconnected

Improvement and quality

Autonomy and Freedom

Choice and Control

UKERC

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Public VALUES – Nuclear Concerns

Source: ***Transforming the UK Energy System: Public Attitudes and Acceptability: Synthesis Report*****. UK Energy Research Centre (2013)**

Reducing the use of finite resources

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Public VALUES – Nuclear Concerns and Upsides

Source: ***Transforming the UK Energy System: Public Attitudes and Acceptability: Synthesis Report*****. UK Energy Research Centre (2013)**

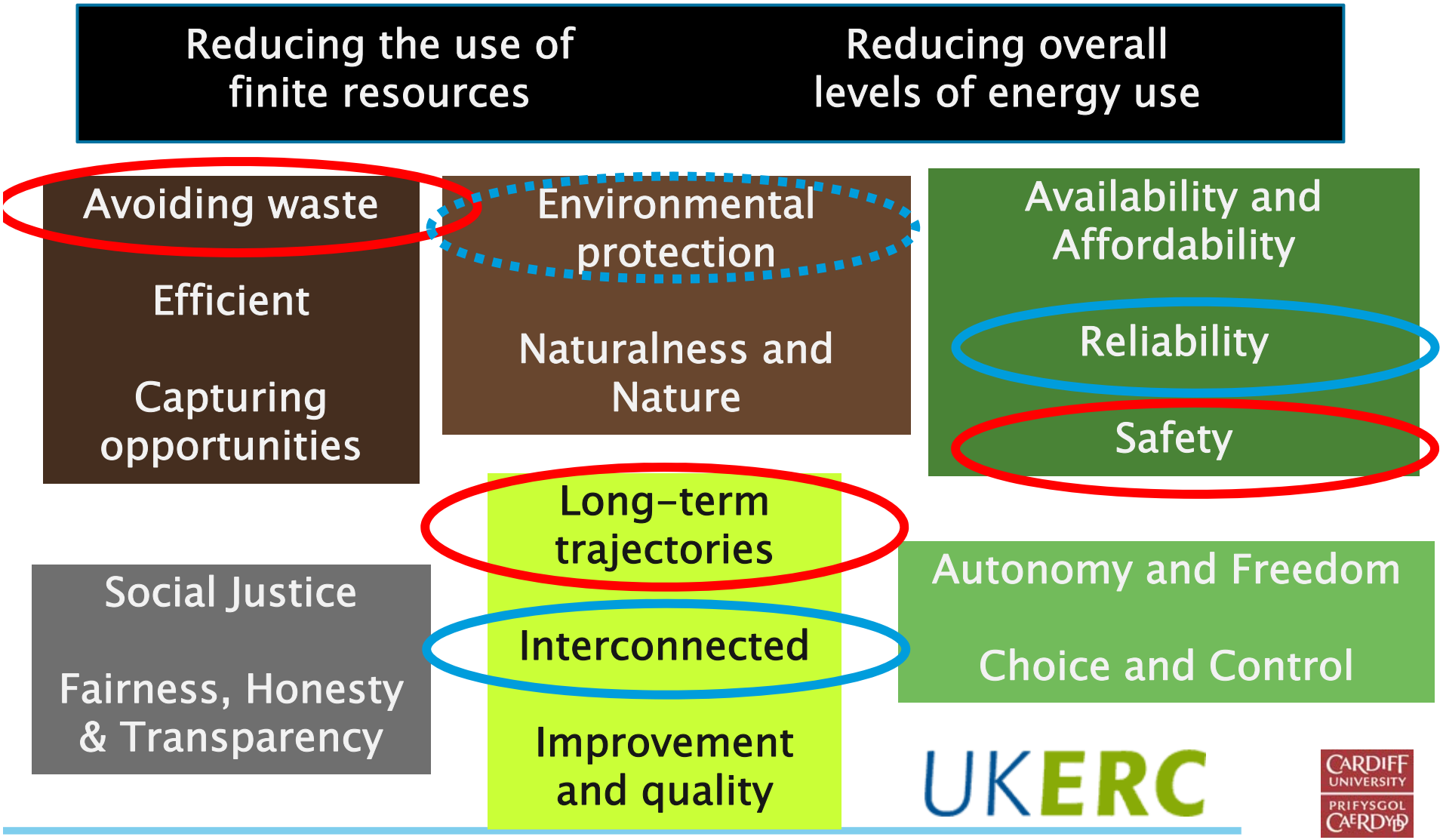

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Figure 1 | Screenshot of the my2050 tool. The image depicts an energy future based on modal responses for respondents completing the original version of the tool where starting positions of levers were set at 0, indicating no change to the current trajectory of that sector (no exemplar scenario presented, n = 1,800). Note that in this pathway, supply exceeds demand by a substantial amount. Image contains public sector information licensed under the United Kingdom's Open Government License v2.0.

See also current (much updated) version - www.my2050.beis.gov.uk

My2050 (2013 version) UK Energy System Tool Lever Positions (0 to 3)

UKERC

	0	1	2	3
Nuclear power	No nuclear power in 2050.	Four times as much nuclear power as today in 2050, comparable to building 13 large nuclear power stations.	Nine times as much nuclear power as today in 2050, comparable to building 30 large nuclear power stations.	Thirteen times as much nuclear power as today in 2050, comparable to building 50 large nuclear power stations.
Carbon capture and storage power	No carbon capture and storage stations beyond UK demonstration programme. Carbon capture and storage does not work at scale.	Around 30 gas and coal stations store their carbon – equivalent to today's gas and coal stations.	Around 45 gas and coal stations filter and store their carbon – Coal and gas industry produces over 50% more power than today.	Around 70 gas and coal stations filter and store their carbon underground. Coal and gas industry over double the size of today.
Wind turbines on land	No onshore wind turbines in 2050.	Eight thousand onshore wind turbines build by 2050. In 2010 we had 3000.	Thirteen thousand onshore wind turbines built by 2050.	Twenty thousand onshore wind turbines built by 2050.

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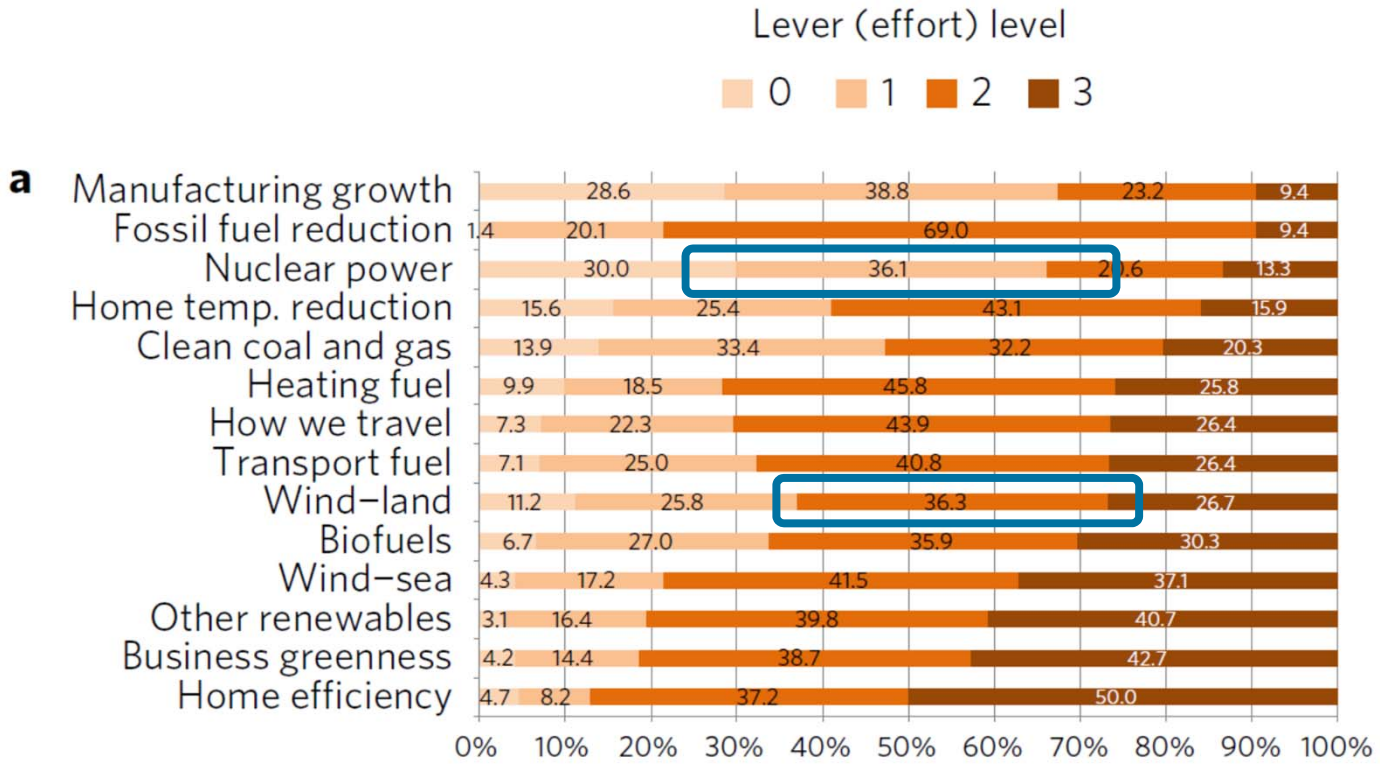

Figure 3 | Responses to the three versions of the my2050 tool. Percentage of respondents at each of the four levels (0 = no effort/change to current trajectory; 3 = heroic measures to change trajectory) for the 14 levers are shown. These are ranked by percentage of respondents choosing the top effort

Source: Demski, Spence and Pidgeon, *Nature Energy*, March 2017.

- **Impacts of Beliefs about Climate Change ?**

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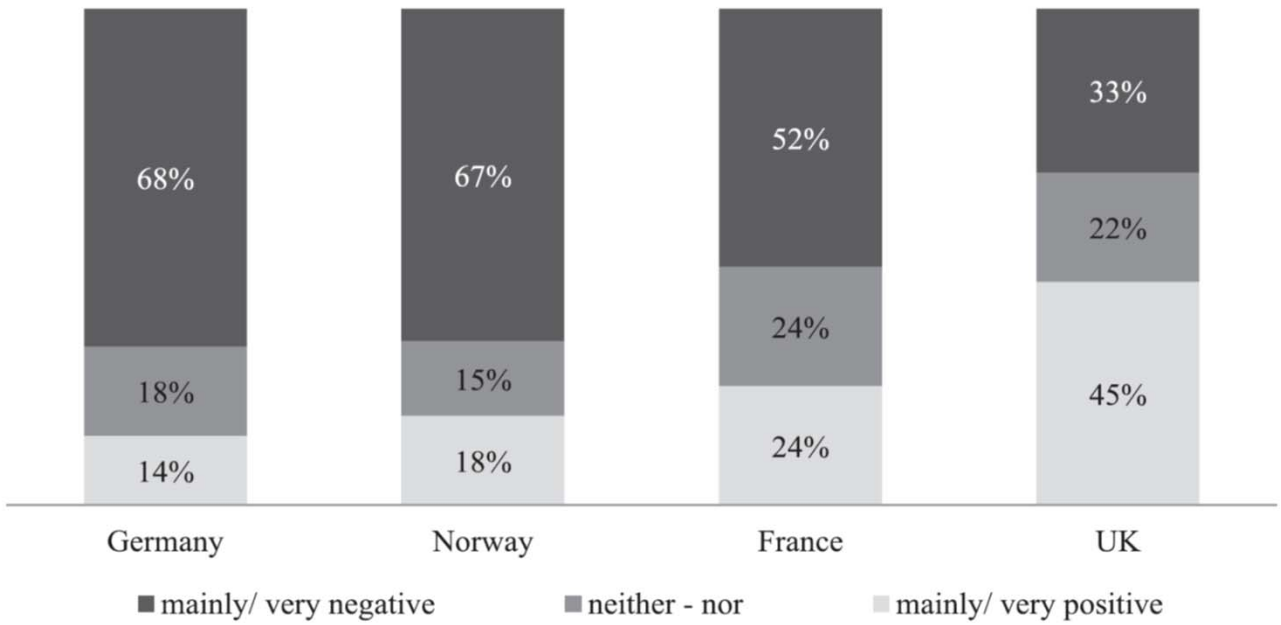
More Recent European Data (Fieldwork 2006; n = 1000 each country)



Note: Item wording: "What is your general opinion about nuclear power as a method of energy generation for the UK/ Germany/ France/ Norway? Please indicate how positive or negative your opinion is"; response scale: 1 = very negative – 5 = very positive.

Fig. 1. Perceptions of nuclear energy in Germany, Norway, France and the UK.

Source: Sonnenberger et al (2021) Climate concerned but anti-nuclear: Exploring (dis)approval of nuclear energy in four European countries. ***Energy Research and Social Science, 75, 102008.***

More Recent European Data (Fieldwork 2006; n= 1000 each country)

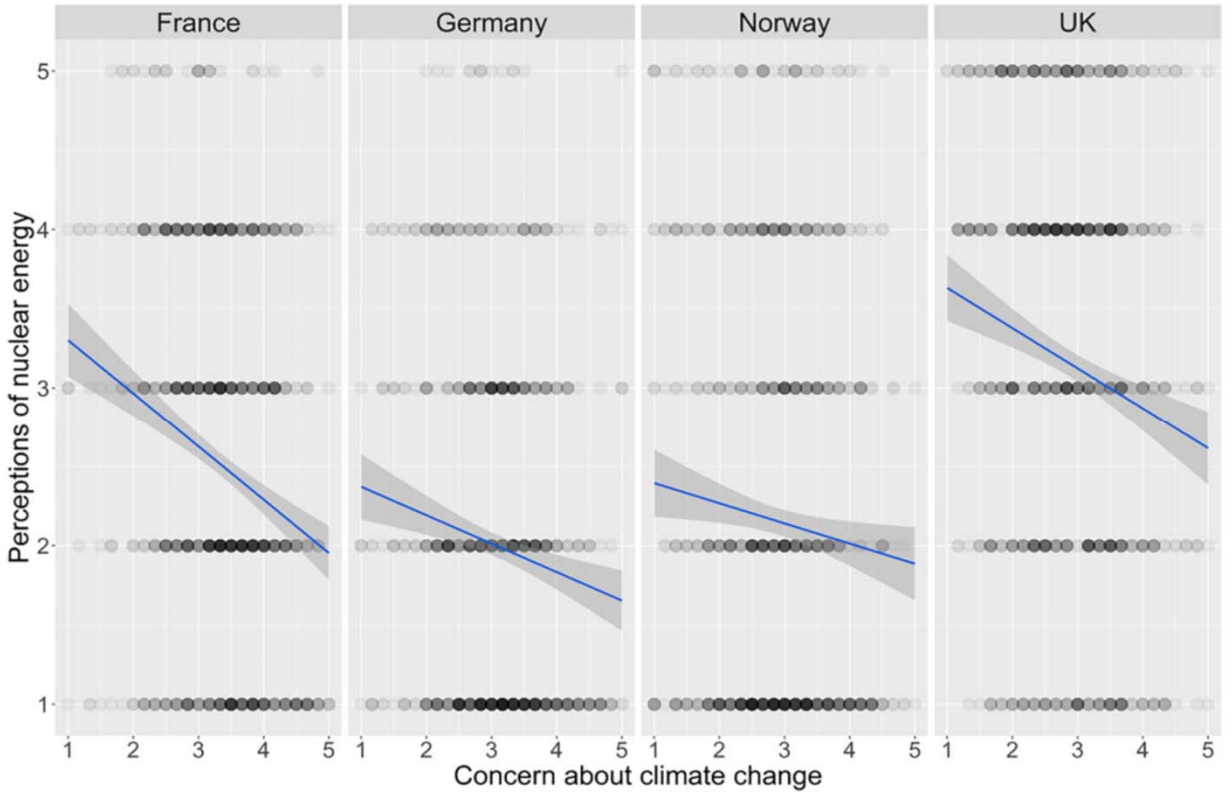


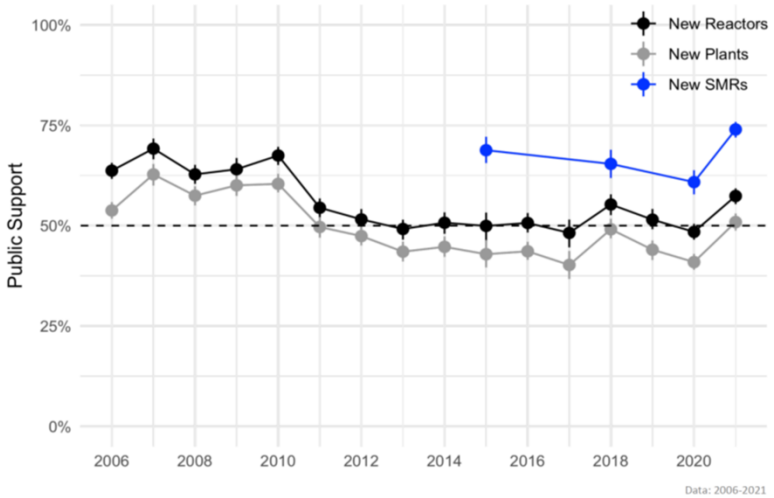
Fig. 2. Association between climate change concern index and perception of nuclear energy in France, Germany, Norway and the UK.

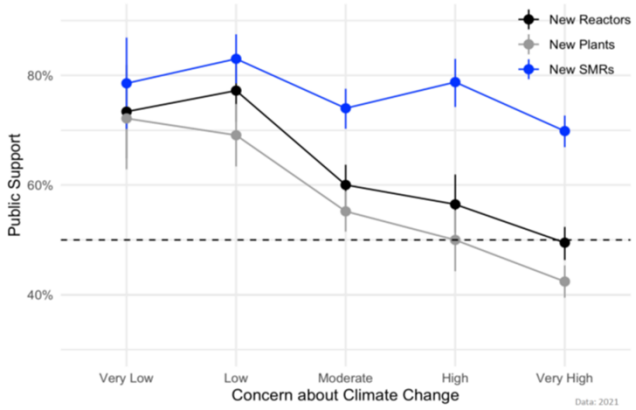
Source: Sonnenberger et al (2021) Climate concerned but anti-nuclear: Exploring (dis)approval of nuclear energy in four European countries. *Energy Research and Social Science, 75, 102008*.

Nuclear Power Support - USA

Public Support for Nuclear Energy

- How do you feel about constructing:
  - Additional nuclear reactors at the sites of **existing** nuclear power plants in the US?
  - Additional nuclear power plants at **new** locations in the US?
  - Small modular reactors to generate electricity in the U.S.?
- Public support is significantly higher for SMRs

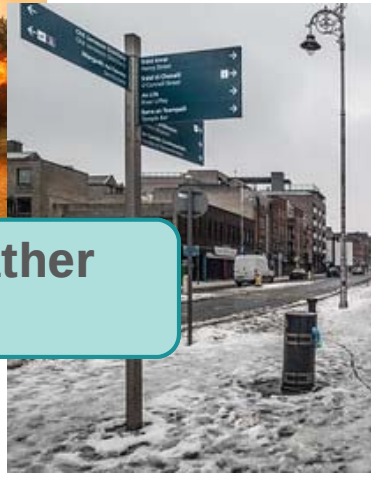




Materials courtesy of Hank Jenkins-Smith and Kuhika Gupta, University of Oklahoma

The New Political Normal ?

Climate change protests



Extreme weather events

Stressed political fabric(s), social uncertainty and extreme polarization

Acknowledgements

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Pidgeonn@Cardiff.ac.uk