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Conditional Progress

Technical Rationality and Wicked Problems in Nuclear Waste Management

Hannes Lagerlöf

Institutionen för sociologi och arbetsvetenskap

Samhällsvetenskapliga fakulteten

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Abstract

While various states and enterprises have produced nuclear power for decades, that is, demonstrated the functionality of the nuclear fuel cycle from uranium mining to power production, the waste that is simultaneously produced has been provisionally stored awaiting a safe solution. Still, no country has implemented such a solution.

Nuclear waste is both dangerous and notoriously controversial, implying a range of social and technical problems. However, according to prevailing assertions in nuclear waste management (NWM), lingering concerns have now been addressed and definitive solutions are ready to be implemented.

In this thesis, I problematize these claims. By asserting that NWM constitutes a ‘wicked problem’ – that is, a problem to which there is no ‘silver bullet’ solution, only a set of suboptimal options to choose from – my ambition is to produce knowledge of that which has remained unsolved, de-emphasized, sacrificed, or even suppressed as NWM has progressed. Rather than understanding NWM as progressing because it has *solved* remaining problems, I ask how progression is possible *in spite of* the insolubility of these problems.

Points of departure like my own are marginal in previous research. Albeit sometimes critical, research has far from exhausted critical perspectives readily available for social scientists. I argue that such concepts are a viable future research route. To contribute to formulating a more critical research path, I turn to science and technology studies (STS) because this field contemplates a broader range of sociotechnical issues than does most NWM research. However, STS has increasingly come to elaborate theoretically on instances in which socio technical configurations are made unstable, change occurs, and actors challenge taken-for-granted scientific facts and technologies. My core observation is that such a focus downplays the significance of stability and inertia, which I hold to be far more prevalent phenomena in NWM.

With a few caveats, I propose that these aspects of NWM can be understood using ‘critical constructivism’, that is, an alloy of the Frankfurt School’s critical procedure and STS. By emphasizing the critical legacy of critical constructivism – primarily by borrowing the concept of ‘technical rationality’ – I argue that NWM’s progress can be understood in new ways.

Empirically – by means of participant observation and textual analysis – I engage with four NWM sites, both locally and internationally. In Study I, we study how contradictory social interests in NWM were concealed by means of *technical* consensus and the production of *technical* standards at the European policy level. In Study II, I seek to understand why a scientific controversy over copper corrosion remained the main issue in a Swedish court of law for technical and nontechnical actors alike, and why the broader implications of nuclear power and NWM were not made explicit. In Study III, I analyse the Swedish nuclear industry’s tactics to secure consent in order to prevent opposition in a local community where a final repository for spent nuclear fuel will be built. In Study IV, we analyse how internationally influential implementers conceive of public emotions, and how implementers foresee the transformation of public emotions to facilitate the implementation of repositories.

On an aggregate level, the individual studies together show the ways in which NWM – in order to implement geological disposal – depresses and excludes reasonable objections that could challenge NWM’s biases or expose its historical contingencies and preconditions. In the prevailing culture of NWM and its technical rationality, one of the few areas in which critique is still seen as legitimate is in strictly *technical* domains. The scrutiny of scientific and technical detail is recognized as viable because of its association with technical rationality, taking precedence over other forms of critical procedures based on, for example, the lived experience of technology and/or ethical concerns. A core conclusion that I draw, and that is enabled through the deployment of critical constructivism – is that the material nature of nuclear waste has rendered *irreversible* damage to the prospects of achieving change in the field.

Keywords: nuclear waste management, science and technology studies, critical constructivism, sociology, technical rationality, reification

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