

# How Should History of Technology Be Written?

## Some Lessons from an Ongoing Research Project on the Global History of Nuclear Energy

KATI LINDSTRÖM, ALICIA GUTTING, PER HÖGSELIUS, SIEGFRIED EVENS, ACHIM KLÜPPELBERG,  
ROMAN KHANDOZHKO AND ANNA STORM

In the last ten years, history of technology has transformed from a national, single-authored endeavour to an increasingly transnational or even global undertaking that follows the cross boundary flows of matter, scientific and technological knowledge as well as experts and organisations. Transnational history of technology such as in the *Making Europe* book series<sup>1</sup> has highlighted the asymmetrical relations of power and mobility in the state-sanctioned and unofficial flows of technology and expertise, without sacrificing the materiality of the technologies. Our own international project on global history of nuclear energy,<sup>2</sup> in which the seven of us have been working together since 2018, is part of this movement. The following is an outcome of the many methodological discussions in our heterogenous team on how history of technology can and should be written.

For us the main strategic choice, when it comes to the spatial-geographical dimension, is not so much about whether to choose one or another geographical level or scale. The challenge is, instead, to make different spatial perspectives speak to each other. We make heavy use of local and regional cases to tell a global story. Like Joachim Radkau, we strongly believe that research on a local level may help global history to ground-breaking new insights.<sup>3</sup> But the opposite point can also be made: global historical analyses should be performed in such a way as to enrich our understanding of local and regional historical destinies. However, too often historians of technology opt to engage not more than marginally in discussions that involve different geographical levels. In doing so, they miss out on an important opportunity to make their research relevant for a wider academic audience. This is perhaps one reason why many articles and books published in our field attract the attention of a sadly low number of readers.

1 *Making Europe*, series editors Johan Schot and Philip Scranton, six volumes published between 2013–2019 by Palgrave Macmillan, see [makingeurope.eu](http://makingeurope.eu).

2 The project, funded by the ERC and led by Per Högselius at KTH Royal Institute of Technology, is called NUCLEARWATERS: Putting Water at the Centre of Nuclear Energy History. It will be completed by 2023. See further the project website [www.nuclearwaters.eu](http://www.nuclearwaters.eu) [accessed 15.5.2021].

3 Joachim Radkau, *Nature and Power. A Global History of the Environment* (New York 2008).

We are strong believers in the benefit of transnational historical analysis, although, needless to say, national perspectives do remain relevant. Transnational analysis, as we see it, requires that we simultaneously acknowledge and ignore national borders.<sup>4</sup> We observe that, in actual practice, the potential of transnational approaches continues to be vastly underexploited, at the expense of studies that take the nation state as their point of departure out of mere convenience. Our own thematic field is a case in point: nuclear energy historians have provided us with numerous excellent studies of the national nuclear programmes of Germany, France, Britain, the Soviet Union, Bulgaria and so on, while offering strikingly few studies that take the transnational dimension seriously.<sup>5</sup> This is a pity. In our view, few things in the history of nuclear energy are more fascinating than to trace technological ideas and engineering practices as they travel the world, how international organizations fit in our global nuclear story and how nuclear materials, technological equipment and radioactive contamination move over vast distances. We have also found it useful to break out of the still-dominant methodological nationalism by taking physical—rather than political-administrative—geographies as points of departure. Hence our project involves writing the nuclear histories of “wet regions” such as the Baltic Sea region, the Rhine river basin and the aquatic complex hosting the Chernobyl nuclear power plant—rather than of

- 4 For in-depth discussions about transnational approaches to writing history of technology, see e.g. Erik van der Vleuten, “Toward a Transnational History of Technology. Meanings, Promises, Pitfalls”, *Technology and Culture* 49 (2008), 974–994; John Krige (ed.), *How Knowledge Moves. Writing the Transnational History of Science and Technology* (Chicago 2019).
- 5 See e.g. Joachim Radkau, *Aufstieg und Krise der deutschen Atomwirtschaft 1945–1975. Verdrängte Alternativen in der Kerntechnik und der Ursprung der nuklearen Kontroverse* (Reinbek b. Hamburg 1983); Joachim Radkau and Lothar Hahn, *Aufstieg und Fall der deutschen Atomwirtschaft* (Munich 2013); Gabrielle Hecht, *The Radiance of France. Nuclear Power and National Identity after World War II* (Cambridge, MA 1998); C.N. Hill, *An Atomic Empire. A Technical History of the Rise and Fall of the British Atomic Energy Programme* (London 2013); Paul Josephson, *Red Atom. Russia’s Nuclear Power Program from Stalin to Today* (Pittsburgh 2000); Sonja Schmid, *Producing Power. The Pre-Chernobyl History of the Soviet Nuclear Industry* (Cambridge, MA 2015); Ivaylo Hristov, *The Communist Nuclear Era. Bulgarian Atomic Community During the Cold War, 1944–1986* (Amsterdam 2014). Even the impressive, pan-European HoNESt project, which was completed only recently, was organized primarily as a set of national case studies, although some very interesting follow-up work by the project members do take into account the transnational dimensions in promising ways, see e.g. Astrid Mignon Kirchhoff and Jan-Henrik Meyer, “Global Protest against Nuclear Power”, *Historical Social Research* 39 (2014), 165–190; Arne Kaijser and Jan-Henrik Meyer (eds.), “Siting Nuclear Installations at the Border”, special issue in *Journal for the History of Environment and Society* 3 (2018). Other studies that do take a transnational approach include, for example, Itty Abraham, “The Ambivalence of Nuclear Histories”, *Osiris* 21 (2006), 49–65, and Gabrielle Hecht, *Being Nuclear. Africans and the Global Uranium Trade* (Cambridge, MA 2012). Two intriguing ongoing projects that, like NUCLEARWATERS, take a transnational approach include the IAEA History project at the University of Vienna and Maria Rentetzi’s ERC project on the history of radiation protection.

the politics that happen to be part of those regions. This approach should be of interest for a range of other history of technology topics as well, but so far it has not been used to the extent it deserves.

Moreover, it seems to us that geographical scales cannot be seen apart from temporal ones. History of technology needs to be written in such a way as to allow different time periods to speak to each other. In our case, we have taken on this challenge by looking for the deeper historical roots of nuclear energy, which, as we argue, go back to the Industrial Revolution and, more controversially, to ancient “hydraulic civilizations” like China and Mesopotamia. Such cross-temporal links between seemingly disparate time periods, we contend, can often be fruitfully identified through playful reinterpretations of the technology at focus. In our case we reinterpreted nuclear energy, which has usually been thought of as a radical new technology based on nuclear physics and chemistry, as a hydraulic—a water- and steam-manipulating—technology, thereby allowing us to place it in a much longer technological tradition. Our ultimate ambition is to write nuclear energy history in such a way that it becomes relevant not only for historians of the post-World War II period, but for historians of the early industrial era and even for historians of ancient cultures. We believe that radical cross-temporal links of this kind can add a lot to the history of other “modern” technologies, too, and so we encourage our colleagues in the history of technology community to explore them! At stake here are the potentially huge benefits of collective learning among scholars who think of themselves as specialized in narrowly defined time periods. Clearly, we have everything to gain from challenging dominant temporalities and suggesting alternative ones, thereby also rethinking mainstream historical periodizations, which are often overly Western-centric and known to be a bad fit for many other parts of the world.<sup>6</sup>

Linked to this, we argue that while historians are naturally inclined—or even trained—to look for change, they should also write about *continuities*. We can and should move towards a Braudelian ‘longue durée’ perspective on technology.<sup>7</sup> This is a particular challenge for historians of technology, since the concept of technology itself is heavily connoted with change, innovation

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6 In particular, separate dynasty-based periodizations are used for most Chinese or Japanese history since terms like the Middle Ages, feudalism or (Pre-)Modern are not functional. See e.g. Dipesh Chakrabarty, “The Muddle of Modernity”, *American Historical Review* 116 (2011), 663–675; Chris Lorenz, *The Times They Are a-Changin. On Time, Space and Periodization in History*, in *Palgrave Handbook of Research in Historical Culture and Education*, ed. M. Carretero, S. Berger and M. Grever (London 2017), 109–133. This also holds true for older historical periods, such as the Neolithic and Palaeolithic, see Junzo Uchiyama, J. Christopher Gillam, Leo Aoi Hosoya, Kati Lindström and Peter Jordan, “Investigating Neolithization of Cultural Landscapes in East Asia: The NEOMAP Project”, *Journal of World Prehistory* 27 (2014), 197–223.

7 The Making Europe series operated on the temporal basis of what the editors and authors called the “long twentieth century”, spanning the time period from roughly 1850 to 2000.

and progress. Here we think it is crucial to take inspiration from provocative works such as David Edgerton's *The Shock of the Old*, in which the interdependence between technology's spatial and temporal scales becomes clear. Edgerton shows how the temporal strategy of adopting a long-term view on technological history can make us see new things in terms of the spatial dimension, as technologies are usually "old" or "new" at the same time in different localities, while they constantly travel.<sup>8</sup> Another source of inspiration should be the ideas advanced by Francesca Bray and others in the context of Chinese history of technology, which suggest that the urge to explain "change" is largely a Western-centric, biased point of departure. Equally and often more important is to unveil the powerful forces and complex social processes that make possible technological (and social) stability and continuity over long periods of time.<sup>9</sup>

Ambitious research undertakings along the lines that we have identified above cannot be done by historians of technology who work alone. One of the great strengths of the *Making Europe* book series was its emphasis on collective writing and research, comprising two series editors and thirteen authors.<sup>10</sup> We strongly endorse the spirit of this approach. We also believe it can and must be further developed. Collective efforts in the history of technology should aim to creatively merge different geographical levels of analysis and different temporal dimensions as argued above. But they should also make sure to exploit, in a similarly creative way, *academic diversity* in terms of language skills, personal background, (inter)disciplinary competence and position in the academic hierarchy. The benefits of diverse language skills are perhaps the most obvious. To take a concrete example from our own water-based interest in the history of nuclear energy: a history of nuclear energy in the Rhône river basin can, as evidenced by the work of Sara Pritchard, be written by a single person.<sup>11</sup> It is in principle also feasible for a single person to write a history of the "nuclear Rhine", if that person speaks French, German and Dutch. A nuclear history of the Danube, by contrast, would require language skills in German, Hungarian, Czech, Slovak, Slovenian, Croatian, Serbian, Romanian, Ukrainian, and Bulgarian. Apart from language skills, the importance of technical skills cannot be underestimated either. For historians, it can be a challenge to understand how complex technological systems such as nuclear power plants operate. This is especially true for the hydraulic water/steam

8 David Edgerton, *The Shock of the Old. Technology and Global History since 1900* (London 2008).

9 Francesca Bray, *The Rice Economies. Technology and Development in Asian Societies* (Berkeley 1994).

10 Johan Schot and Phil Scranton, *Making Europe. An Introduction to the Series*, preface in *Consumers, Tinkerers, Rebels. The People Who Shaped Europe*, ed. Ruth Oldenziel and Mikael Hård (Basingstoke and New York 2013), ix-xv.

11 Sara Pritchard, *Confluence. The Nature of Technology and the Remaking of the Rhône* (Cambridge, MA 2011).

focus we advocate. Yet, even the smallest technical detail can be relevant from a historical point of view. It is unlikely for us to reach the level of knowledge of all actors that operate these systems, but collaborations between several scholars with different backgrounds and know-how can lead to a better understanding of the systems we research, up to the extent that it is necessary for the historical analysis.

Collaboration in this sense goes beyond mere co-authoring of books and articles; it comprises joint efforts regarding, for example, practical issues relating to archival access and other formal and informal problems that tend to come up in the research process. Moreover, a discovery of a topic or a document in one region can lead to unexpected discoveries in others, where it might otherwise remain unnoticed in archiving systems. For example, in our team a discussion on jellyfish in the intake tunnels of nuclear power plants in the Rhine river basin led us to incidents in Japan that did not surface in archival catalogues, while a study of cooling towers at US nuclear power plants made us see totally new things in the memoirs of leading Soviet nuclear-hydraulic experts. However, this kind of added value that large projects may generate is likely to materialize only in a working atmosphere characterized by trust, where younger as well as more established researchers are comfortable to suggest haphazard and counter-intuitive ideas.

Finally, the diversity of academic backgrounds comes to the fore as a useful force. Our own project originally grew out of an unexpected opportunity for one of us to discuss the history of nuclear energy with environmental and water historians. This became the starting point for asking totally new questions about nuclear energy in space and time, and ultimately for a radically new narrative of the global history of nuclear energy. Building on this, our project can now be seen to form part of a wider trend towards “enviro-technical” analysis.<sup>12</sup> One lesson from this is that historians of technology must remain open to unexpected influences from other fields. Another is that such influences may bring new, fruitful empirical categories to the fore—in our case: water—that would most probably remain hidden if we stick too strongly to what we see as constituting “our” field. We may also speculate, in this context, that the best history of technology, paradoxically, may in future be written by research teams that include a healthy share of participants who do not actually identify themselves as historians of technology.

We do not pretend that writing collaborative, interdisciplinary and transnational history of technology is easy. Establishing transnational, interdisciplinary and intergenerational dialogue is time-consuming and understanding each other’s methods and materials requires a concerted effort. It can also occur that due to the transnational or global focus, the national contribution

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12 See e.g. Sara B. Pritchard and Carl Zimring, *Technology and the Environment in History* (Baltimore 2020).

to the developments remains underestimated.<sup>13</sup> Furthermore, the combination of different disciplines can lead to a dilution of the research field of history of technology. Nevertheless, we believe that the history of technology in the twenty-first century needs to be radically rethought and with our research approach, which claims to be transnational, reflective, interdisciplinary and cross-epochal, we believe we are on the right track.

Address of the authors:

Dr. Kati Lindström, Alicia Gutting, Prof. Dr. Per Högselius, Siegfried Evens, Achim Klüppelberg and Dr. Roman Khandozhko, Division of History of Science, Technology and Environment, KTH Royal Institute of Technology, SE-100 44 Stockholm.

Email addresses: [kati.lindstrom@abe.kth.se](mailto:kati.lindstrom@abe.kth.se), [alicia.gutting@abe.kth.se](mailto:alicia.gutting@abe.kth.se), [per.hogselius@abe.kth.se](mailto:per.hogselius@abe.kth.se), [siegfried.evens@abe.kth.se](mailto:siegfried.evens@abe.kth.se), [achim.klueppelberg@abe.kth.se](mailto:achim.klueppelberg@abe.kth.se), [roman.khandozhko@abe.kth.se](mailto:roman.khandozhko@abe.kth.se)

Prof. Dr. Anna Storm, Department of Thematic Studies, Linköping University, SE-581 83 Linköping, Email: [anna.storm@liu.se](mailto:anna.storm@liu.se)

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<sup>13</sup> Vincent Lagendijk, “Europe’s Rhine power. Connections, borders, and flows”, *Water History* 8 (2016), 23–39.