History, Trust and Mistrust: Lessons from Radioactive Waste Disposal Megaprojects

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Abstract:

High-level nuclear waste repository projects are unique megaprojects: they are to provide a local solution to a national/global problem, entail exceptional intergenerational justice considerations and multiple interests of the state. As such, repository projects exhibit particular trust and mistrust problems and dynamics. This paper examines in particular the role of public trust in institutions – in the first hand those responsible for NWM, but also trust in institutions of society more generally – as a key element conditioning the success of repository projects. It focuses on three themes: historical legacies, interaction between various dimensions of trust and mistrust, and the potential virtues of mistrust. The paper discusses the importance of these themes via illustrative examples from repository projects in three forerunner countries – Finland, France, and Sweden – and the UK as a contrasting case of failed yet elaborate trust-building efforts. The historical evolution of trust-mistrust relations have facilitated trust-building in Finland and Sweden, but hindered them in France and the UK. These historically shaped trust-building efforts have been conditioned by interpersonal (social) trust relations, but in particular by ideological trust and mistrust relating to broader institutions of society, such as the legitimate roles of market and the state. Success in governing megaprojects will require greater attention to the mutual interaction between trust and mistrust, in particular the virtues of 'healthy mistrust' via 'civic vigilance'.

Keywords: *nuclear waste; dimensions of trust; virtues of mistrust; civic vigilance; social acceptance*

1. Introduction

Despite almost half a decade of intensive efforts, the unresolved "waste problem" – what to do with the high-level radioactive waste – still constitutes a major impediment to nuclear new-build. Burial in deep geological repositories represents the "reference option" for international and national organisations responsible for nuclear waste management (NWM), yet no such repository is operational yet. Apart from the as such formidable engineering task of constructing a safe repository, the key challenge facing these projects is that of identifying local communities with adequate geological conditions and willing to host such facilities. Site investigations in many countries have, one after another since the late 1980s, stalled in the face of vehement local opposition. Since the early 1990s, industry and public authorities have sought to implement more participatory approaches in order to earn *social acceptance* or a "social licence to operate" (SLO) for their repository projects (e.g. Sundqvist & Elam 2010). From

project management perspective, participation has been a major means whereby project owners and promoters seek to strategically manage their external stakeholders, including notably community activists, media, advocacy groups and other non-governmental organisations (e.g. Freeman, 1999; Aaltonen and Kujala 2010). Earning public trust and confidence in the repository concept, in the actors involved, and in the process has become a major objective when organisations deal with external stakeholders and seek social acceptance. The strategies employed by these organisations for stakeholder management, in turn, crucially affect their trust relationships with external stakeholders. Strategies entailing compromise through balancing, pacifying and bargaining with external constituents would appear, a priori, the most susceptible to engender trust, yet alternative options of acquiescence, avoidance, defiance and outright manipulation (Olivier 1991) are common, and would risk generating increasing mistrust.

Repository projects are in many ways unique as megaprojects. Most fundamentally, these projects are not designed in the first hand to generate profit or national, regional and local socioeconomic development, but to provide a local solution to a national – even a global – problem (e.g. Lehtonen et al. 2017a). When weighing the costs of these projects against their benefits, the benefit side is therefore in a way prefixed. Second, radioactive waste needs to be isolated from living organisms for up to 100 000 years, which greatly complicates the arbitrations between the local, national and global interests, and accentuates intergenerational justice considerations. Third, the state is involved in NWM policy in ways that are more profound and multiple than in most other megaprojects. This follows from the distinct patterns of economic interests involved, in particular the close ties between nuclear energy policy and NWM, and from the contentious nature of nuclear power. The industry was initially born to support the production of nuclear weapons, and has, even in the most economically liberal countries, received crucial support via R&D, communication and knowledge-creation, regulation, and direct and indirect economic and institutional assistance. The unresolved 'waste problem' therefore continues to haunt a dense network of partly transnational links between the industry, government institutions, local and national politicians, taxpayers and voters. Fourthly, and crucially for this paper, NWM actors have since a long time recognised the vital importance of issues of trust and mistrust. Efforts to identify willing hosts for waste repositories have suffered from the tradition of opacity and secrecy that have characterised nuclear industry, as well as from the technocratic and non-inclusive processes of site selection that prevailed in the 1980s and 1990s. The creation of the Forum on Stakeholder Confidence (FSC) under the OECD Nuclear Energy Agency (NEA) in 2000 epitomises the realisation of the importance of building trust and confidence if NWM policy was to advance. Trust-building has, indeed, become somewhat of a 'silver bullet', believed to solve what are typically framed as problems of public acceptance and acceptability.

Most trust-related megaproject management literature has focused on the inter-firm partnerships and alliances or interpersonal trust within firms (e.g. Lau and Rowlinson, 2009; Maurer, 2010). By contrast, this paper concentrates on institutional trust. It starts from the assumption that public trust in institutions – in the first hand those responsible for NWM, but also trust in institutions of society more generally – is indispensable for successful NWM policies. However, this paper makes three claims, which it seeks to illustrate via examples from NWM policy in four European countries: Finland, France, Sweden, and the UK. First, I will

demonstrate that ***institutional trust is closely interwoven not only with interpersonal (social) trust relations, but also with ideological trust***, that is, citizens' trust in broader and more abstract ideas relating to the legitimate roles of various institutions in society. In NWM, ideological battles over nuclear power further accentuate the importance of ideological trust. Second, I will illustrate the various ways in which these interactions affecting NWM policies are shaped by the ***country- and context-specific histories*** of the projects in question – within specific 'cultures of trust' or 'regimes of trust'. The attention to context also aligns with observations from recent stakeholder management literature: an individual project is not necessarily the major concern for stakeholders, who operate in the framework of their own stakeholder relationships and historically formed coalitions, which often have powerful impact on the project (Eskerod et al. 2015). Third, I will argue that the focus on 'building' trust has tended to conceal the multiple ***virtues of mistrust*** – in the form of 'healthy' mistrust towards those in power and hence a foundation of liberal democracy, but also as civil society activity, in the form of "civic vigilance" (Laurian 2009).

Finland, France, and Sweden are internationally considered as the three leading countries in repository development, with project in the course or near implementation. The UK provides a contrasting case, with a history of failed efforts to generate consensus and find a willing host community, despite the extensive trust-building efforts. The case selection allows contrasting the Nordic high-trust societies with the low-to-medium trust contexts in France and the UK. The long experience of trust-building and mistrust in the NWM area can provide useful lessons to megaproject management, by highlighting the vital role of institutional trust. This type of trust is indispensable not only for nuclear waste repository projects, but arguably for megaprojects more generally.

The illustrative examples presented in this paper come from two main sources. First, I will use the material produced within the recently finalised Euratom-funded HoNESt project (History of Nuclear Energy and Society), which explored interaction between the nuclear sector and society in 19 European countries and in the USA. Second, I will draw on the extensive work by myself and my colleagues concerning NWM and nuclear energy in the four case study countries (e.g. Kojo 2009; Kojo & Kari 2010; Teräväinen et al. 2011; Kojo & Richardson 2012; Kojo et al. 2010; 2012; Lehtonen 2010a; 2010b; 2015; Lehtonen et al. 2017a; 2017b; Lehtonen & Kojo 2019; Litmanen et al. 2017; Vilhunen et al. 2019; Kari et al. 2010; 2019). This work included semi-structured interviews conducted mainly between 2009 and 2016 with key actors involved in the nuclear waste policy of the four countries at the national, regional and local levels (e.g. local and national-level politicians and authorities, civil society, the nuclear industry and waste management organisations, and academic researchers).

The next section outlines the key concepts employed: social, institutional and ideological trust and mistrust. Section three briefly presents the NWM policies in the four case study countries. Section four examines this experience in light of the above-mentioned three key topics of the paper. Section five concludes.

2. Conceptual framework

In scholarly literature as well as in everyday usage trust is almost invariably portrayed in positive terms. Research has shown its value for a wide range of economic and social processes: interpersonal relations and economic exchange (Dasgupta 1988), financial investments (Kalkbrenner and Roosen 2016, 62), the legitimacy of political power (Tait 2011), societal and economic development and growth (Gallucio 2018), innovation, education, rule of law, good governance, reduction of corruption and violence, well as subjective well-being (Zak and Knack 2001; Laurent 2009, 14; Volland 2017), environmental performance and the propensity to adopt strict environmental policies (e.g. Owen and Videras 2008; Tjernström and Tietenberg 2008; Carattini et al. 2015).

2.1 The three dimensions of trust and mistrust

We define **trust**[1] as a stance whereby an individual accepts 'believing without knowing', thereby placing herself voluntarily in a position of vulnerability towards 'the other', be it another individual or an institution[2] (Earle and Siegrist, 2006). There is always a risk that the 'trustee' proves untrustworthy, yet as a voluntary choice, trust does not have to imply the feeling of loss power and control (Espluga et al. 2009).

Social trust is interpersonal. It can be further divided into **generalised** trust in other, unknown, members of society (Rothstein and Stolle, 2008) and **particularised (specific)** trust in people we already know, with whom we interact regularly, for example in our own social or demographic group (Bäck and Christensen, 2016, p. 180).

The main focus here is on **institutional trust** – the public trust in key institutions involved in NWM, such as nuclear safety authorities, the government, nuclear operators, government regulation, and environmental organisations. Institutional trust can entail **specific support** for a given institution or organisation, or **diffuse support** for the system as a whole (Kestilä-Kekkonen and Söderlund 2016, 141; Lehtonen and de Carlo, 2019). The former typically derives from individuals' judgement of what an institution *does* (its performance), whereas diffuse support springs from what an institution represents for the individual – what it *is* (ibid.). For example, trust in the present government coalition would constitute specific institutional trust, whereas trust in the "British government" would represent a diffuse form of institutional trust. To earn trust, an institution needs to demonstrate competence, sincerity, transparency, reliability in keeping its promises, proven ability to deal with mistrust and avoid mismanagement or entanglement in political scandals (Holmberg and Weibull 2017, 39; Laurian, 2009, p. 383-384; Tuler and Kasperson, 2010). In situations of longstanding institutional mistrust, attempts at trust-building via participation and openness can initially

[1] For the sake of simplicity, we use the term trust to encompass both its traditional meaning as a normative judgement concerning an individual or entity, and *confidence*, that is, a belief based on earlier experience that certain events will occur as predicted (Earle and Siegrist, 2006; Luhmann, 2006; Kinsella 2016).

[2] Following Hodgson (2006, 18), we define institutions broadly, as "systems of established and embedded social rules that structure social interactions". Organisations, in turn, are a specific type of institution.

undermine trust (Gouldson et al., 2007; Laurian, 2009).

The concept of **ideological trust** relates to higher-level institutions, such as democracy, the state, market, and planning, and their legitimate roles in society (Tait, 2011, 158). As a more abstract form of trust, it is difficult to capture via quantitative surveys. Ideology is here understood as a scheme of interpretation of reality, which relates to means-ends relationships and strategies (Söderbaum 1999), i.e. to "wider abstract systems and ideas", such as economic growth models, the legitimate role of government in intervening in the economy (Tait 2011, 160), technological optimism, the precautionary principle, centralised or decentralised solutions (Söderbaum 1999, 163), or the legitimacy of nuclear power as an electricity-generating option. Trust in specific individuals and institutions is ultimately embedded in trust concerning these wider and more abstract ideological elements. What distinguishes ideological trust from social and institutional trust is that it "transcends information" (Tait 2010, 160), that is, ideological trust is not based on previous evidence or knowledge, but "on an individual's or institution's place within wider social discursive structures" (ibid.; see also Lehtonen and de Carlo, forthcoming). However, in longer term, ideological trust can be gradually shaped by our experience from interpersonal interaction and trustworthiness of institutions.

2.2 Downsides of trust and virtues of mistrust

Trust has its downsides. Goel et al. (2005, 203) mentions three harmful consequences from "overtrust": leniency in judging the trustee, delay in perceiving exploitation, and increased risk-taking. 'Bonding social capital' can feed exclusion, homogeneous social networks, specific norms of reciprocity, groupthink, the exclusion of different yet competent others, and creation of sharp boundaries between 'insiders' and 'outsiders' (Laurent, 2009; van Deth and Zmerli, 2010; Kujala et al. 2016, 702). Trustful citizens may lack the motivation to participate in planning and decision-making, preferring instead to delegate power to trusted experts and institutions (Parkins and Mitchell, 2005, 536).

Ultimately, as 'healthy suspicion', mistrust towards the powers that be constitutes a foundation for the vitality of a democratic system – a form of "civic vigilance" (Laurian 2009), responsibility, and countervailing power that helps citizens to hold political, economic and cultural elites to account (Warren, 1999, 310; Laurent 2009, 27; Allard et al. 2016, 14). Organisations and procedures of regulation (e.g. auditing, evaluation, ranking, and benchmarking) represent an institutionalised form of mistrust and vigilance (van Deth and Zmerli 2010, 2665).

Table 1. Summary of the key concepts relating to trust and mistrust.

Type of trust/mistrust	**Social**	**Institutional**	**Ideological**

Description	Generalised Particularised	Diffuse support Specific support	Legitimacy of and support to meta-level institutions
Sources of trust	Competence Sincerity		Worldviews, visions
	Normative predisposition in relation to an institution or an individual (trust)		
	Predictability, based on previous experience (confidence)		

2.3 Measures for building trust and feeding mistrust

NWM actors (industry, governments, government experts) typically stress the importance of public trust as an essential prerequisite of successful RWM. The technical and scientific analyses and design of the waste disposal solution constitutes the most fundamental trust-building measure (e.g. Elam et al. 2010). This paper focuses on the non-technological **trust-building measures**, in the first hand on **those designed to strengthen trust in institutions**. Four categories of measures are particularly relevant in NWM: 1) voluntary opt-in and opt-out, i.e. voluntary engagement by the community and the possibility to withdraw from the siting process; 2) participatory governance approaches; 3) economic support, including notably the community benefit schemes; and 4) the creation of independent bodies of control and oversight.

Civil society actors critical towards RWM policy, in turn, seek to build mistrust – towards institutions via various campaigning strategies such as by disseminating critical information or by revealing cases of mismanagement or even corruption. They further employ means of undermining ideological trust, via criticising nuclear power as an energy supply solution or, for example, criticising what they see as undue involvement of the private sector in governing nuclear energy and RWM policy.

3. Building trust and mistrust in NWM in four case study countries

This section briefly describes the evolution of NWM policy in the four case study countries, in particular from the perspective of dynamics of trust and mistrust. Surveys consistently show exceptionally high levels of interpersonal and institutional trust in Finland and Sweden, whereas France and the UK are situated at an average European level (OECD, 2013, 30; Delhey 2011). However, while evidence for such a general observation seems robust, opinion surveys more specifically focused on NWM policy sometimes give ambiguous if not contradictory results, depending notably on the framing of the questions. For example, a 2007 Eurobarometer study concerning nuclear safety, 48% of the British trusted that nuclear waste could be disposed of safely – a figure only two percentage points lower than in Sweden, slightly higher than in Finland (45%), and far above that of the 26% in France (Eurobarometer, 2007, 29). However,

a similar survey, conducted only a year later, but this time focused on NWM, suggested much higher scepticism concerning the possibility of safe disposal of waste: more than 80% of Finnish, Swedish and French citizens largely or totally agreed that there was "no safe way of getting rid of high-level of radioactive waste", while only 66% UK citizens expressed this kind of scepticism (Eurobarometer, 2008, 27-28). Interpreting the four cases in light of the three key themes of this article hence requires going beyond mere opinion survey data, and specific attention to the historical evolution of trust and mistrust relationships, within the country- and case-specific contexts.

3.1 Finland

In 1978, the nuclear power operators – the state electricity company IVO (today, Fortum Power and Heat Ltd), and the private TVO – were made legally responsible for managing their waste. Operating two reactors of Soviet origin, IVO exported its waste to the USSR, whereas TVO sought a national solution for its waste problem. The highly technical approach to site selection generated local opposition in the late 1980s and early 1990s, and pushed TVO to gradually increase the involvement of citizens in the process (Kojo 2009). Two legislative decisions in 1994 triggered a participatory turn: banning of nuclear waste exports as of 1996, and the Environmental Impact Assessment (EIA) Act, which rendered EIA mandatory. To prepare the construction of a repository, TVO and Fortum set up a joint waste management company, Posiva, which engaged in an exceptionally long and thorough participatory EIA process in 1997-1999. Critics described the EIA as mainly 'theatre play' with little impact on decisions (e.g. Rosenberg 2007; Hokkanen 2008; Strauss 2010). Four municipalities were considered, but Posiva had already shifted its focus to the country's two nuclear municipalities – Loviisa and Eurajoki – where it expected to face little resistance. In 2000, Eurajoki municipal council gave its approval, and thereby allowed Parliament to approve in 2001 a government Decision-in-Principle with votes 159-3 for the construction, of a rock characterisation facility (ONKALO), eventually to become a repository. A year later, Parliament approved the construction of a new nuclear reactor in Olkiluoto. Construction of ONKALO began in 2004, following the Swedish KBS-3 concept, in granitic host rock. In 2015, the government granted Posiva a construction licence for the repository, which employs the Swedish KBS-3 concept of deep disposal in granite bedrock. Posiva, hopes to start disposing of spent nuclear fuel (SNF) in Olkiluoto, in the municipality of Eurajoki, in 2024, only slightly behind the schedule set out in a 1983 government decision.

The government today holds about 52% of the shares of Fortum, whose key areas of activity are in the Nordic and Baltic countries, Poland, Russia, and India. TVO is owned by a consortium of power and industrial companies, with Pohjolan Voima and Fortum as its largest shareholders. The Ministry of Economic Affairs and Employment is responsible for policy planning and coordination (including in the processes of Environmental Impact Assessment, EIA), the safety authority (STUK) acts as the main regulatory body, the highly autonomous municipalities constitute the key local-level actors, while Parliament approval is required for the project to go ahead.

In international arenas, Finland is often portrayed as an exemplary case of democratic and consensual governance of RWM, whose disposal project has advanced without generating

hardly any overt citizen opposition, allegedly owing to careful long-term preparation and consistent implementation of the government strategy from 1983 (e.g. Vira 2006; Kojo 2009; Lehtonen et al. 2017b). This consistency has indeed helped to generate trust in the policy actors, not least amongst the nuclear power companies.

The Finnish case has been characterised by near-absence of overt public opposition, although surveys show relatively low trust in repository safety amongst citizens in Eurajoki (41%) and nationally (36%). Only 57% of Eurajoki residents trust in the reliability of information provided by Posiva. However, this modest level of trust seems to be compensated by exceptionally strong (82%) trust, both nationally and in Eurajoki, in the nuclear safety regulator as source of information on nuclear-related issues (Vilhunen et al. 2019; Energiateollisuus 2018). In its partnerships with the nuclear industry, the municipality has adopted somewhat of a position of a 'bystander', willing to fully delegate safety review of the project to the safety authority, and primarily tending to its economic interests.

The Finnish case carries features of **pragmatic trust**: the repository project appears as inevitable, albeit an outcome of a legally correct process.

3.2 France

The French project has a long and conflict-ridden history (e.g. Blowers 2016). In line with the state-driven nuclear policy in France, the government created in 1979 the National Radioactive Waste Management Agency (Andra) to implement geological disposal. Andra's initial site investigations in the late 1980s generated vehement local opposition. To unblock the subsequent stalemate, the government reopened the search in 1991 to include three different RWM options, and opened the discussion to a wide range of actors (Barthe 2006). Towards the late 1990s, local conflict aggravated again, in the context of declining public trust in the governance of risk,[3] and following government decision to designate as a site for an underground research laboratory (URL) Bure – a small village in a remote, rural, sparsely populated, and socio-economically declining region in the east of France. The other sites eliminated one by one, Bure soon became the *de facto* only candidate for hosting a repository (Blowers 2016). The fifteen-year period of 'opening up' inaugurated in 1991 culminated in a mandatory public debate organised in 2005-06 by the National Commission on Public Debate (CNDP). Even many opponents considered that the Commission had succeeded in resisting pressures from vested interests, protecting its own integrity, and bringing new perspectives to the debate (GC 2006, 64).

The planned repository, Cigéo[4], to be built in clay host rock, would host the high- and medium-level waste from the 58 reactors currently supplying over 70% of France's electricity consumption. Andra plans to start construction in 2022 and operations in 2030. The financing for the project comes via taxes levied on the largely state-owned waste producers: EDF, Orano (until late 2017 Areva), and the national nuclear R&D agency, CEA.[5] The nuclear sector enjoys

[3] Including the widespread perception that the government had sought to conceal the true extent of Chernobyl fallout in France (Lehtonen 2018).
[4] Centre industriel de stockage géologique.
[5] The French state owns over 80% of the shares of EDF, the operator of France's 58 nuclear reactors, and more

a special place among state interests, as a major export sector, a key actor in the modernisation of the country since the 1950s, and a source of national pride (Hecht 2009).

Although supported by most parliamentarians, departmental authorities, business organisations, trade unions, and local mayors (CNDP 2014, 7), the project continues to generate controversy. Only a handful of mayors of the numerous small rural communes in the immediate vicinity of the installation oppose the project, yet radical contestation by local and national activists has intensified recently, and has led to clashes between the police and the demonstrators.

Only 5-6%[6] of the French population would agree to live near a nuclear waste repository (IRSN, 2017, 94-95), yet 78% of the local population trusts in the safety of the repository and 63% trust in Andra as a source of information on the project (Ifop, 2016, 6). National-level surveys reveal a discrepancy between the strong (76,5%) trust in the competence of safety authorities and a relatively low trust in their sincerity in telling the truth of nuclear risks (40% for ASN and 57% for IRSN) (IRSN, 2017, 129).[7]

The French case could be described as one of **'resigned trust'**, characterised by ideological trust in the state, deep-seated reciprocal institutional mistrust, resignation of local actors in the face of state decisions, and perception of the repository project as the 'only hope' for an economically declining region.

3.3 Sweden

In 1977, nuclear law obligated the nuclear operators to demonstrate a "totally safe" solution to the waste problem, as a precondition for new reactor licencing. After a nine-month period of intensive research, the power companies came up with the so-called KBS[8] method. In 1981, they created a joint company (first SKBF; today SKB) to develop and implement the solution. SKB is owned by the 100% state-owned Vattenfall, Forsmarks Kraftgrupp AB (with Vattenfall as a majority owner), OKG Aktiebolag, and E.ON. The Finnish mostly state-owned Fortum owns shares in Swedish nuclear power stations, while other Swedish companies owning shares in the country's nuclear plants are Fortum's subsidiaries.[9] Sweden was one of the early adopters of nuclear power, and the industry has played a significant role in the country's economy. Following a referendum in 1980, the government committed to phasing out nuclear power, yet the schedule has been repeatedly delayed. Eight nuclear reactors today provide about 35% of the country's electricity. The governance structure resembles that of Finland, with strong municipal autonomy as a founding pillar, yet unlike in Finland, the provincial authorities have a coordinating role in EIA, and the licencing system entails two "tracks" – one based on the Nuclear Activities Act, and another on the Environmental Code.

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than 90% of those of the full-fuel-cycle nuclear company, Orano.

[6] Percentage of those accepting to live near a radwaste disposal facility. The figure declined from about 12% in mid-1980s, to the present level in 1987-88.

[7] Trust that these organisations tell the truth about the nuclear issues.

[8] **K**ärn**b**ränsle**s**äkerhet (engl. Nuclear Fuel Safety).

[9] For example, Värmlandkraft OKG-delägarna, Mellansvensk kraft group.

SKB's initial search for a willing site proved unsuccessful in the face of public opposition (Sundqvist, 2002). In 1993–2000, it conducted feasibility studies in eight municipalities. Like Posiva, SKB ended up concentrating its efforts on nuclear communities, of which Oskarshamn and Östhammar proved to be the most eager to engage (ibid.). Like in Finland, the host municipalities are prosperous nuclear communities (hosting nuclear power stations and low—to-medium level waste repositories), where the local nuclear industry appears as a trusted employer and partner. With a largely favourable local opinion, the municipalities engaged in competition for the repository project. In 2009, SKB chose Östhammar as the repository site, while Oskarshamn would receive the encapsulation plant. SKB submitted a construction licence application in 2011, yet the final decision is still pending, notably because of doubts concerning the corrosion rate of the copper-clad waste containers, and the financing of the facility. Perhaps even more so than its Finnish counterpart, the Swedish example is internationally described as a model for democratic and dialogical planning and decision-making (Cotton 2017, 17).

Trust in the safety of the disposal project is stronger than in Finland, both nationally – 73% in short-term safety and 54% in long-term safety (Hedberg, P. & Holmberg, S. 2018) – and locally (86%) (Demoskop 2017). The locals seem to hold significant trust in SKB (76%), while only 61% of Östhammar residents trust in the regulator as source of information on nuclear-related issues (ibid.).

The Swedish case could be described as one of **genuine trust via constructive mistrust**, based on dialogue and counter-expertise, and backed up by strong national-level social and institutional trust, as well as ideological trust in political representation.

3.4 The UK

In contrast with the three forerunner countries, and despite various attempts (most notably in 1982-1987 and 2008-2013), the UK is still to find a willing host for its high-level waste. More often than reactor new-build, waste disposal projects have in the UK been recurrent targets for social mobilisation. Even in the immediate aftermath of Chernobyl, UK residents viewed radioactive waste as a greater risk than a Chernobyl–like accident (Butler et al., 2018).

In 1976, the landmark "Flowers report"[10] by the Royal Commission on Environmental Pollution suggested making nuclear new-build conditional on a solution to the 'waste problem'. The report also called for the establishment of an RWM planning and siting organisation totally independent from industry (Cotton 2017, 72). Contrasting the latter recommendation, Nirex (the Nuclear Industry Radioactive Waste Executive), set up in 1982 to discuss and develop options, was made up of nuclear industry bodies. From 1987 onwards, Nirex sought to find a willing host for a repository, following a 'deficit-model' approach and Decide-Announce-Defend (DAD) tactics. This led to a crisis of trust, which culminated in 1997 when, following

[10] Named after the chairman of the committee in charge of the report, Sir Brian Flowers, a former UKAEA official and a respected nuclear physicist.

a lengthy public inquiry, the government rejected Nirex proposal for an underground Rock Characterisation Facility (RCF) at Sellafield (Cotton, 2017; Butler et al., 2018).

The RCF 'debacle' provided an opportunity for a fresh start and a 'participatory turn': a new independent advisory body, the Commission on Radioactive Waste Management (CoRWM), was vested with the task of inspiring public trust in the country's RWM policy (MacKerron and Berkhout 2009). It embarked in 2003-2006 on an unprecedented process of public and stakeholder engagement.[11] CoRWM was widely commended for its ability to build trust, via its plural composition, openness to public inputs and analytical-deliberative approach (e.g., Chilvers 2007; Chilvers and Burgess 2008; MacKerron and Berkhout 2009; Morton et al., 2009). None of the organisations involved or observing the process contested the final report's recommendations (Cotton 2017, 198): in light of current knowledge, geological disposal was preferred, but should be supported by a robust programme of research on interim storage, while volunteerism and broad participation should characterise the site selection (CoRWM 2006).

A Eurobarometer (2008, 40-41) survey on NWM revealed that only 8% of UK citizens would be prepared to leave decisions on RWM to government alone – the lowest figure in Europe, and well below the 21% in Finland and Sweden and 17% in France. The recent and positive CoRWM experience may in par explain this demand for direct participation in decision-making. An earlier Ipsos Mori poll from 2002 illustrated the mistrust of the government: only 22% of the citizens trusted in government's competence in dealing with the NWM, while 51% thought it was excessively influenced by the industry on this matter (Bickerstaff et al. 2008, 157). As many as 75% trusted the environmental NGOs to tell the truth about NWM, while only 30% trusted the industry and 35% the government (ibid.).

A multistakeholder West Cumbria Managing Radioactive Waste Safely Partnership (2010-2013) put the volunteering approach to test. In January 2013, Cumbria County Council withdrew from the stepwise siting process. The lower-tier Borough Councils (Allerdale and Copeland) were willing to continue, but since an agreement from all three parties was required, the siting process stalled. Subsequent amendments to the policy, notably the introduction of the notion of 'Nationally Significant Infrastructure Projects', seem to transfer power from local councils back towards the central government (Butler et al., 2018).[12]

The UK case could be described as one of '**ambiguous mistrust'** characterised by growing institutional mistrust of the 'Big Six' energy companies (HOL 2013) long-standing ideological trust in market-based energy policy (Rutledge & Wright 2010; Kern et al., 2014) and in "community" (Hildreth, 2011). It further underscores the heterogeneity of publics and ambiguities amongst the UK citizens torn between trust and mistrust towards government scientists and the deficit model (Cotton 2012).

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[11] CoRWM engaged over 5000 people in 8 discussion groups, 4 citizens' panels, an open access online discussion guide, a schools' project, a national stakeholder forum, stakeholder roundtables at 14 nuclear sites, open meetings, consultation documents and correspondence by letter or email (CoRWM, 2006, 6).

[12] The White Paper stated that ministers would prefer to work with public support, but reserved the right to take more aggressive action on planning if "at some point in the future such an approach does not look likely to work" (Cotton 2017, 229).

4. Discussion: historical legacies, interaction of dimensions of trust, and virtues of mistrust

This section discusses the above-described country-specific descriptions in view of the three arguments outlined in the introduction. First, I will first discuss the ways in which the country- and project-specific historical legacies have shaped trust and mistrust relations, and then move on to illustrating the interaction between the three dimensions of trust and mistrust. Finally, the third subsection draws examples from the four cases to highlight the virtues of mistrust in the form of 'civic vigilance'.

4.1 Historical legacies: positive and negative

The British and French experiences highlight the importance of negative historical experiences that have undermined trust-building efforts. In the UK, these start from the mistrust generated over the years by the mediocre technical, safety and economic track record of the domestic nuclear industry (Bickerstaff et al., 2008; Butler et al., 2018). Bickerstaff et al. (2008, 153) evoke the "rich cultural repertoire of images associated with the history of nuclear technology (primarily in the UK), centering on errors and concerns about institutional control, secrecy and competence". Ultimately, such images would be rooted in memories and collective consciousness dating as far as the early 1900s (Bickerstaff et al., 2008).

In the planned repository area, Cumbria, the nearby Sellafield nuclear complex has over the years been subject to repeated health and environmental scandals, ever since the fire in 1957 at Windscale (Blowers 2016; Butler et al., 2018).[13] Mistrust and local opposition were spurred by the Decide-Announce-Decide tactics of Nirex, which sought to educate the presumably ignorant public and persuade it to accept the solution designed by experts, labelling opposition as mere NIMBY-ism and stemming from lack of understanding (Bickerstaff et al., 2008; Butler et al., 2018). The historically established mistrust towards the government RWM efforts also undermined the operation of the West Cumbria Partnership, pushing discussions to broader topics such as nuclear new-build, the types and scale of wastes being produced, and alternative waste management options (Cotton 2017, 212). In the 1990s, scandals such as the BSE (mad cow disease) eroded trust in government's ability to control scientific and technological risks, and also affected NWM trust-building efforts, as people felt excluded from scientific and technical decisions significantly affecting their lives (Bickerstaff et al. 2008, 151).

In the French host region, mistrust has become entrenched throughout the long and conflict-ridden history of the RWM policy, exemplified by local discourses of "us" against "them" ("the state"), and critique against the state's failure to deliver on its promises. Both opponents and defenders of the project often describe the legally mandatory community benefit schemes as a form of bribery (e.g. Blowers 2016; Lehtonen & Kojo 2019), but which has failed to generate the promised territorial development. Furthermore, while the Meuse and Haute-Marne departments indeed volunteered in the mid-1990s to host a URL, Bure then turned from a host for an URL to a repository host, "almost by stealth" (Blowers 2016), which generated discontent

[13] In 1981, the government renamed the Windscale site as Sellafield, to improve its reputation.

amongst the locals, in the face of overwhelming state power. "We've been conned", a local mayor lamented. The so-called "Chernobyl cloud affair" was probably the most fundamental event generating national-level mistrust towards the country's "nuclear establishment": there is a widespread perception that the authorities intentionally sought to conceal the true impacts of the accident in France (e.g. Lehtonen, 2018). In both France and the UK, the tradition of secrecy, traceable to the link between the civilian and military applications of nuclear, constitute another source of mistrust.

In Finland and Sweden, feelings of "broken promises" seemed absent,[14] and the industry and authorities underline the importance of patient and perseverant long-term work towards implementation, following prescribed steps and timetable (e.g. Vira 2006; Elam and Sundqvist 2011). In Finland, trust-building has further benefited from the absence of reactor accidents and from the excellent performance of the country's operating reactors.[15] The Chernobyl disaster probably further enhanced trust in the Finnish solution, by accentuating the prevailing perceptions of a sharp contrast between the 'safe and reliable' Finnish technology management and the unreliable and reckless Soviet/Russian ones (Litmanen and Kojo 2011, 181). In Sweden, the 1980 referendum decision to phase out nuclear has enhanced trust and facilitated discussion on waste management.

4.2 Interacting dimensions of trust and mistrust

Institutional trust and particularised social trust

The trust-based and cooperative regulatory style in Finland and Sweden is ultimately based on the strong ***particularised social trust*** amongst RWM policy actors. The experts have since their university years built up the kind of close ties that have helped to enhance cohesion and mutual trust across institutional boundaries (Jasper 1990; Montin 2015). In international arenas, the seemingly strong trust that the safety regulator expresses in relation to the operators often raises eyebrows.[16] While regulation in the UK has a more adversarial and mistrust-based style (e.g. Jasper 1990, 72), in France, the early regulatory style, characterised by trust-based collaboration within an inner circle of experts – notably the regulator and the operators – has adopted international best practices and evolved towards greater transparency, independence of the regulator and openness towards civil society (Foasso 2012; Mangeon and Pallez 2017; Pallez 2019). This hybrid system coexists alongside adversarial relations between the state and the civil society. Unlike in the Nordic countries, the cohesion within the "nucleocracy" or nuclear "establishment" decried by critics has undermined public trust in NWM. Amongst the

[14] Despite a promise by TVO in 1980 that the "waste would not stay in Eurajoki" – a promise that local opponents reminded about, but absent from the collective memory.

[15] Measured by performance indicators such as Lifetime Energy Availability Factor, Lifetime Unit Capability Factor, and Lifetime Unplanned Capability Loss Factor, the Finnish reactors consistently rank as among the best in the world (e.g. IAEA 2017).

[16] E.g. at an RWM conference on 11 April 2019 in Paris, the Finnish regulator was criticised for setting a bad example, as a representative of a forerunner country, for other countries in their RWM management efforts, by founding its activities on an unwarranted trust in the operator.

local population in the host region, it has fed "us vs. them" perceptions and mistrust of the state. As such, it illustrates the downsides of "bonding social capital".

The UK example of highlights the reciprocity and self-reinforcing nature of trust and mistrust. Nirex may have been sincere in its efforts to build trust, yet the Decide-Announce-Defend approach was inherently built on mistrust towards the competence but also the sincerity of citizens. This perception that Nirex and government engineers and scientists were arrogant and mistrustful towards citizens generated resentment, opposition and further mistrust amongst the local population (UK SCR).

Institutional trust and ideological trust

The historical legacies and social-institutional trust/mistrust relations operate against the background of long-standing ideological trust. Ultimately, our cases reflect the historical differences between the Nordic trust-based and the liberal mistrust-based models of democracy, and between the trust-based and mistrust-based regulatory styles (e.g. Jasper 1990; Montin 2015).

In the 'Nordic model', the public interest is collaboratively defined and defended by state bureaucracy and local authorities (e.g. Puustinen et al. 2017). The Finnish high levels of trust in RWM institutions is backed up by strong ideological trust in representative democracy, municipal autonomy, state bureaucracy, and legalism (ibid.). In such a context, anchoring the approval in a parliamentary decision was vital for the legitimacy of the project. The strong trust in technology and science, rationality, and pragmatism have led some to portray Finland as an "engineering nation"[17], with the 'Finnish engineer' sometimes seen as almost a mythical figure (Lammi, 2009). The successful "Finlandisation" of Russian reactor technology in Loviisa further buttressed this perception (Michelsen and Harjula 2017). The Swedish case exhibits similarly solid ideological trust in state institutions, yet the primary object of trust is the system of political representation democracy, while "trust in bureaucracy" appears strong yet secondary (e.g. Kettunen, 2012, 78; Tahvilzadeh, 2015).

The French and British cases illustrate the ambiguities and contradictions in the interaction between institutional and ideological trust and mistrust. In the UK, these reflect the ambiguous relationships between a growing institutional mistrust of the 'Big Six' energy companies (HOL 2013), government's RWM policy (Bickerstaff et al., 2008; Eurobarometer, 2008), and the long-standing ideological trust in both market-based energy policy solutions (Rutledge & Wright 2010; Kern et al., 2014) and "community", e.g. in the form of "localism" (Hildreth, 2011), such as community energy. Despite the trust in the markets, as a private-industry-led organisation, Nirex was not seen as a legitimate and credible defender of safety and public interest, but instead engendered mistrust and 'uninvited' forms of participation (e.g. Cotton 2017; Butler et al., 2018).

The French example, in turn, reveals ambiguities between strong ideological trust in the state as the only legitimate defender of public interest (e.g. Saurugger 2007), and an equally

[17] An expression used by an interviewed energy industry representative, in June 2016.

strong and reciprocal institutional mistrust between the state, the local level actors, and civil society. Local actors mistrust the state institutions (esp. Andra) precisely because these have in the past failed to respect the norms of French republicanism and live up to the high standards expected from them. Arguably, the strong ideological trust in the state has 'raised the bar', and thereby accentuated the mistrust felt when state authorities are seen to fail to deliver their promises. Furthermore, local authorities in Finland and Sweden have an established and legitimate role in defending the public interest, while state actors in France and the UK typically mistrust the local authorities. Such mistrust is partly institutionalised in legislation, as exemplified by the recent planning legislation reforms in the UK that shift decision-making power back to the central level.

4.3 Virtues of mistrust, downsides of "overtrust"

In France, the traditionally adversarial relations between the grassroots and the state constitute a fruitful basis for mistrustful and potentially constructive counter-expertise. Given its origins as an offspring of atomic weapons industry, the French nuclear energy sector suffers from a reputation of secrecy and opacity. The state has over the years pushed for transparency, under pressure from civil society, and following especially the controversy over the impacts of the Chernobyl accident (Lehtonen 2018, 63–75). As an enduring topic in nuclear-sector debates in France, transparency has been increasingly institutionalised in legislative acts, multistakeholder bodies, and 'counter-expertise' organisations recognised by the state (e.g. Lehtonen, 2018).

However, the Nordic cases provide the most interesting illustrations of the potential virtues and ambiguities of mistrustful 'civic vigilance'. "Civic vigilance" seems absent in Finland – another indication of the absence of a 'Nordic model' (cf. Litmanen et al., 2017). Civic vigilance is founded in the idea that the key function of counter-expertise and NGO activity is feeding mistrust, in the name of the public interest. In Sweden, the two host municipalities adopted a highly proactive role, seeking to build independent competence also in safety matters (Kari et al., 2019). Stakeholder dialogues were anchored at the municipal level political representation, yet they also illustrated active efforts by the state to build trust by supporting municipalities and NGOs in their 'counter-expertise', communication, participatory review and monitoring (ibid.). The dialogical Environmental Court hearings in 2017, and the attempts by the National Council on Nuclear Waste to provide a more level playing field for debates further helped to build trust. The two-track licencing may have complicated the process yet it also gave environmental NGOs a stronger and specific role in the EIA, and put on a more equal footing and confronted the competing paradigms of 'planning' and 'precaution' (Keskitalo et al., 2009). Trust was built via long processes of dialogue, counter-expertise and open exploration of potential weaknesses of the technical solution, that is, via a dynamic interaction between trust and mistrust.

The Finnish example, in turn, reveals great deference to authorities, the rule of law, and the engineers in charge of the project, and relatively strong mistrust of environmental NGOs (e.g. Litmanen et al., 2017). A certain mistrust of civil society is institutionalised within the decision-

making structures: administrative decisions alone suffice for construction and operation licences, while funding to NGOs and a counter-expertise tradition are practically absent. The absence of civic vigilance evokes the danger of institutional "overtrust" – excessive deference to authorities. The Finnish host municipality seems to have nearly symbiotic relationship with the companies essential for its prosperity, and is willing to fully delegate risk-related analysis to the safety authority (Kari et al., 2019). The shortcomings of the EIA in building trust (Rosenberg, 2007; Strauss, 2010; Hokkanen, 2008) did little to undermine this trust and silent acquiescence in the face of a project that the community saw as indispensable for its socioeconomic wellbeing and survival.

As the recent controversies over the safety of the Swedish repository concept show, the Swedish model carries traits of a mistrust-based regulatory style – which is arguably making inroads to Nordic administration more broadly (Montin, 2015; Puustinen et al., 2017), but does not seem to have yet affected the Finnish RWM policy. The compatibility of the civic vigilance model with the trust-based Swedish tradition remains to be proven. Furthermore, in both Nordic countries, the strong ideological trust in bureaucracy and political representation translates into the corresponding mistrust of approaches that would give citizens a more direct role in decision-making (e.g. Rask 2003; Lehtonen and De Carlo, 2019). In this context of strong institutional and ideological trust, more direct forms of citizen engagement appear as doubtful to many.

5. Conclusions

Building trust in the relevant institutions is crucial for the success of nuclear waste management megaprojects and, arguably, for megaprojects more generally. However, efforts to build such trust need to carefully consider three key elements highlighted in this paper. First, the historical evolution of trust-mistrust relations may either facilitate (like in Finland and Sweden) or hinder (France and the UK) the success of specific trust-building efforts. Experience from research and practice on stakeholder engagement has time and again demonstrated the crucial role of context and history for trust-building efforts. Given the extremely long timescales involved, nuclear waste repository projects help to underline the enduring importance of such contextual factors. Project stakeholder management may well have moved on beyond its initial and arguably excessive focus on a given project by paying greater attention to stakeholder networks (Eskerod et al. 2015) and adopting various network approaches to project governance, with trust as a major element in such governance (e.g. Girmscheid and Brockmann 2010) yet the enduring importance of history and context deserves greater attention.

Second, institutional trust is constructed or undermined in dynamic interaction with social and ideological trust. In NWM projects, ideological trust takes on particular importance, given the value-laden nature of nuclear power, and the pervasive role of the state in this industry and markets. However, the relevance of ideology is not limited to the contentious nuclear-sector megaprojects. Quite the contrary, social mobilisation against megaprojects typically stems from disagreement over deeply held values, whether those values concern relations to nature and natural resources, community identities, trust in the state and the markets, or diverging conceptions of justice, democracy and community participation. Analysing megaprojects

through the angle of the interacting dimensions of trust and mistrust can help project managers and stakeholders better understand such conflicts and achieve more informed albeit not necessarily conflict-free mutual interaction.

Third, along with efforts to build trust, success in governing megaprojects such as nuclear waste project repositories requires attention to the ways of mobilising mistrust for constructive purposes. Not only is mistrust unavoidable, but it is also an essential element of democracy, which can strengthen megaprojects, including their underlying knowledge base, anchoring in the local community, and democratic legitimacy. Obviously, entrenched mistrust can be highly dysfunctional, and trust and mistrust often go hand in hand. The challenge for megaproject management is therefore identifying ways in which such interaction between trust and mistrust can serve productive purposes and when mistrust instead becomes dysfunctional. This in turn requires keen attention to the historically shaped context, and to the interplay between the various dimensions of trust and mistrust.

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