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Performing a Nuclear Power Plant That Never Was One  
A Study of the Guided Tours Through Nuclear Power Plant  
Zwentendorf

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## Abstract (English)

Austria's only nuclear power plant (NPP), Zwentendorf, is a fascinating place. This is because it never actually was an NPP. Even though it had been turnkey in 1978, the plant was not turned on after a national referendum voted extremely narrowly against putting it into operation. Today, the site is used in a variety of ways, from training facility for the staff of NPPs in other countries to film set and event location. It is furthermore a highly significant place within Austrian culture: The tight referendum against NPP Zwentendorf is commonly considered *the* starting point of the country's consensual rejection of nuclear power, which has become a central aspect of its national identity.

This master's thesis is about the public guided tours through NPP Zwentendorf, which show thousands of visitors around the plant each year. The guided tours aim to explain to visitors how nuclear power works, which makes them an instance of the public communication of science and technology (PCST). They are furthermore a site where the dominant ways of interpreting Austria's nuclear history and tying it to the national identity are (re-)negotiated. These aspects link the tours to Science and Technology Studies' (STS) concerns with how technoscience and society are done together.

In line with recent STS approaches to PCST, this study conceives of the guided tours as performative. This means that they are seen as actively producing specific versions of science and technology as well as other entities involved, such as a collective past and future. Previous works which have employed such a constructivist angle have mostly focused on instances of PCST seeking to directly influence policymaking. They have also tended to examine how these activities produce publics while other central aspects of PCST, such as the spatial and the emotional, remain understudied.

Investigating the work done by the guided tours through NPP Zwentendorf, which do not have any ties to policy, this thesis adds to the literature by illustrating the potential of *all* kinds of PCST to actively shape the wider relations between science, technology, and society. This becomes especially clear from this study's examination of how the guided tours interact with the dominant ways in which Austria's nuclear history and nuclear-free future are usually constructed and connected. By investigating diverse dimensions including the emerging space of the plant, this study furthermore highlights the heterogeneity of the guided tours. In this way, it extends the existing literature by bringing into view aspects of PCST that have so far been largely disregarded.

To conceive of the guided tours as performative, this thesis uses co-production as one main theoretical framework. On top of that, the cultural studies' definition of culture as being about the production and circulation of shared meanings is drawn on to understand how the tours interact with the wider cultural context. Methodologically, an ethnographic approach has been taken. Accompanying several guided tours and interviewing visitors afterwards has allowed for an open-ended examination of what the tours bring into being.

## Abstract (German)

Österreichs einziges Atomkraftwerk (AKW), Zwentendorf, ist ein faszinierender Ort. Das liegt daran, dass es nie ein AKW war. Obwohl der Bau des Kraftwerks im Jahr 1978 abgeschlossen war, wurde es nach einer Volksabstimmung, die ganz knapp gegen das AKW ausfiel, nicht in Betrieb genommen. Heute wird das Gelände auf vielfältige Weisen genutzt, beispielsweise als Trainingszentrum für Kernkraftwerksmitarbeitende aus anderen Ländern, Filmkulisse oder Eventlocation. AKW Zwentendorf ist außerdem ein kulturell sehr bedeutender Ort für Österreich: Die knappe Abstimmung gegen die Inbetriebnahme wird gemeinhin als *der* Anfang des landesweiten Anti-Atom-Konsens gedeutet, welcher zu einem zentralen Bestandteil der österreichischen nationalen Identität geworden ist.

Diese Masterarbeit erforscht die öffentlichen Führungen durch das AKW Zwentendorf, im Rahmen derer jedes Jahr tausende Menschen das Kraftwerk besuchen. Ziel der Führungen ist es, den Besuchenden zu erklären, wie Atomkraft funktioniert, was sie zu einem Beispiel von Wissenschafts- und Technikkommunikation macht. Gleichzeitig wird auf den Führungen die Geschichte der Atomkraft in Österreich und ihre Verflechtung mit der nationalen Identität (neu-)verhandelt. Diese Aspekte verbinden die Führungen durch das AKW mit der Frage, wie Wissenschaft, Technik und Gesellschaft miteinander verwoben sind und werden, die in den *Science and Technology Studies* (STS) gestellt wird.

In Anlehnung an neuere STS-Ansätze zur Erforschung der Wissenschafts- und Technikkommunikation versteht die vorliegende Arbeit die öffentlichen Führungen durch das AKW als performativ. Damit ist gemeint, dass die Führungen aktiv bestimmte Versionen von Wissenschaft und Technik sowie andere beteiligte Entitäten, wie beispielweise Vorstellungen der kollektiven Vergangenheit und Zukunft, hervorbringen. Arbeiten, die einen solchen konstruktivistischen Blickwinkel aufweisen, haben sich bisher vor allem mit Beispielen von Wissenschafts- und Technikkommunikation auseinandergesetzt, die Wissenschafts- und Technikpolitik direkt beeinflussen wollen. Außerdem haben frühere Studien häufig den Fokus darauf gelegt, wie diese Aktivitäten bestimmte Öffentlichkeiten produzieren, während andere zentrale Aspekte der Wissenschafts- und Technikkommunikation, wie Raum oder Emotionen, wenig berücksichtigt wurden.

Die vorliegende Masterarbeit leistet einen Beitrag zu dieser Literatur, indem sie am Beispiel der Führungen durch das AKW, die keine direkten Verbindungen zur Politik aufweisen, illustriert, dass *alle* Arten von Wissenschafts- und Technikkommunikation das Potenzial haben, die Beziehungen zwischen Wissenschaft, Technik und Gesellschaft zu gestalten. Das wird insbesondere an den Interaktionen der Führungen mit gängigen Vorstellungen der Geschichte der Kernenergie in Österreich sowie einer atomfreien österreichischen Zukunft deutlich. Darüber hinaus untersucht diese Masterarbeit vielfältige Dimensionen der Führungen, darunter räumliche Aspekte, und rückt so ihre Heterogenität in den Vordergrund.

Um die Performativität der Führungen zu erfassen, nutzt die vorliegende Masterarbeit *Co-Production* als theoretischen Hintergrund. Darüber hinaus greift sie auf den Kulturbegriff der *Cultural Studies* zurück, welcher Kultur als Produktion und das in Umlauf bringen von kollektiven Bedeutungen begreift. Das erlaubt es zu verstehen, wie die Führungen mit ihrem kulturellen Kontext interagieren. Methodisch wurde ein ethnographischer Ansatz gewählt. Durch das Begleiten mehrerer Führungen und anschließende Interviews mit Besuchenden konnte offen untersucht werden, was die Führungen hervorbringen.

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# 1. Introduction

Austria's only nuclear power plant (NPP), Zwentendorf, is "a captivating place" and a "one-of-a-kind nuclear power plant" (EVN, n.d.-d). This is how the plant is described on its own website run by its current owner, *Energieversorgung Niederösterreich* (EVN), the main energy supplier in Lower Austria, which is where the plant is located. In a pamphlet also published by the EVN, the plant is further characterized as being "probably the only power plant in the world to have its own fan page on Facebook" (EVN, n.d.-g). Clearly, there is a sense that NPP Zwentendorf is special. This is because it was never an actual nuclear power plant or at least not used as one. Even though it had been turnkey, the plant was not turned on after a national referendum in 1978 voted extremely narrowly against putting it into operation. Until today, NPP Zwentendorf has never been active. Instead, it is now used as a training facility for the staff of NPPs in other countries as well as film set and event location (EVN, n.d.-a, n.d.-f). There is also a photovoltaic (PV) system installed on the premise, which contributes to the regional power supply (EVN, n.d.-e). The focus of this master's thesis are the public guided tours through the plant, which have, together with private tours, been showing "thousands of visitors" (EVN, n.d.-c) around the plant each year since 2010.

My first point of departure for studying the public guided tours through NPP Zwentendorf is that they are an instance of the public communication of science and technology (PCST). Their aim is, as the head of the EVN's corporate communication, Stefan Zach, has been quoted in a newspaper article, "to explain how [nuclear power] works" (Schörghofer, 2022). This links the guided tours to Science and Technology Studies' (STS) concerns with how technoscience becomes present in society. Recent STS literature has conceived of and studied instances of PCST as performative (see, e.g., Felt & Davies, 2020b), meaning that PCST is not seen as merely *representing* science and technology in public. Rather, instances of PCST are thought of as actively *producing* specific versions of science and technology as well as other entities involved, such as "the public". This has implied a need to study empirically and open-endedly what instances of PCST bring into being. On top of that, STS works have emphasized the heterogeneity of PCST: They have drawn attention to the fact that instances of PCST are made up of very different kinds of entities, such as bodies, objects, spaces, talk, thoughts, and emotions (see e.g., Horst & Michael, 2011).

STS case studies employing this kind of approach have so far mostly examined instances of PCST seeking to directly influence science and technology policy. Much attention has been paid to participatory exercises, such as citizen conferences, typically arranged by governmental or technoscientific institutions and aiming to involve members of the public in the governance of science and technology (see also the discussion in Davies, 2015). Others have investigated examples of "uninvited participation" (Wynne, 2002, p. 103), that is citizens influencing the governance of science and technology

on their own accord, for instance, through activism (see, e.g., Chilvers & Longhurst, 2016). In both lines of research, the focus has often been on how these activities produce publics (see, e.g., Lezaun & Soneryd, 2007) while other central dimensions of instances of PCST, such as the material, the spatial, and the emotional, seem to have been largely disregarded (see also Davies, 2014).

One of the aims of my thesis is to contribute to this literature by using a performative approach to study the guided tours through NPP Zwentendorf, which are an instance of PCST without direct links to policymaking. In line with a few recent STS contributions (Davies, 2015; Davies & Horst, 2016; Felt & Davies, 2020b), I argue that *all* kinds of PCST have the potential to actively shape the wider relations between science, technology, and society. My thesis illustrates this by examining the work done by the guided tours and how they interact with wider developments, such as broader debates about nuclear power. I further aim to do justice to the heterogeneity of the guided tours by paying attention to diverse aspects including the role played by the space of the plant and that of emotions. In this way, I add to the existing literature by bringing into view dimensions of PCST that appear to be understudied.

The second central starting point of my research on the guided tours through NPP Zwentendorf is the significance of the plant in Austrian culture. The country is known for its consensual rejection of nuclear power, which has become a central aspect of its national identity (Felt, 2015). Austria's anti-nuclear position is usually considered an outcome of the controversy over and referendum against NPP Zwentendorf: A few months after the vote in 1978, the country outlawed the use of nuclear fission for the production of energy in Austria. In 1999, this ban was upgraded to a constitutional law. Most recently, a representative poll taken in December 2022 (Kleindl et al., 2023) has shown that an overwhelming majority of the population continues to oppose nuclear power: 62% percent of the respondents said that Austria should definitely not rely on nuclear power in the future. An additional 18% were rather opposed to Austria going nuclear. Only 15% of the respondents thought nuclear power was definitely or rather acceptable (Kleindl et al., 2023). Internationally, the country has a reputation for advocating against nuclear power and in favor of renewables. A recent example of this is Austrian politicians criticizing plans by the Czech Republic to build four new nuclear reactors close to the Austrian-Czech border as “a threat to the national [Austrian] security” and “slowing down the expansion of renewable energy” (“Sicherheitsrisiko”, 2024). Another case was the Austrian government filing a lawsuit against the European Commission's taxonomy defining nuclear power and natural gas as green investments (Taylor, 2022). All of this is commonly linked back to and justified with the tight 1978 referendum which is mythologized as *the* moment in which Austria disavowed nuclear power once and for all. NPP Zwentendorf has come to stand for the success of the Austrian population in rising up against nuclear power.

The constitutional law, the results of the recent poll, and Austrian politicians' efforts to advocate against NPPs internationally make Austria's anti-nuclear position seem unshakable. At the same time, the country is not exempt from the concerns which have led to renewed global interest in nuclear power since at least the 2000s. Driving this "nuclear renaissance" (Müller & Thurner, 2017, p. 3) is the idea that nuclear power can help us mitigate the climate crisis. As Kinsella (2015) points out, this builds on a widespread portrayal of nuclear power as being necessary and inevitable for meeting our energy demands in an emission-free way, which is pushed by the nuclear industry and its allies. Other factors contributing to the nuclear revival are arguments that nuclear power is relatively affordable, concerns about energy security, as well as promises that new generations of reactors are safer and produce less nuclear waste than previous ones (Müller & Thurner, 2017). Following Russia's invasion of Ukraine in February 2022, the debate has recently gained further traction in Europe around the question whether nuclear power can allow European countries to gain energy independence from Russia (see, e.g., Mazzucchi, 2022).

That these discussions do not bypass Austria can be seen from recent news coverage of the topic. An article published on the online platform of Lower Austria's main regional newspaper in November 2023, for instance, asked, "Should Austria rely on nuclear power in the future after all?" (NÖN Redaktion, 2023). Two opposing points of view were presented with the pro-nuclear one arguing that nuclear power is *the* solution to the question of how large enough amounts of energy can be produced in environmentally friendly ways. To gain energy independence, Austria should, therefore, "seriously consider" building its own NPPs. Much discussed in the news was also a statement made by the U.S. climate envoy, John Kerry, in the context of the most recent Ministerial Meeting of the International Energy Agency in February 2024. He advised Austria to go nuclear to become independent from Russian gas, which was labelled a "minor nuclear bomb" Kerry had dropped in Austria's main tabloid *Kronen Zeitung* (Perry & Matzl, 2024). While Kerry's suggestion was immediately dismissed by Austria's climate minister, Leonore Gewessler, who re-emphasized the country's anti-nuclear position, this example again shows that the renewed debate on nuclear power does not leave Austria untouched.

Another news article suggested that these discussions take to some extent also place at the guided tours through NPP Zwentendorf. This one, published in October 2022, cited Stefan Zach from the EVN saying that more and more visitors were asking whether the plant could still be turned on in an emergency (Sica, 2022). Zach put this down to increased fears about energy shortages which were at their peak in fall 2022 when Russia had just reduced its gas supply to Europe drastically (McHugh, 2022). Given these effects of the renewed debates about nuclear power on the guided tours and the significance of NPP Zwentendorf for Austria's anti-nuclear identity, my research interest also lies in capturing how the tours interact with the wider controversy on and meanings of nuclear power. To

that end, part of my performative approach is an examination of how the past, present, and future are constructed and connected at the tours: How is the history of NPP Zwentendorf made sense of at the tours and how does this reflect and/or challenge the significance attributed to the plant in Austrian culture? What role do the ongoing discussions about energy security and the need to decarbonize play at the guided tours? What energy futures are articulated in relation to this?

To sum up, my thesis is concerned with studying in an open-ended manner the work the public guided tours through NPP Zwentendorf are doing. This is reflected in my main research question which is, *How is NPP Zwentendorf performed at the guided tours through the plant?* My interest in the guided tours as an instance of PCST sensitizes me to the processes of knowledge production taking place there. I think of the tours as actively making rather than merely transmitting knowledge about science and technology and investigate what and how knowing occurs there. Furthermore, I am attentive to the heterogeneity of the guided tours. Specifically, I investigate how NPP Zwentendorf is constituted as a space at the tours and the role played by emotions. My third focal point are, as I have just described, the versions of the past, present, and future that emerge. This allows me to take into account the historical significance of NPP Zwentendorf and the ongoing renewed debates about nuclear power and thus provides an inroad to understanding how the tours interact with wider developments.

To conceive of the tours as actively producing these various entities, I use co-production (Jasanoff, 2004) as one of my main theoretical frameworks. Furthermore, I draw on the notion of culture developed within cultural studies (Hall, 1997) which defines culture as being about the production and circulation of shared meanings. This allows me to understand how the tours interact with wider ways of making sense of the world. Methodologically, I took an ethnographic approach: I accompanied several guided tours and interviewed visitors afterwards both formally and informally. This allowed me to study open-endedly what happens at the tours and what is brought into being.

The results of my empirical work are presented and analyzed in chapter 6 of this thesis. Before that, I dive deeper into the STS literature on PCST as well as works on the history and significance of NPP Zwentendorf in the State of the Art (chapter 2). In chapter 3, I present my research questions. Chapter 4 is devoted to my main theoretical frameworks as well as additional sensitizing concepts. Afterwards, I go into further depth on my approaches to data collection and analysis (chapter 5). I conclude by discussing connections between my findings and the literature presented in the State of the Art as well as the contributions my thesis makes to these works (chapter 7).

## 2. State of the Art

As I mentioned in the Introduction, one main starting point for this thesis is previous STS work on PCST. After I briefly point out the increasing importance attributed to PCST in research, practice, and policy, the first part of this State of the Art (section 2.1) is devoted to exploring contributions STS has made in this domain. I also point out areas in which STS research on PCST seems to be lacking. This sets the stage for the additions to the existing literature I intend to make, which I outline in chapter 3 on my research questions. Before that, I go into further depth on the history of NPP Zwentendorf and the significance it holds in Austrian culture in section 2.2 of the State of the Art. This provides necessary context for my project and inspiration as to what aspects of the tours are particularly interesting to examine.

### 2.1 STS Approaches to PCST

In contemporary European (and most other) societies, life has become tightly intertwined with science and technology. This can be seen from mundane activities, such as communicating, studying, and working, as well as large-scale controversies and policy decisions in the context of the climate crisis, for example. Accordingly, PCST is widely considered an important activity and actively promoted, for instance, by policymakers. Underlying this is the assumption that PCST is central to a functioning democracy as well as continued progress and economic growth. Ensuring that people have a sufficient understanding of scientific knowledge and technology, how they are produced, and what their limitations are is considered necessary for their ability to participate in public debate and make well-informed voting decisions (Davies & Horst, 2016). At the same time, as Felt and Wynne (2007) demonstrate, a public without this kind of connection to science and technology is often framed as an obstacle to research- and innovation-driven progress and growth. Most recently, support for PCST has been reinforced by concerns about the prevalence of misinformation and a loss of authority of scientific knowledge (Felt & Davies, 2020c).

Given the importance attributed to PCST, it is unsurprising that alongside policy efforts a lively, multi-faceted field of research on PCST has developed in recent years (for an overview see, e.g., Bucchi & Trench, 2021b; Jamieson et al., 2017). Although STS has, as I explore in the remainder of this section, made central contributions to this field, I would like to stress that not all the pre-existing research on PCST is related to STS (Horst et al., 2017). Indeed, this field has drawn on diverse research traditions including communication, media studies, political science, and psychology among others (Bucchi & Trench, 2021a; Kahan et al., 2017). STS has contributed to this by instigating a shift from a view of PCST as a means of informing a passive and ignorant public to approaches that seek to engage active publics in dialogue and discussion. This is examined in further detail in section 2.1.1. As we will see in section

2.1.2, more recently, STS has also articulated a third way of conceptualizing and studying PCST. In contrast to the deficit and dialogue models, this third performative or constructivist perspective aims to avoid making a priori assumptions about the kinds of entities involved in PCST and how they communicate with each other. Rather, this approach seeks to study open-endedly the capacity of concrete instances of PCST to establish these entities and their relationships. However, I also argue towards the end of section 2.1.2 that pre-existing STS research which adopts such a performative angle to study PCST has certain limitations. Specifically, I suggest that STS research has so far mainly focused on participatory exercises seeking to directly influence science and technology policy at the expense of other, non-policy related forms of PCST. Furthermore, I make the case that some aspects of PCST, such as the construction of publics, have been foregrounded in pre-existing works while other central elements have been sidelined. These claims resonate with a few recent STS contributions that have, as I discuss in section 2.1.3, argued for the need to study the work performed by *all* forms of PCST as well as the diversity of entities involved.

### 2.1.1 From Deficit to Dialogue?

One main contribution STS is believed to have made to PCST is identifying the so-called 'deficit model' of PCST and instigating a shift towards approaches that stress two-way communication and dialogue (Davies & Horst, 2016). This is significant because, as Trench (2008) points out, the idea that such an evolution has occurred is crucial to how contemporary PCST thinks of itself:

Science communication has been telling a story of its own development, repeatedly and almost uniformly, for almost a decade. The story is a straightforward one: science communication used to be conducted according to a 'deficit model', as one-way communication from experts with knowledge to publics without it; it is now carried out on a 'dialogue model' that engages publics in two-way communication and draws on their own information and experiences. (Trench, 2008, p. 1)

As Trench (2008) also notes, this narrative is, however, not an accurate representation of reality in that the supposed shift from deficit to dialogue has neither been complete nor comprehensive. Dialogue events organized, for instance, by science museums or science centers have indeed proliferated in recent years (Davies et al., 2009). At the same time, many areas of PCST, such as popular science books, however, clearly continue to operate predominantly along the deficit model. While it is usually implied within PCST that dialogue is better than deficit-style communication (Trench 2008), this is not my assumption in the context of this thesis. Rather and in line with my open-ended approach, I see the two models non-normatively as describing different tendencies in how encounters between science, technology, and publics can go and use them to analyze how communication is imagined and takes place at the guided tours.

To that end, I use the remainder of this section to trace some of the roots of the putative shift from deficit to dialogue. This takes us to debates within STS and policymaking over the causes and remedies of public opposition to science and technology. Specifically, my focus lies on a set of STS works from the 1990s that argued for a move from top-down, technocratic ways of governing science and technology towards more participatory and deliberative<sup>1</sup> ones. At the end of the section, I also briefly outline how STS scholars responded to policymakers' ensuing efforts at establishing an open dialogue with the public. This allows me to set the scene for introducing the performative approach to PCST that I adopt in this thesis. As is common practice within STS literature on the topic (see, e.g., Davies & Horst, 2016; Irwin 2006; Irwin & Michael, 2003), I draw on a set of paradigmatic examples from the UK to illustrate the partial shift from deficit to dialogue that took place within science policy around the turn of the millennium. While this means that the story told in this section maps particularly well on the British context, similar things have been observed in other European countries, on the European level, and in the US (Davies & Horst, 2016; Irwin & Michael, 2003). At the same time, there are counterexamples: Denmark, for instance, which has a longer established tradition of public participation in the governance of science and technology, has seen increased skepticism about deliberative activities in recent years (Horst & Irwin, 2010; Irwin, 2006).

The idea that a shift from deficit to dialogue was necessary is in particular connected to the work of the British STS scholar Brian Wynne. He coined the term deficit model in the late 1980s (see, e.g., Wynne, 1991; Wynne, 1993) to describe and criticize the policy and social scientific approaches to science-technology-society relations which were dominant in the UK (and most of Europe) at the time (see Royal Society, 1985 for the paradigmatic British example of this approach). The dominant perspectives attributed negative public attitudes towards science first and foremost to scientific illiteracy. In other words, the key problem these approaches identified was a lack or deficit of scientific knowledge within the public. The remedy was believed to lie in greater efforts by scientists to publicly communicate their research.

Wynne drew attention to several unfounded assumptions embedded in these ideas: Firstly, he pointed out that this rendering implied a view of public ignorance of science as a "vacuum" (Wynne, 1991, p. 119). In other words, due to their perceived lack of scientific knowledge, members of the public were imagined as possessing no relevant knowledge at all. Secondly, the deficit model came with a simplistic view of the communication between science and society as a "one-way transmission of information packages" (Wynne, 1991, p. 114) and therefore reduced the members of the public to

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<sup>1</sup> As Davies (2015) notes, the differences between "participation" and "deliberation" are largely glossed over in the STS literature on PCST. It is usually taken for granted that participatory formats, such as citizen conferences, which STS scholars have been promoting, allow for in-depth deliberation, that is a fair and thorough exchange of reasoned arguments.

the role of passive receivers of knowledge. Thirdly, Wynne argued that deficit-style approaches rested on a naive understanding of science as universally valid and applicable and thus ignored STS insights into how society inevitably and fundamentally shapes science (see, e.g., Irwin & Wynne, 1996b).

By contrast, Wynne and others' ethnographic research (in particular Irwin & Wynne, 1996c) on how science is encountered in practice revealed that people actively judge and interpret scientific knowledge to make it meaningful in a given context. To do so, people draw on previous knowledges they have, for instance, about local circumstances or the wider institutional context of science. In contrast to the deficit model, Wynne and colleagues thus portrayed the public as knowledgeable and emphasized the interactivity of the communication between science and society. They concluded from their research that if people rejected scientific knowledge, this was often because they did not find it useful in their concrete situation. Furthermore, Wynne and others' studies showed that scientific experts who a priori assumed the superiority of science and therefore met lay knowledges with ignorance contributed to alienating the public.

In sum, this ethnographic STS research attested that the deficit model fundamentally misrepresented public interactions with science and that a lack of self-reflection within science on its limitations and inherently situated character further exacerbated the situation. As Irwin and Wynne (1996b) put it, the reasons for a lack of public support of science were thus not only located within the public but as much in a "science which misunderstands both the public and itself" (p. 10). Accordingly, these authors called for greater acknowledgement of the existence of alternative knowledges and that science is not less contextual than these forms of knowledge. In more practical terms, they encouraged policymakers to develop ways of bringing together scientific and lay knowledges to allow science and science policy to listen to the public (Irwin & Wynne, 1996a).

Such demands for a replacement of deficit-style approaches by more open and two-directional communication were seemingly quickly embraced by many European policymakers (Irwin, 2001; Irwin, 2006; Irwin & Michael, 2003). One paradigmatic example of how the language of "dialogue" entered official documents is a report by the UK's House of Lords Select Committee on Science and Technology (2000). Drawing on ethnographic STS research, this report described the public as no longer expecting mere information but wanting to be "consulted" and therefore postulated a "new mood for dialogue". Accordingly, the Lords advised that open dialogue with the public should no longer be "an optional add-on to science-based policy-making" but rather become "a normal and integral part of the process". Simultaneously, there were numerous practical initiatives by governments that aimed to dialogue with the public on questions of science and technology. Notable examples from the UK include the *Public Consultation on Developments in the Biosciences* between 1997 and 1999, which addressed topics



such as cloning or genetic testing (Irwin, 2001), and *GM Nation?*, a 2003 large-scale deliberative activity on the use of GM crops (Irwin, 2006).

At least on the surface, it thus appeared as if policymakers were listening to STS insights and recommendations. However, STS researchers including those who had originally been calling for greater involvement of the public soon began to scrutinize these developments. With talk of dialogue and practical initiatives proliferating, there was a sense that these things required scholarly attention. In an influential article, Irwin (2006), for instance, made the case that there was “a pressing need to move away from the orthodox science and technology studies (STS) defence of public participation and citizen-science engagement towards an analytically sceptical (but not dismissive) perspective on the ‘new’ mode of scientific governance” (p. 300). As this statement suggests, the goal was not to take policymakers’ efforts apart but rather to conduct open-ended, empirical studies of the work that these initiatives were performing in and upon the world. Nevertheless, as we will see below, this approach produced deeply critical accounts of the new participatory activities.

Irwin’s (2001) study of the *Public Consultation on Developments in the Biosciences* is a paradigmatic example of this body of work: Based on a detailed account of the consultation, he analyzed in an open-ended manner the version of scientific citizenship that was embedded in and brought into existence by this activity. He showed that only a predominantly passive role was available for the participants of the exercise. One aspect of this was that an agenda of issues deemed central by scientific and policy experts had already been set beforehand rather than being decided on by the participants. Relatedly, there was an emphasis on providing the participants with accurate scientific information which suggested a lingering deficit model-like view of the public. This also meant that the exercise mainly focused on science instead of participants’ values or pre-existing knowledges, for example. Observations like these led Irwin (2001) to conclude that the exercise overall configured scientific citizens “as essentially *reactive* members of the public” (p. 13) that can merely respond to inevitably coming developments within the biosciences rather than being able to shape or stop them.

These findings by Irwin (2001) exemplify many of the central criticisms STS scholars raised when they turned their attention towards policymakers’ efforts to establish dialogue with the public. As Wynne (2006) and others (see, e.g., Irwin et al., 2013) have summarized, the bottom line of much of the criticism was that policymakers employed participatory exercises primarily as means of securing support for pre-determined courses of action. As STS researchers showed, these activities did not actually represent an opportunity for citizens to influence the directions pursued within research and innovation. Accordingly, the issues up to debate at these events were often pre-framed narrowly in terms of impacts or risks at the expense of wider public concerns, for instance, with the driving forces behind research and innovation (Wynne, 2006). Rather than listening to what the public cared about,

science and policy institutions thus continued to assume the universality of their own interpretations of what the issues at stake were and therefore “reinvented” (Wynne, 2006, p. 211) the deficit model. Based on this, STS scholars (see again, e.g., Wynne, 2006) argued that through their dialogue events, policymakers constructed a particular public that was concerned about the issues they deemed relevant and could merely react to (accept or reject) new scientific knowledge and technologies. This is illustrated by Irwin’s (2001) study of the kind of scientific citizen that emerged in the *Public Consultation on Developments in the Biosciences*.

STS research thus moved from calling for greater involvement of the public to criticizing policymakers’ ensuing practical efforts for failing to actually engage with the public and truly open up the governance of science and technology. As we have seen in this section, these criticisms were based on close empirical attention to how dialogue events framed the issues at stake exclusively in scientific terms and constructed a corresponding public. These insights into the power of participatory activities to shape and produce the entities involved in them connects to a second central contribution STS has made to PCST research: As we will see in the next section, around the same time, STS scholars began to articulate a view of the communication between science, technology, and society as a constitutive force.

### 2.1.2 The “Constructivist Turn”

As I described in the previous section, a crucial contribution STS is believed to have made to PCST is criticizing technocratic, deficit-style approaches to the governance of science and technology and prompting a move towards more participatory ones. However, as we will see in this section, at the same time when empirical studies were starting to look critically at participatory events, there was also more conceptual STS work scrutinizing the supposed shift from deficit to dialogue. These contributions suggested an alternative, third way of conceiving of participation and PCST which – like the empirical work discussed at the end of the previous section – emphasized performativity and further highlighted the diversity of the entities involved. Part of this “constructivist turn” (Braun & Schultz, 2010, p. 404) has also been a rich and growing body of empirical studies examining the work performed by specific participatory activities. However, as I argue towards the end of this section, there are also notable limitations. Specifically, I suggest a lack of research from such a performative angle on forms of PCST other than those with direct ties to science and technology policy. Furthermore, I argue that the existing research taking a constructivist approach has been narrowly focused on some of the entities involved in participation while sidelining others.

After triggering the partial move from deficit to dialogue, several conceptual STS contributions began to identify a set of implicit assumptions shared between the two models and, consequently, suggested an alternative, third way of thinking about PCST. Michael (2002), for instance, pointed out

that deficit as well as dialogue approaches imagined the communication between science and society as disembodied and immaterial and thereby disregarded the close entanglements between social relations and technologies. Underlying both models was, according to Michael, furthermore the idea that science and society pre-exist as separate entities and need to be brought together. These entities were also assumed to be stable, that is independent from and untouched by the communication between them. Along similar lines, Horst and Michael (2011) made the case that both approaches viewed communication as a stable medium transporting information from science to the public or vice versa without making changes to the information, its senders, or receivers. Framed in this way, the direction in which information is imagined flowing emerges as the central difference between these models (Horst & Michael, 2011) while neither of them questions the pre-existence, discreteness, or stability of the entities of science and society and the relations between them.

In contrast with these implicit assumptions, Michael (2002), Horst and Michael (2011), and other contributions (see, e.g., Horst, 2008; Irwin & Michael, 2003) all proposed alternative ways of thinking about encounters between technoscience and society. While they drew on and developed different theoretical notions, what their suggestions have in common is, firstly, an emphasis on the constitutive character of PCST. Contrary to the deficit and dialogue models, these approaches conceive of science and society not as pre-given or inherently separate. Neither do they assume that the communication between them and specifically its direction can be defined a priori. Instead, all these entities are thought of as being established temporarily within specific instances of PCST and thus in particular shaped and changed by the act of communication. Secondly, rather than disembodied and immaterial, PCST is viewed as heterogeneous, that is comprising very different entities including people, objects, spaces, talk, thoughts, emotions, and so on. Both these ideas are, for instance, captured by Horst and Michael's (2011) proposition to think of instances PCST as "events" (p. 284). On a first level, this notion speaks to the idea that instances of PCST are actual encounters of heterogeneous elements. On a second level, Horst and Michael argue that the entities that make up the event do not only come together but also "become together" (p. 286): Their interactions shape and change what they are and how they relate to each other. Temporarily, a science and a society thus emerge as well as a communication between them.

In recent years, a rich and growing body of empirical work has been employing such a performative angle to study instances of PCST that seek to directly influence science and technology policy. This has led some authors to speak of a "constructivist turn" (Braun & Schultz, p. 404) in STS research on participation. Continuing the lines of thought found in earlier empirical studies of participatory exercises (e.g., Irwin, 2001), this work has often focused on how these activities and specifically their formats and organizers construct particular publics (see also the discussion in Davies, 2014).

Lezaun and Soneryd (2007) have, for instance, compared the publics produced by two engagement events, the UK's aforementioned *GM Nation?* and a Swedish public consultation on third-generation mobile phones. They have showed that underlying both exercises was the ideal that participants should be mobile, that is able to develop and change their views throughout the exercise. This led the organizers to distinguish between the general public and “stakeholders” (p. 280). The general public was imagined having no prior engagement with and thus no preconceived opinions on the topics under deliberation which made it particularly mobile in organizers' eyes. Stakeholders, on the other hand, were believed to already have a firm position on the issues and therefore considered less movable. Paradoxically, while mobile publics were highly valued, Lezaun and Soneryd have argued that especially the *GM Nation?* exercise ultimately produced a static image of the public: In their reports, the organizers portrayed the views their participants developed throughout the event as representative of a fixed set of concerns held by the public at large.

This and many other contributions (see, e.g., Bellamy & Lezaun, 2017; Braun & Schultz, 2010; Lama & Tironi, 2019; Laurent, 2011) have all described how participatory exercises and their formats construct particular publics, for instance, by making certain speaking positions available while preventing others, distributing responsibilities, or framing the issues at stake in certain ways. There has, as Braun and Schultz (2010) have pointed out, thus been a sense that “the construction of publics is one of the most fundamental aspects of participatory events” (p. 406). Felt and Fochler (2010) have added to this debate by analyzing not only the roles these kinds of activities intend for members of the public but also showing how participants can transform and resist the identities imposed upon them. Furthermore, some contributions have broadened the scope by examining the making of publics not only within what Wynne (2007) has termed “invited participation” but also “uninvited participation” (p. 103), that is citizens influencing the governance of science and technology on their own accord. Chilvers and Longhurst (2016), for instance, have analyzed how four different instances of public engagement in low carbon energy transitions in the UK produced publics alongside particular issues and visions of democratic participation. Their case studies included not only government-led participatory exercises but also an activist movement and a grassroots renewable energy project.

As these examples indicate, a rich body of empirical work has already approached public involvement in science and technology as performative and studied in particular the publics concrete instances bring into being. What seems to be mostly lacking, however, is constructivist research on other forms of PCST, that is activities that aim to engage lay people with science and technology but do not have direct ties to policy (see also the discussion in Davies, 2015). This lacuna is particularly striking given that, as I described above, these non-policy related activities have also been considered crucial to functioning democracies. My argument, therefore, is that the work performed by instances

of PCST without links to policymaking requires as much open-ended empirical attention. Furthermore, the existing research has, as I discussed above, mostly been concerned with how publics are made within instances of participation. While this work is important, this focus has also meant that the heterogeneous character of PCST remains understudied. Central dimensions of how we experience and make sense of the world, such as the material, the spatial, and the emotional, have largely been disregarded (see also Davies, 2014). However, as we will see in the next section, there are a few recent contributions which have re-emphasized the relevance of the performative approach for PCST at large and pointed out a greater variety of aspects we should be attentive to.

### 2.1.3 Bringing the Performative Approach to PCST at Large

While much STS work on PCST has focused on examining how publics emerge within instances of PCST directly tied to policymaking, several authors have recently argued for a need to also investigate other forms of PCST from a performative angle. As I discuss in this section, their works frame *all* kinds of engagement with science and technology as being able to shape the wider relations between science, technology, and society. Like the theoretical texts covered in the previous section, the contributions presented here furthermore share an emphasis on the heterogeneity of PCST and call us to broaden the dimensions of PCST we study. Most of these works are predominantly conceptual. However, towards the end of the section, I also discuss a few recent case studies that bring these STS sensitivities to non-policy related instances of PCST.

Davies (2015) presents two connected reasons for why we should study the work done by forms of PCST other than those which seek to directly influence science and technology policy. Firstly, she suggests that public deliberation of science and technology does not only take place in participatory exercises but can also be found in other kinds of PCST. To make this argument, she draws on an approach in deliberative theory by Mansbridge et al. (2012) who invite us to think of deliberation as a system distributed throughout society rather than confined to legislative institutions and state-sponsored deliberative events. These authors claim that deliberation happens when- and wherever public issues are being discussed with an orientation towards possible solutions, that is involving “an element of the question ‘what is to be done?’” (Mansbridge et al., 2012, p. 9). This is because these kinds of conversations can have an influence on state as well as societal decisions, such as when there is a change of values or practices within the majority of a society. Based on this approach, Davies (2015) argues that *all* forms of PCST are potential loci of deliberation on science and technology which is why we need to investigate what they bring into being. Secondly, she points out that non-policy related instances of PCST are usually explicitly oriented towards emotions like pleasure or enjoyment. Furthermore, at least some of them, such as science museums or hackerspaces, also emphasize the materiality involved in science and technology. This is very different from how participatory exercises and

deliberation more generally are typically imagined, namely as incorporeal exchanges of reasoned arguments (as can also be seen from Mansbridge et al.'s exclusive emphasis on talk). Investigating a more diverse set of activities can, Davies argues, help us account for the heterogeneity of the entities involved and thereby broaden our understanding of deliberation even further.

Davies and Horst (2016) advocate for the ability of *all* kinds of PCST to interact with the wider relations between science, technology, and society from a different perspective. Building on cultural studies and in particular the work of Hall (1997), they frame PCST as a cultural activity. By this, they mean that PCST is at its heart about the production and circulation of shared meanings. In their view, engaging in any form of PCST also always means participating in negotiations about what certain pieces of scientific knowledge and technology mean. Because contemporary societies are, as I also discussed above, tightly intertwined with science and technology, this makes PCST a way of making sense of the world more broadly. According to Davies and Horst, we thus need to study the work done by instances of PCST because they draw on and reproduce but also shape and transform shared interpretations of the world. PCST can, for instance, contribute to the formation and stabilization of collective and individual identities, such as national identities or scientists' personal and professional ones. Davies and Horst's cultural approach further emphasizes the heterogeneity of PCST. As they point out, "[m]eaning is created out of a plethora of inputs and interactions, including sounds, images, bodies, objects, emotions, or places" (Davies & Horst, 2016, p. 46). Understanding PCST as being about meaning making thus necessitates attention to various dimensions including its affective components. The latter point is already noted by Davies and Horst (2016) but brought even more to the fore by Davies et al. (2019) who emphasize that groups interpret the world as much through emotional experiences as they do through reasoned argument. Inviting us to consider diverse aspects as well as highlighting the interactions between PCST and wider processes of meaning making, Davies and Horst thus arrive at similar conclusions as Davies (2015).

A similar argument is further made by Felt and Davies (2020a) who also portray PCST as actively shaping societies and their relations to science and technology. To that end, they draw on Jasanoff's (2004) notion of co-production which is the claim that "the ways in which we know and represent the world (both nature and society) are inseparable from the ways in which we choose to live in it" (p. 2). This means that (scientific) knowledge and society are tightly intertwined and mutually shape each other. They are co-produced. Accordingly, Felt and Davies's (2020a) account highlights in particular that instances of PCST do not neutrally represent stable "facts" about science and technology but rather produce this very knowledge. Given co-production's emphasis on mutuality, Felt and Davies draw attention to the ways in which PCST makes knowledge and diverse other entities in tight conjunction or "in one and the same move" (Felt & Davies, 2020d, p. 39). These other elements include, for

instance, the spaces in which instances of PCST take place, the futures and pasts they construct, and the atmospheres and emotions they make present. Like the other contributions discussed in this section, Felt and Davies thus also stress that very different kinds of entities are involved in and produced by instances of PCST. To explain the performative character of PCST, they further use the notion of narrative (Czarniawska, 2004). In Felt and Davies's view, the heterogeneous assemblies that constitute instances of PCST ultimately construct and materialize diverse stories about science and technology. These stories both draw on and feed back into broader imaginaries about how society does and should relate to science and technology. Felt and Davies (2020a, 2020d) thus present yet another way of describing the ability of *all* forms of PCST to shape the world they appear to represent.

Apart from providing a conceptual perspective on the performativity of PCST, Felt and Davies's (2020b) edited volume also contains a range of case studies that examine the work done by various (non-policy related) instances of PCST while being attentive to their heterogeneity. Tybjerg et al. (2020), for instance, analyze the stories and relations that emerged around specific objects, namely two hacked gene guns, in different PCST settings. They show how these objects came to be and mean different things in different spaces and how this was mutually constituted with different ideas about what PCST should be about and for. Another example is the chapter by Owens (2020) who studies two public parks that each surround a science and technology museum. He demonstrates how the designs of these spaces communicate certain concepts of nature while also embedding expectations about how people should act and feel in the parks as well as towards nature more generally. This leads Owens to argue that certain "ecological publics" (p. 101) are co-produced with the park spaces and knowledge about nature. In the same volume, Ben-Shachar and Davidovitch (2020) report the results of their longitudinal study of different Israeli dietary guides from between 1940 and 1980. They analyze the kinds of questions the different nutritional guides address and silence as well as the publics they perform. Based on this, they argue that knowledge about food and national values, specifically imaginations of what makes a good Israeli woman, are made together in the guides.

Alongside the more conceptual accounts I presented in this section, these empirical studies make clear why there is a need to approach *all* forms of PCST as sources of performativity. These works all demonstrate the ability of instances of PCST without direct ties to policymaking to actively shape the world, for instance, by giving form and meaning to objects and prescribing ways in which we should feel and act in certain contexts. While the making of publics is a central line of inquiry in some of these contributions, crucial to all their arguments is attention to the interactions of very different kinds of entities. They show how objects, spaces, people, concepts, values, emotions, and so on are made together. Overall, these works thus highlight the need to devote empirical attention not only to the work performed by participatory exercises and to consider not only the publics that emerge, which have

been the foci of much of the existing research. In chapter 3, I chart how my thesis contributes and adds to these debates. Before that, I use the remainder of the State of the Art to turn to the history of NPP Zwentendorf and its significance in Austrian culture. This provides necessary context as well as leads as to what dimensions of the guided tours are particularly interesting to study.

## 2.2 The History of NPP Zwentendorf and Its Meanings in Austrian Culture

As I already mentioned in the Introduction, NPP Zwentendorf was completely built and ready to go online but never put into operation after a national referendum voted very narrowly against doing so in 1978. Not long after the referendum, nuclear power was outlawed in Austria and in 1999, this ban even became part of the Austrian constitution. In this section, I explore different ways in which these developments have been made sense of. In a first step (section 2.2.1), I present an overview of the history of NPP Zwentendorf based on a set of works in (political) history from the last three decades (Bayer, 2013, 2014; Kriechbaumer, 2004, 2008; Kuchler, 2012a, 2012b; Müller, 2017; Preglau, 1994; Rathkolb, 2012). As we will see, these accounts emphasize the influence of party politics on the events that unfolded around NPP Zwentendorf. In Austria more generally, the controversy around the plant is usually remembered in a different manner: As I discuss in section 2.2.2, according to Austria's collective memory, the referendum was a direct outcome of the protest of the anti-nuclear movement and constituted the beginning of Austria's broad anti-nuclear consensus.

My presentation of the two divergent ways in which the history of NPP Zwentendorf has been made sense of might suggest that there is a "correct" version of events provided by historiography and an "incorrect" one floating around in Austria. This is, however, not the argument I intend to make. Rather, I treat the different accounts primarily as resources that help me analyze what versions of the past the guided tours through the plant produce. What distinguishes the two accounts is, as we will see, that the version of events inscribed in the collective memory is tightly intertwined with Austria's seemingly unshakable anti-nuclear identity. Yet, as I point out towards the end of section 2.2.2, this imagination of Austria and the associated interpretation of NPP Zwentendorf require continuous nourishment to remain stable. I conclude by suggesting that this invites us to study how the tours participate in stabilizing and/or challenging how the controversy over the plant is usually remembered. This seems a particularly interesting line of inquiry given the renewed global interest in nuclear power, which does not leave Austria untouched (see chapter 1).



### 2.2.1 The Controversy Over NPP Zwentendorf According to (Political) History

The works from (political) history considered in this section usually begin the history of NPP Zwentendorf by pointing out the wide support the project initially enjoyed across the political party spectrum as well as in the population. NPP Zwentendorf was the first of several NPPs planned to be constructed in Austria during the post-WWII economic boom. The general permit to build NPP Zwentendorf was issued in 1969 by the single-party government of the Christian democratic Austrian People's Party (ÖVP; Müller, 2017). After taking over the office in 1970, the single-party government of the social democratic Socialist Party of Austria (SPÖ) under chancellor Bruno Kreisky, according to Rathkolb (2012), "continued the ÖVP's policy seamlessly and swiftly" (p. 203): In 1971, the decision was made to start building NPP Zwentendorf and in 1972, construction work began (Preglau, 1994). Both major Austrian parties, the ÖVP and the SPÖ, which were together winning 90% of the votes at the time (Preglau, 1994), thus initially supported nuclear power production in Austria. This was due to a shared commitment to economic growth, full employment, and prosperity: Both parties believed that nuclear power was necessary to meet growing energy demands which were, in turn, considered a sign of societal development and economic well-being (Preglau, 1994; see also Bayer & Felt, 2019). Austria's nuclear power program was also supported by a majority of the population until the mid-1970s. As Kuchler (2012b) notes, in polls of the local population taken in the first half of the 1970s, only 20% of the respondents said that they were against NPP Zwentendorf or against nuclear power generally while 50% reported a positive and 30% a neutral attitude. On the national level, a poll from 1975 showed that more than half of the respondents believed that NPPs were more dangerous than other kinds of power plants. A majority of people was nevertheless willing to accept the dangers associated with nuclear power if the alternative was doing without the large amounts of energy NPPs could generate ("Die Meinungsentwicklung zur Kernkraftfrage", 1979; Preglau, 1994). Not only the political parties but also the population thus seemed convinced that nuclear power was necessary for growth and prosperity.

By 1975, the situation was, however, starting to shift when the growing anti-nuclear movement succeeded to make nuclear power an increasingly contested political issue. In the first half of the 1970s, there had already been some local and regional protest against specific NPP projects. In Vorarlberg, for instance, there had been resistance against a Swiss NPP that was to be constructed close to the Austrian border. In Lower Austria, protest had formed against plans to build Austria's second NPP in St. Pantaleon-Stein (Bayer, 2014). From the mid-1970s onwards, these local efforts began to become a broader nationwide movement: Had the protests initially mainly consisted of conservative groups, they now increasingly also attracted left-leaning ones (Bayer, 2014; Preglau, 1994). In 1975, many of these heterogeneous initiatives joined forces in a national umbrella organization, the Initiative of

Austrian Nuclear Power Opponents, which stood for a small set of demands the groups could agree on: No turning on of NPP Zwentendorf, no other NPPs in Austria, no radioactive waste storage in Austria, and no NPPs at Austria's borders (Bayer, 2013; Preglau, 1994). Apart from that, the activists' campaigns focused, for instance, on the negative effects of NPPs and radioactivity on health and the environment, the likelihood of a catastrophic accident, the finiteness of uranium resources, and the unsolved question what to do with radioactive waste (Bayer, 2013). The anti-nuclear movement succeeded in turning nuclear power into a controversial issue within Austria. What had initially simply been accepted as a necessity by the political parties and most of the population now became "a question of principle that was to be discussed broadly and decided politically at the national level" (Preglau, 1994, p. 49).

With nuclear power turning into a political issue, it was also recognized by the political parties as an arena for the competition over votes and office. In this context, several authors (e.g., Bayer, 2013; Kriechbaumer, 2004; Müller, 2017; Kuchler, 2012b; Preglau, 1994) highlight the significance of the 1967 Swedish general election which forced the social democrats into the opposition for the first time in decades. This was primarily due to their support for nuclear power while their opponents had taken an anti-nuclear stance and successfully waged an "atomic election campaign" (Preglau, 1994, p. 54). For Kreisky, this emphasized the need to ground the decision on whether NPP Zwentendorf should be turned on in an inter-party consensus to avoid sharing the fate of his party's Swedish counterpart (Müller, 2017). He wanted the choice to be made in parliament (as opposed to by his single-party government), where he hoped to reach an agreement at least with the ÖVP, which had after all initiated Austria's nuclear energy program (Kuchler, 2012b; Preglau, 1994). The topic was debated in parliament between June 1977 and June 1978, but no agreement was achieved. The main reason for this was that inspired by the Swedish experience, the ÖVP refused to consent to putting NPP Zwentendorf into operation (Preglau, 1994). While the party maintained their general pro-nuclear orientation, they argued that the responsibility for NPP Zwentendorf lay exclusively with the SPÖ government. Taking up two of the central issues in the public controversy, the ÖVP, for instance, demanded that Kreisky should personally guarantee the safety of the plant and that his party needed to present a solution for the nuclear waste produced by NPP Zwentendorf (Kriechbaumer, 2004; Müller, 2017). This stance on NPP Zwentendorf, which the party itself had issued the general permit for back in 1969, had primarily electoral reasons, according to the authors cited in this section: The ÖVP hoped that like their Swedish colleagues, they could instrumentalize the nuclear issue in the upcoming 1979 legislative election (see, e.g., Preglau, 1994).

With the parliamentary negotiations not making much progress, on June 22, 1978, Kreisky suggested a referendum as an alternative. According to the analyses considered here, this was again

mainly for electoral purposes. Several authors argue (see, e.g., Kriechbaumer, 2004; Preglau, 1994; Rathkolb, 2012) that given the Swedish case, Kreisky was adamant to keep nuclear power out of the 1979 elections. These scholars consider this one of the central reasons why Kreisky advocated for a referendum when faced with the ÖVP's refusal to consent to turning Zwentendorf on, which the SPÖ interpreted as an attempt to bring the decision even closer to the election (Müller, 2017). On top of that, Kreisky expected a clear majority in favor of NPP Zwentendorf going online (Kriechbaumer, 2004; Müller, 2017; Preglau, 1994; Rathkolb, 2012). According to Bayer (2013), the referendum was thus not envisioned as a vote for or against nuclear power but rather seen as a way of ending the debate between the political parties. Kreisky's suggestion was approved by parliament on June 28, 1978, and the referendum took place on November 5 of the same year. Surprisingly, even to those opposing nuclear power, the referendum ended with a tight majority against NPP Zwentendorf: 50.47% voted against putting the plant into operation while 49.53% were in favor of it (Preglau, 1994). The reasons for this result are controversially discussed within the literature considered in this section: Preglau (1994), for instance, emphasizes the success of the anti-nuclear movement in mobilizing voters in the lead-up to the referendum, which was aided by the balanced way in which the media reported on the issue. Preglau further argues that large groups of people voting against their traditional party affiliations as well as a new type of "post-materialistic" (p. 59) middle class that did not have strong ties to any of the established parties were crucial. In contrast, Bayer (2013) stresses the impact of the ÖVP not recommending that their adherents should vote "yes" to NPP Zwentendorf, which meant that many nuclear proponents supporting the party refrained from voting.

Much discussed in the literature is also the role of a notorious statement Kreisky made a few days before the referendum in which he suggested that he might resign in case the referendum voted against NPP Zwentendorf. This has generally been interpreted as an attempt by Kreisky to mobilize SPÖ supporters to vote in favor of turning the plant on (see, e.g., Bayer, 2013; Kuchler, 2012b). Some authors also consider this a central factor which shaped the referendum in an unintended way, namely by causing a portion of ÖVP adherents to vote "no" to try to force Kreisky to resign even though they might have supported nuclear power (Kriechbaumer, 2004; Müller, 2017). For Rathkolb (2012), Kreisky's statement contributed to moving the debate away from nuclear power while he also notes that the "discussion as a whole had long since expanded beyond Zwentendorf into a party political dispute between the government and its political opponents" (p. 205). This resonates with the more general point the academic sources considered in this section make, namely that the referendum came about primarily due to party political maneuvers by which ÖVP and SPÖ hoped to set themselves up for success in the approaching 1979 general election. Election tactics were, according to these authors, also crucial to the ban on using nuclear fission to produce energy in Austria, which the parliament

passed in the aftermath of the referendum in December 1978. By taking the initiative to outlaw nuclear power, the SPÖ effectively managed to keep the topic out of the 1979 election campaign aside from occasionally performing Kreisky as the “guarantor for upholding the ban on nuclear energy” (Müller, 2017, p. 119; see also Bayer, 2014; Kriechbaumer, 2004; Kuchler, 2012b). This strategy proved successful given that in 1979, the SPÖ again won the absolute majority and even the most votes a party has ever won in Austria to date (Kriechbaumer, 2004; Müller, 2017).

While nuclear power was now banned in Austria, this did not mean that the debate on this topic was over. Rather, the works discussed this section emphasize that attempts to lift the ban and turn on NPP Zwentendorf were made until the Chernobyl accident in 1986. One group of actors working to that end were Austria’s large economic interest groups (including, e.g., the Trade Union Federation and the Economic Chamber), which play a central role in Austrian social and economic policy more generally. Not long after the 1979 election, they founded a lobby organization aiming to promote nuclear power and NPP Zwentendorf going online together with the electricity industry (Kriechbaumer, 2004; Preglau, 1994). In 1980, the Trade Union Federation further sponsored a popular initiative demanding the abolition of the ban on nuclear power. While it secured the required number of signatures, the parliament never made a decision on it (which it is not obliged to do; Kriechbaumer, 2004; Preglau, 1994). This was, Kriechbaumer (2004) argues, because an agreement between SPÖ and ÖVP was not in sight before the initiative expired in 1983. Meanwhile, there were also unsuccessful attempts at further action by the anti-nuclear movement. A popular initiative for the conversion of NPP Zwentendorf into a conventional power plant did, for instance, not achieve enough signatures (Müller, 2017; Preglau, 1994). More generally, the anti-nuclear movement was, as Preglau (1994) puts it, “no longer able to muster the concerted striking power or publicity that it had had before the referendum” (p. 61). What is more, by 1985, public opinion seemed to be again in favor of putting NPP Zwentendorf into operation: Several opinion polls indicated that a majority of the population would now vote to turn the plant on (Kriechbaumer, 2008).

This coincided with the SPÖ again working actively towards putting NPP Zwentendorf into operation which was, as the authors considered here argue, however, once more unsuccessful for party political reasons. In 1985, the SPÖ started to push for a new referendum on repealing the ban on nuclear power (Preglau, 1994). The party was now in a coalition with the much smaller national-conservative Freedom Party of Austria (FPÖ), which was strictly anti-nuclear. Accordingly, the SPÖ wanted to achieve the two-thirds parliamentary majority necessary for a new referendum again with the support of (the pro-nuclear parts of) the ÖVP. These attempts were once more blocked by the ÖVP, which demanded that a government bill was necessary before the matter could be negotiated in parliament. Due to the anti-nuclear stance of the FPÖ, such a bill was, however, not possible (Kriechbaumer, 2008;

Preglau, 1994). Kriechbaumer (2008) suggests that this positioning of the ÖVP had again strategic reasons: The ÖVP wanted to send the message to the SPÖ that if they were to form a coalition after the next general election, an agreement on a new referendum would be possible within government. This can, for instance, be seen from the fact that while the ÖVP was obstructing a new referendum, they also wanted to continue maintaining NPP Zwentendorf in the “ready-to-start” (Müller, 2017, p. 112) condition in which it was being kept as opposed to starting to dismantle it (Kriechbaumer, 2008).

All attempts to lift the ban on nuclear power and turn on NPP Zwentendorf ended abruptly with the Chernobyl disaster, which the authors considered in this section unanimously see as the beginning of Austria’s anti-nuclear consensus. Kuchler (2012a), for instance, argues that the accident in Chernobyl on April 26, 1986, “turned Austria into an anti-nuclear power nation” (p. 257). He describes how nuclear proponents within the political elites, such as the SPÖ chancellor Fred Sinowatz, who had been pushing for the new referendum, “changed their mind literally overnight” (Kuchler, 2012a, p. 257). Lifting the anti-nuclear ban and turning on NPP Zwentendorf was no longer an option for them. The same applied, according to Preglau (1994), to the population: He demonstrates how public support for putting NPP Zwentendorf into operation plummeted in the wake of the Chernobyl disaster. Austria’s consensual rejection of nuclear power was re-affirmed after the country joined the European Union in 1995. As Müller (2017) points out, this development instigated fears that the European single market might, for instance, allow foreign companies to transport nuclear materials through Austria or deposit them within the country. In response to this, the ban on nuclear power was upgraded to a constitutional law in 1999, further strengthening Austria’s anti-nuclear position (Müller, 2017). With nuclear power outlawed, the debate shifted to NPPs elsewhere and in particular to the ones in Austria’s Eastern European neighboring countries (Müller, 2017; see Lofstedt, 2008 for a detailed analysis of Austria’s anti-nuclear policy towards Slovakia). More generally, Austria has in recent years been advocating internationally against nuclear power and in favor of renewable energies. The country’s protest against the EU labeling nuclear energy a sustainable investment is a recent example of this (see chapter 1).

In sum, the works from (political) history discussed in this section foreground party political competition over votes and office in how they make sense of the history of NPP Zwentendorf. The anti-nuclear movement is credited for turning nuclear power into a controversial political issue in the first place as well as mobilizing large numbers of voters in the lead-up to the referendum. The referendum itself is, however, not understood as having come about due to public pressure but rather considered a means by which the government wanted to keep the topic out of the next elections. Similar party political explanations are provided for why nuclear power was banned shortly after the referendum

and the failure of the various attempts made at repealing this law until the Chernobyl accident. As we will see in the next section, all this is interpreted differently in Austria's collective memory.

### 2.2.2 NPP Zwentendorf in Austria's Collective Memory

Having discussed how (political) history makes sense of the events around NPP Zwentendorf, I now turn to how they are remembered in Austria more generally.

Large collectives, such as the Austrian nation, can of course not actually *have* a common memory since the cognitive processes of remembering exclusively take place within the minds of individuals (Assmann, 2019; Erll, 2008). Rather, such collectives actively *make* a collective memory, that is a shared version of the past based on "various symbolic media" (Assmann, 2019, p. 175). This includes, for instance, texts, images, statues and other monuments, as well as commemorative events. The concept of the collective memory as it is used in (collective) memory studies is, in other words, "a metaphor" (Erll, 2008, p.4): It transfers the notion of remembering from individual brains to a collective level. This is useful since there are, as Erll (2008) points out, important similarities between the individual process of remembering and the collective construction of a shared past: First, both individual and collective memories are highly selective. Certain aspects of the past are foregrounded while others are suppressed. Second, what individuals as well as collectives remember (and forget) about the past and how they do so is shaped by the present; what is happening and how we make sense of it (Erll, 2008). Third, the metaphor of the collective memory draws attention to how tightly intertwined memory and identity are not only on the individual but also on the collective level. Their collective memories provide groups of people with a sense that they have a shared history and tradition (Assmann, 2019). Apart from being similar, individual and collective processes of remembering also necessarily interact with each other. As Erll (2008) points out, our individual memories of the past are always shaped by the cultural context we live in and the representations of the past we encounter. At the same time, without being taken up by individual members of the collective, "monuments, rituals, and books are nothing but dead material, failing to have any impact in societies" (Erll, 2008, p. 5). Individual and collective memory thus depend on and shape each other.

Having provided this conceptual background on collective memory, I now go on to describe how the controversy over NPP Zwentendorf is collectively remembered in Austria. That this controversy is part of the nation's collective memory can be seen from the fact that certain versions of the events around NPP Zwentendorf have retrospectively been produced and circulated through symbolic media. This is demonstrated by Weingand (1995) who analyzes mentions of "Zwentendorf" in reports published by Austria's main news agency between 1983 and 1995. On this basis, he attests that since the Chernobyl accident, public political debate has been constructing the narrow referendum of 1978 as *the* beginning of Austria's consensual rejection of nuclear power. The vote has been mythologized

as the moment in which demonstrating foresight, the Austrian population once and for all disavowed nuclear power. This interpretation is, according to Weingand, tied to an understanding of the referendum as mandating Austrian politicians to advocate against nuclear power on an international level. In other words, Weingand describes how public discourse has produced a particular way of remembering the referendum which speaks to present concerns and events. Along similar lines, Strohmeier (2004) argues that NPP Zwentendorf is an Austrian site of memory (“Gedächtnisort”, p. 358) that is mobilized in particular when it can be brought to bear in contemporary political debates. Examining how and by whom the referendum against the NPP was actively remembered on its fifth, 10<sup>th</sup>, and 20<sup>th</sup> anniversary, Strohmeier concludes that commemorative efforts primarily come from anti-nuclear groups. They are the ones publishing commemorative pamphlets about NPP Zwentendorf and organizing exhibitions, for example. Remembering the referendum as a “victory of the nuclear opponents” (Strohmeier, 2004, p. 370) provides these groups, Strohmeier argues, with self-confidence and optimism in renewed debates about nuclear power, for instance, about the NPPs in Eastern Europe.

These accounts already indicate that the memories of the controversy over NPP Zwentendorf floating around in Austria place a greater emphasis on the role played by the Austrian population compared to the historiographical view I discussed in the previous section. The differences between the two perspectives are brought to the fore by Bayer (2013, 2014). He argues that the version of events engrained in Austria’s collective memory makes direct causal links between the anti-nuclear movement, the referendum against NPP Zwentendorf in 1978, and the Austrian public unanimously rejecting nuclear power. In this narrative, the referendum is, according to Bayer, seen as the result of the population protesting nuclear power. It is considered an achievement of the public which contrasts with (political) history’s view of the referendum as the outcome of party political strategizing (see section 2.2.1). Furthermore, as is also noted by Weingand (1995), the referendum is typically remembered as the starting point of Austria’s anti-nuclear consensus. This, Bayer (2013, 2014) argues, disregards the tightness of the referendum which he interprets as a sign of polarization rather than unanimity. The notion that the referendum was *the* turning point in Austria’s position on nuclear power is moreover at odds with the historiographical argument that the debate continued well beyond 1978. The version of events remembered in Austria, according to Bayer, thus also ignores that a majority of the population was again supportive of nuclear power by 1985 and the many efforts made to turn the plant on until the Chernobyl disaster (see section 2.2.1). For Bayer, Austria’s collective memories of the controversy around NPP Zwentendorf are not an accurate representation of what happened. Rather and in line with the tight connections Assmann (2019) and Erll (2008) see between collective memory and identity, Bayer (2013, 2014) attests that the remembered version of events serves to create an image of a unified Austrian nation of nuclear opponents.

This view is supported by Felt (2015) who shows that the rejection of nuclear power, which is so closely associated with the controversy around NPP Zwentendorf, has become tightly intertwined with Austria's national identity. Her article is based on a series of public discussion workshops in Austria which aimed to explore how citizens imagine and assess emerging nanotechnologies. Felt analyzes how two previous experiences with emerging technologies, namely Austria's rejection of nuclear power and attempts to ban the use of genetically modified organisms (GMOs) in agriculture and food, served as shared frames of reference throughout the workshops. Based on this, Felt argues that the choice of "keeping certain technologies out" (p. 105) of Austria has been mutually constituted with a particular national identity: Austria is imagined as distinct from other nations precisely because it has rejected these technologies. Drawing on the concept of the socio-technical imaginary first introduced by Jasanoff and Kim (2009), Felt calls this an "imaginary of the absent" (p. 104). Socio-technical imaginaries are firmly stabilized and regularly rehearsed collective visions of what life will and should be like in relation to science and technology in the future (Jasanoff, 2015). Based on the nano workshops, Felt (2015) argues that in the Austrian case, the nation's past encounters with nuclear power and GMOs have merged into such an imaginary: They have become "filters" (Felt, 2015, p. 119) which can be applied to new technologies, such as the nano, and used to imagine a future in relation to them.

More specifically, Felt (2015) argues that the "imaginary of the absent" (p. 104) entails a vision of an Austria that can, despite its smallness, make different sociotechnical choices than its bigger and more powerful neighbors. Furthermore, Austria is imagined as having a special relation to nature which is why Austrians are framed as being "naturally" opposed to nuclear power and GMOs. In the workshop participants' references to these past experiences, the Austrian people also emerge as a community of "knowledgeable agents" (Felt, 2015, p. 107) who have the capacity to make informed and value-driven choices and can make a political difference. In the nuclear case, the population is, for instance, believed to have demonstrated more foresight than the political and scientific elites. Remembering the rejection of nuclear power as being the Austrian public's achievement has thus contributed to a specific imagination of what it means to be Austrian. This way of making sense of the controversy around NPP Zwentendorf furthermore acts as a resource based on which visions of desirable futures, for instance, in relation to emerging nano technologies can be articulated. It has, as Felt points out, been mutually constituted with an alternative sociotechnical imaginary in which Austria stands for sustainable energy and organic food.

Public performances of Austria's anti-nuclear position, such as the recent criticisms of Czech plans to expand their nuclear energy program (see chapter 1), make the imaginary seem unshakable. Felt (2015), however, also argues that such technopolitical identities require continuous nourishment to persist. When Austrian politicians call the Czech Republic's intention to build four new nuclear



reactors close to the border an “attack on the Austrian-Czech relations” (“Sicherheitsrisiko”, 2024), this does, according to Felt, not only demonstrate the strength of the anti-nuclear imaginary but is in fact necessary for keeping it alive. The need to continuously rehearse Austria’s anti-nuclear stance is also emphasized by Bayer and Felt (2019). They argue that the broad support nuclear power initially enjoyed in Austria (see section 2.2.1) was a pro-nuclear socio-technical imaginary that was as stable and deeply engrained in Austrian self-understanding as the current anti-nuclear one. To demonstrate this, Bayer and Felt, on the one hand, examine institutions and infrastructures that were created to establish the nuclear in Austria. On the other hand, they analyze narratives and myths that served to construct nuclear technologies as a part of Austria’s national identity. As Bayer and Felt describe, this involved remembering the achievements Austria had made in nuclear research prior to WWII and tying this version of the past to a bright future in which nuclear power would allow for growth and prosperity. Austria’s pro-nuclear imaginary was thus firmly entrenched both institutionally and ideologically. That it has nevertheless dissolved and been replaced by an anti-nuclear one highlights the fragility and need for continuous rehearsal of any imaginary for Bayer and Felt. Furthermore, they interpret the fact that Austria’s past nuclear enthusiasm has been erased from the collective memory as a sign that the current anti-nuclear position is built on more fragile grounds than it appears. Their argument is that the broad support for the nuclear that used to exist in Austria has been “covered up” rather than consciously turned away from “in a process of public learning” (p. 186). This further stresses the need of Austria’s anti-nuclear stance for regular nourishment.

The inherent fragility of the anti-nuclear imaginary and the work done to keep it stable seem particularly interesting given the “nuclear renaissance” (Müller & Thurner, 2017, p. 3), i.e., the renewed global interest in nuclear power (see chapter 1). While a recent poll indicates that Austria’s anti-nuclear consensus seems to have remained unshaken by this debate (Kleindl et al., 2023), the country is not exempt from the underlying debates about energy security, independence from Russia, and the need to decarbonize. As I described in the Introduction, recent news coverage suggests that, on the one hand, the nuclear revival provides an impetus for further rehearsals of the anti-nuclear imaginary. This can, for instance, be seen in the case of John Kerry’s advice that Austria should go nuclear, which led to the anti-nuclear stance being publicly re-affirmed (Perry & Matzl, 2024). On the other hand, some news articles pose the question “Should Austria rely on nuclear power in the future after all?” (NÖN Redaktion, 2023) anew. There thus seems to be some room to consider alternatives to Austria’s strict anti-nuclear policy. These kinds of debates also appear to affect the guided tours through NPP Zwentendorf, for instance, when visitors were asking whether the plant could still be turned on around the time when Russia cut its gas supply to Europe (Sica, 2022; see chapter 1). Against this background, it seems particularly interesting to investigate how the dominant way of remembering the history of

NPP Zwentendorf, which is so tightly intertwined with the country's rejection of nuclear power and its collective vision of a nuclear-free future, are rehearsed and/or challenged at the tours.

## 2.3 Conclusion

In sum, I discussed two different strands of literature in this State of the Art. In section 2.1, I examined STS literature on PCST, which forms the backbone of my thesis project. I demonstrated that after instigating a shift from deficit to dialogue approaches within PCST, STS became increasingly critical of this move. As an alternative, STS scholars developed a third way of thinking of instances of PCST as heterogeneous sources of performativity. While there is already a considerable body of work on PCST from such a constructivist, open-ended angle, I argued that there are also certain limitations: So far this research has focused predominantly on instances of PCST with direct ties to policymaking. Furthermore, some aspects of PCST, such as the making of publics, have been foregrounded at the expense of other dimensions. I concluded this section of the State of the Art by pointing out a recent set of conceptual and empirical works which emphasize that *all* kinds of PCST have the ability to actively shape science-technology-society relations and therefore warrant analysis in their own right.

In section 2.2, I turned to the literature that has been published on NPP Zwentendorf. I first provided an overview of how (political) history makes sense of the fact that the plant was never turned on and nuclear power subsequently outlawed in Austria. The body of work I discussed mainly attributes these events to competition between the established political parties. These contributions further emphasize that the debate about nuclear power by no means ended with the referendum in 1978 but continued until the Chernobyl accident in 1986. In contrast, in Austria's collective memory, the referendum is retrospectively constructed as *the* moment in which Austria decided against nuclear power once and for all. Furthermore, the referendum and the ban on nuclear power are above all considered achievements of the anti-nuclear movement and the Austrian population. I argued that this way of explaining the events around the plant is tightly intertwined with the idea that the rejection of nuclear power distinguishes Austria from other countries. While this technopolitical identity might seem stable, it requires, as I pointed out, continuous nourishment. I closed by noting that the fragility of this imaginary and the work done to maintain it are also highlighted by the renewed global interest in nuclear power.

### 3. Research Questions

Building on the literature discussed in the State of the Art, I now introduce my research questions and how answering them adds to the existing research. Like the constructivist takes on PCST I described above, my approach to the guided tours through NPP Zwentendorf emphasizes performativity and heterogeneity. I examine open-endedly what actually happens at the tours; what is brought into being by the dynamic interactions between different kinds of elements that take place there. I therefore employ an approach that has so far mainly been used to study public participation in science and technology policymaking to examine an instance of PCST without ties to policy. As such, my thesis contributes to drawing attention to the potential of *all* forms of PCST to actively shape wider science-technology-society relations. My main research question is:

**[MQ] *How is NPP Zwentendorf performed at the guided tours through the plant?***

With my subordinate research questions, I focus on a set of heterogeneous dimensions of the tours that emerged as particularly relevant throughout my literature review and empirical analysis:

**[SQ1] *How is knowledge made at the guided tours through NPP Zwentendorf?***

This question deals with processes of knowledge production occurring at the guided tours. With it, I examine the kinds of statements that are made about nuclear power, how the plant would have operated, and its history. I also want to find out how this knowledge is shaped by and shapes the context of the tours. This includes investigating the issues these statements address and what visitors make of them.

**[SQ2] *How does NPP Zwentendorf emerge as a space within the guided tours and how does this space impinge on the tours?***

With this question, I study the kind of space that is made at the tours. This means looking out for the positions of bodies and objects and the interactions between them as well as how this emerging space is made sense of. At the same time, I investigate how NPP Zwentendorf as a pre-existing space shapes the guided tours physically but also by facilitating certain kinds of experiences and emotions.

**[SQ3] *How are pasts, presents, and futures constructed at the guided tours and how are they connected?***

This question allows me to analyze how Austria's nuclear history is remembered, how the present is perceived, how (energy) futures are imagined, and what links are made between them at the tours. In this way, I also expect to gain insights into how the guided tours nourish and/or challenge the dominant way of interpreting the history of the plant and tying it to a particular kind of "Austrianness".

By foregrounding these diverse aspects in my analysis of the tours, I bring into view dimensions of PCST that have so far been largely disregarded. [SQ2] in particular allows me to represent the heterogeneity and materiality of the tours. [SQ3] speaks to the significance of NPP Zwentendorf for Austrian culture and identity and the ongoing nuclear revival I described in the State of the Art. To further account for the heterogeneous character of the tours but also because following Davies et al. (2019), I recognize that emotions are always involved when we make sense of the world, my research is also guided by the following sensitizing question:

**[SQ4] *What emotions become present in what moments of the guided tours?***

This question draws my attention to how the tours are experienced emotionally. My aim is not to provide a full analysis of the emotions that emerge throughout the tours (even though that would certainly be worthwhile). Rather, this sensitizing question reminds me to look out for the role played by the emotional in the processes of knowledge, space, and past, present, and future making I observe. It helps me see the emotional component involved in my research questions.

## 4. Theory and Sensitizing Concepts

Having presented my research questions, I now turn to the theories and concepts I use to frame my work. In this chapter, I make clear how my conceptual background helps me understand my research questions and what it allows me to see in my empirical material. I begin by briefly revisiting my two overarching theoretical frameworks, co-production and the understanding of culture developed by cultural studies, which I already mentioned in the State of the Art. Here, I clarify how these theories make me see the guided tours (section 4.1). Afterwards, I introduce additional concepts that guide me in addressing my subordinate research questions. In section 4.2, I discuss theoretical lenses which help me study the processes of knowledge production taking place at the tours. Section 4.3 is concerned with how I conceive of space while section 4.4 is devoted to how I think of the past, present, and future and their relations.

### 4.1 Overarching Theoretical Frameworks: Co-Production and Cultural Studies Theory

As I already discussed in the State of the Art (see section 2.1.3), the notion of co-production was introduced by Sheila Jasanoff (2004) and suggests that technoscience and society are mutually constitutive. This invites us to study concrete instances of how science, technology, and society are done together; what emerges in moments in which they engage with each other. Co-production therefore provides me with a way of understanding the performativity of the guided tours. Concretely, as is also suggested by Felt and Davies (2020a, 2020d), I view the tours as co-producing the various entities involved in them, including the (technoscientific) knowledge they seem to transmit. This means that I do not examine the different elements covered by my subordinate research questions in isolation but rather look at how they mutually shape each other within the guided tours. Furthermore, co-production opens the door for thinking about the guided tours as shaping and being shaped by wider imaginations of the relations between science, technology, and society (Felt & Davies, 2020a, 2020d). The work they do can be seen as being co-produced with broader ways of making sense of the world.

To clarify this second point, I further, as Davies and Horst (2016) propose, use the notion of culture developed within cultural studies and especially by Stuart Hall. He defines culture as follows:

Primarily, culture is concerned with the production and the exchange of meanings – the “giving and taking of meaning” – between the members of a society or group. To say that two people belong to the same culture is to say that they interpret the world in roughly the same ways and can express themselves, their thoughts and feelings about the world, in ways which will be understood by each other. (Hall, 1997, p. 2)

According to this perspective, culture consists of shared ways of making sense of the world. To view the guided tours as a cultural activity is thus to say that they create and circulate meanings (see also Davies & Horst, 2016). In doing so, they interact with collective interpretations of the world. They can become sites for further circulating them or produce alternatives. This is because there is, as Hall (1997) points out, always “more than one way of interpreting or representing” (p. 2) any given topic within one and the same culture. Looking at the tours from this perspective thus invites me to examine how they reproduce and/or challenge shared ways of making sense of the world. Specifically, I examine how they interact with the meanings about nuclear power and the plant that, as I described in section 2.2.2, float around in Austria at the present moment in time. Furthermore, Hall’s emphasis on the diversity of interpretations being produced and circulating within one culture makes me look out for both patterns and variations in the meanings that emerge at the tours. It also leads me to assume that these meanings are not determined by the organizers and guides of the tours but also depend on what visitors make of them (Davies & Horst, 2016). Methodologically, this means that there is a need to consider how visitors make sense of the tours when trying to understand what they bring into being.

## 4.2 Conceptualizing Knowledge Production

Having described my overarching theoretical frameworks and what follows from them, I now present additional sensitizing concepts that have guided my subordinate research questions and helped me interpret my empirical material. This section focuses on the theoretical lenses I use to conceive of and study the processes of knowledge production taking place at the guided tours [SQ1]. Specifically, I introduce John Law’s (2017) concept of the knowing space and how it has been applied to instances of PCST by Felt and Davies (2020a). Furthermore, I present Bruno Latour’s (2004) notion of matters of concern (MoC). As we will see, both concepts can help illuminate how and what knowledge is produced at the tours.

The term ““knowing spaces”” (Law, 2017, p. 47) captures the foundational STS insight that (scientific) knowledge is not independent from the context in which it was produced but rather contingent on it. As such, it is one way of concretizing the basic idea behind co-production, which is, as I mentioned before, the argument that “the ways in which we know and represent the world (both nature and society) are inseparable from the ways in which we choose to live in it” (Jasanoff, 2004, p. 2). Law (2017) defines a knowing space as being made up of the various and heterogeneous elements used to construct and stabilize “facts” in a given context. Knowing spaces are, as Law puts it, the “arrays of subjects, objects, expressions or representations, imaginaries, metaphysical assumptions, normativities, and institutions” (p. 47) that shape how and what is and can be known in a certain (actual or metaphorical) location. Within science, a discipline or sub-discipline that comes with specific concepts, methods, values, and traditions and makes use of certain kinds of instruments and spaces but not

others could, for instance, be thought of as a knowing space. All these things influence what kinds of questions can be researched and what kinds of results can be achieved, recognized, and become taken for granted in the respective (sub-)discipline.

Felt and Davies (2020a) invite us to use this concept as a lens for studying instances of PCST. As I already mentioned in the State of the Art (see section 2.1.3), in line with their co-productionist perspective, Felt and Davies view instances of PCST as actively producing the knowledge they purport to transmit. More specifically, they argue that PCST removes scientific results from their original knowing space, that is the conditions under which they were produced and validated. This can be seen from the fact that methodological details are, for instance, usually not included when scientific findings are communicated about in public. Simultaneously, PCST recontextualizes this knowledge, for instance, by adapting it to the concrete communication setting or arguing its relevance to broader societal concerns. This means that instances of PCST create, as Felt and Davies (2020a) put it, “distinct ways of knowing the world” (p. 22) in relation to the context (e.g., physical, institutional, or socio-political) in which they take place. Instances of PCST are thus knowing spaces “in their own right” (Felt and Davies, 2020a, p. 23). They actively produce situated knowledges.

In my approach to the guided tours through NPP Zwentendorf, I follow Felt and Davies’s way of applying the concept of knowing spaces to instances of PCST. I view the tours as knowing spaces that actively produce knowledge and examine how this knowledge is shaped by various contextual factors. These include the physical space which emerges at the tours, the emotional experiences that are deemed suitable, or underlying assumptions about what kinds of knowledge flow from whom to whom in this setting. I am furthermore attentive to how the knowledge the tours make is tied to broader societal concerns. This constitutes a particularly useful lens because nuclear power plants are oftentimes a source of concern to those who oppose them. One example of this is the Austrian anti-nuclear movement worrying about the negative effects of NPPs and radioactivity on health and the environment (see section 2.2.1). Furthermore, examining the sociopolitical concerns the guided tours speak to resonates with my view of the tours as interacting with broader debates about nuclear power (see section 4.1).

To better understand the relationship between knowledge and concerns, Latour’s (2004) notion of MoC is useful. His central point in his 2004 contribution is that “matters of fact emerge out of matters of concern” (p. 235). In other words, he argues that concerns are at the root of “facts” and hold them together. With this, Latour aims to suggest a respectful way of studying the construction of facts as opposed to debunking them. His focus on concerns, according to Puig de la Bellacasa (2011), further adds a particular affective component, namely “connotations of trouble, worry and care” (p. 87), to the making and stabilization of facts. These ideas guide me in my analysis of how and what

knowledge is produced at the tours: I ask, what kinds of worries are implicated in the statements that are made about nuclear power and NPPs in the context of the guided tours? What are the underlying troubling questions? How does the knowledge shared at the tours address and reinforce them? In this way, the notion of MoC helps me understand what and how knowledge is produced at the tours.

### 4.3 Studying the Constitution of Space

My theoretical background for [SQ2], which is concerned with matters of space, comes from German sociology, where several authors have in recent years devoted conceptual attention to the question how we can conceive of space as shaping and being shaped by the social. The most important contribution to this debate within the German context has so far been made by Martina Löw (2001, here referenced in its English translation Löw, 2016). As I describe in this section, her work is central to how I think of space in the context of the guided tours. On top of that, I draw on Hubert Knoblauch and Silke Steets's (2022) approach which critiques and further develops the one proposed by Löw. As I suggest at the end of the section, with regards to the guided tours, both these perspectives are relevant and in fact complementary.

Löw's (2016) central aim is to overcome and provide an alternative to what she terms "the absolutist notion of space" (p. 15). This notion considers space a container, that is a thing existing all around us and in which we can position ourselves and objects. In contrast, Löw proposes a relational approach to space which thinks of space not as enabling the positioning of bodies and objects but rather as being constituted of these bodies and objects and their arrangements. This perspective opens the door for conceiving of space as emerging from human actions, such as where we place ourselves, which enables a view of space as being shaped by the social. At the same time, Löw emphasizes that in any given situation, human (spatial) action is conditioned by pre-existing spatial orders, for instance, by how objects have previously been placed. Löw thus describes a mutually constitutive relationship between space and the social. This clearly resonates with Jasanoff's (2004) idiom of co-production and thus complements my overarching theoretical framework. Specifically, Löw's two-pronged approach invites me to ask two related questions about the tours: How do they produce the plant as a space? And conversely, how do the pre-existing spatial arrangements of the plant impinge upon the tours? Both these dimensions are captured by my research question [SQ2].

Central to Löw's approach is further a distinction between two processes that contribute to the emergence of space. The first one, which she terms "spacing" (p. 134), refers to the physical aspects involved, that is what bodies and objects are present and how they are arranged (or arrange themselves) in relation to one another. At the same time, the making of space is, according to Löw, also about giving meaning to space: It requires people linking the bodies and objects present in a specific place by perceiving, remembering, or imagining them together. Löw calls this second process the



“synthesis” of space (p. 134) and holds that it is crucial to the constitution of any space. Without it, there is no space for her. An accumulation of buildings, for instance, only becomes a space, according to Löw, if someone thinks of these buildings as a single element, say, a neighborhood. This emphasis on the role played by meanings in the constitution of space fits well with my view of the tours as a cultural activity (see section 4.1). Furthermore, Löw’s distinction between spacing and synthesis provides me with concrete guidance as to how I can study the ways in which the space of the plant is produced at and shapes the guided tours: Firstly, I examine what objects are present and how visitors and guides position themselves in relation to them and each other. Secondly, I study how space is made sense of during the tours and the roles played by perception, memory, and imagination.

To adequately capture how the pre-existing spatial arrangements of the plant shape the tours, I further draw on Löw’s notion of “atmosphere” (p. 172), by which she understands the ability of spaces to influence how people feel. To illustrate this idea, Löw provides the example of a store in which there is calming music or a pleasant smell. This can affect your mood: You might, for instance, become more relaxed if you arrived in a hurry because the store is about to close. As this example shows, the concept of atmosphere is concerned with the potential of objects and pre-existing spatial arrangements to “act” themselves by shaping how people experience them. At the same time, Löw stresses that atmospheres have to be “actively picked up” (p. 172). In other words, they emerge in the interactions between people and objects rather than from objects alone. This can be seen from the fact that atmospheres are not universal. As Löw points out, not everyone reacts to the same spatial arrangements in the same way. At the same time, she holds that culture and socialization influence how we perceive atmospheres, meaning that certain spaces usually make certain people feel certain things. Taken together, this invites me to look out for both variations and patterns in how visitors experience the space of the plant.

Having described how I employ Löw’s approach to study the constitution of space at the guided tours, I now turn to Knoblauch and Steets’s (2022) contribution. After briefly summarizing their critique of Löw’s perspective, I explain which elements of their view of space I intend to use in what ways. As I already mentioned, for Löw, the operation of synthesis is a necessary condition for the constitution of space. This is one of the aspects of her approach Knoblauch and Steets (2022) take issue with. They argue that Löw’s emphasis on subjective and cognitive processes, such as perceiving, remembering, and imagining space, creates the misleading impression that space only exists within people’s minds rather than as a material reality. Relatedly, Knoblauch and Steets critique that while Löw thinks of space as relational, she does not apply the same lens to the social when she makes out the operation of synthesis as crucial for the constitution of space. As an alternative, Knoblauch and Steets want to think of space as emerging from relations and interactions between different people and the

world (as opposed to the relations between a single person and the world). They call this process the “communicative construction of space” (p. 19).

Central to the communicative construction of space is what Knoblauch and Steets term “communicative action” (p. 24), that is bodily performed ways in which people interact with one another. Communicative action can involve the use of language but does not need to be discursive: It can, for instance, also consist of eye contact or shared attention to a material object. Using pointing as an example of communicative action, Knoblauch and Steets explain how its bodily performance lends this act a spatial dimension. They describe how when we point at something, we do not only take into account our own position and orientation towards the thing we are pointing at but also the position and orientation of the person we are showing the thing to. We make, for instance, sure that the other person can see the pointing finger rather than hiding it behind our back. As such, the act of pointing establishes a relation between the location of the person pointing and the person something is pointed out to and furthermore with the position of the thing being pointed at. We are, in Knoblauch and Steets’s (2022) words, “dealing with a performative linking of elements to yield a space that is not – as Löw’s operation of synthesis suggests – primarily anchored in consciousness” (p. 26) but rather emerges from communication and interaction. Space is, in this case, not created within the mind of one individual but rather constituted by both people together in relation to their shared environment.

This perspective draws my attention to how space emerges from the bodily performed interactions between guides, visitors, and the pre-existing spatial features of the plant. It allows me to make sense of the many instances in which I observed Knoblauch and Steets’ paradigmatic example of something being pointed at during the guided tours. Knoblauch and Steet’s focus is primarily on how space is constructed physically through these kinds of bodily performed actions and less on questions of meaning making. They do suggest, however, that the basic meaning of the act of pointing is the referent, that is the thing that is being pointed at. This insight helps me understand how meaningful space emerges in conversations between visitors and guides and their interactions with the pre-existing spatial arrangements of the plant. More generally, we will see that despite their differences, both Löw’s and Knoblauch and Steet’s approaches are relevant to how space is made at the guided tours: While space is constituted physically and given meaning to in the interactions between visitors, guides, and objects, space is also perceived, remembered, imagined, and made sense of by individual visitors. What is more, these two processes are, as I will discuss in my empirical analysis, complementary at the tours: How people perceive, remember, and imagine the space of the plant is shaped by space-related communication and vice versa.

## 4.4 Understanding the Relations Between Past, Present, and Future

In this section, I describe the time-related theoretical background I draw on to address [SQ3]. In the State of the Art, I have already introduced the concept of the collective memory as it is used within memory studies (see section 2.2.2). I have argued that large groups of people actively create a shared view of the past through symbolic media. Furthermore, I have pointed out that these collective memories are always constructed for the present and closely related to processes of identity formation and stabilization. I have also made the case that individual and collective memories hang together and feed into each other. Here, I extend this by describing how I conceive of the future and its relations with the past and present. To conclude, I point out what questions this conceptual background allows me to ask about the guided tours.

In a similar manner to how they remember the past, groups of people also construct shared visions of the future. This can, for instance, be seen from Szpunar and Szpunar's (2016) contribution which aims to broaden (collective) memory studies' rather exclusive focus on the relations between past and present to also include the future. Building on how the field understands the collective memory, they define the concept of "collective future thought" as "the act of imagining an event that has yet to transpire on behalf of, or by, a group." (p. 378). This already implies one central similarity between collective versions of the past and future: The imagining of a group's future can take place in the mind of individual people "on behalf" (p. 378) of the larger group. At the same time, collectives also make and rehearse shared visions of the future through texts, images, objects, practices, and so on. As in the case of the collective memory, collective future thought thus has an individual and a collective level and, what is more, the two are mutually constituted (Szpunar & Szpunar, 2016). Furthermore, collective future thought, according to Szpunar and Szpunar, emerges like collective memories in and for the present. On top of that, collective visions of the future are also closely related to matters of group identity: Central to who "we" are is, as Szpunar and Szpunar point out, not only a shared past but also a sense that "our" group will continue to exist in the future.

Collective remembering and envisioning, moreover, interact with each other in complex ways: As Szpunar and Szpunar (2016) point out, memories of the past can be a source of imaginations of the future. At the same time, visions of the future can shape how the past is made sense of. From this conceptual perspective, the relationship between past, present, and future is thus multi-directional: They are not imagined on a line with the past influencing the present and both of them shaping the future. Rather, past and future are seen as emerging from the present and in relation to one another. In contrast with this view developed in memory studies, the anthropologist Arjun Appadurai (2012) argues that there is a deeply entrenched habit in Western thinking to conceive of past, present, and future in the form of a trajectory. He calls this tendency "trajectorism" and defines it as the

omnipresent idea that there is always “a cumulative journey from here to there, more exactly from now to then” or “that time’s arrow inevitably has a telos” (p. 26). In other words, Appadurai attests that in the West, past, present, and future are typically assumed to unfold consecutively and to imply an evolution from one state to another, for instance, “from sin to salvation” (p. 26) in the Bible or “from darkness to light” (p. 26) in Plato’s Allegory of the Cave. While the relations between past, present, and future are, as memory studies suggest, potentially very messy, in the West, we most commonly make sense of them by squeezing them into a linear logic. We typically imagine that we are on a journey from a certain past to a certain future.

This way of thinking contributes to a phenomenon which has been much described in STS and elsewhere, namely the authority the future has gained to shape decisions and actions taken in the present (see, e.g., Adams et al., 2009). Imagining that our past, present, and future develop into a certain direction oftentimes entails, as Michael (2000) points out, “a more or less developed narrative of how ‘we’, or some other constituency, should get to or avoid the future” (p. 27). It dictates what needs to be done and by whom to continue on our journey to the anticipated future. This often happens, according to Michael, by staging a particular problem which needs to be overcome to attain the desired future together with a suitable solution. We have already seen an example of problems and solutions being made together as a way of articulating a certain trajectory in the State of the Art: As I described in section 2.2.2, Bayer and Felt (2019) argue that underlying Austria’s pro-nuclear period was a vision of the future in which energy consumption would rise as an indicator of increased economic and social well-being. The obstacle to this bright future staged here was, as Bayer and Felt point out, that the energy sources predicted to be available would not suffice to cover the increasing demands. At the same time, nuclear power was presented as an ideal and indeed “the only reasonable solution” (Bayer & Felt, 2019, p. 183) to this problem, which involved making a connection to Austria’s past contributions to nuclear research. Drawing loosely on Joan Fujimura’s (1987) work on how “standardized packages” (p. 257) aligning theory and methods help researchers define “doable problems” (p. 257), Bayer and Felt (2019) refer to their observations as a “problem-solution package” (p. 181). This notion highlights that the problem of rising energy demands did not precede its solution, that is embracing the nuclear, but was rather co-produced with it. As this example illustrates, looking out for instances in which problems and solutions are articulated together can help us understand the kinds of trajectories that are imagined and what actions they demand to be taken in the present.

To sum up, in this section, I have described how I conceive of collective imaginations of the future and their relations to how past and present are made sense of. I have argued that shared versions of the future are, like collective memories, actively made and rehearsed through public performances in the present and co-constituted with collective identities. With regards to the guided tours

through NPP Zwentendorf, this asks me to examine how specific versions of the past and future are constructed together in what is said and done and through objects, images, and other material representations. I have also pointed to the interactions that take place between individuals remembering and envisioning collective pasts and futures and the respective collectives doing so. This invites me to view guides' and visitors' articulations of certain versions of the past and future as potentially illustrative of broader discourses which complements my conceptualization of the tours as drawing on and feeding into shared interpretations of the world. While I am, as I have described above, aware that complex relations are possible between performances of the past, present, and future, the notion of trajectorism draws my attention to the evolutions implied in how they are co-produced at the tours. To understand the trajectories articulated and how they shape the present by calling for certain courses of action, I further look out for instances in which problems and solutions are co-articulated.

## 5. Material and Methods

Given my interest in the performative character of the guided tours, that is in what is produced by the interactions between heterogeneous elements that take place there, it was clear to me from the beginning that my research would ideally involve ethnographic work. Taking an ethnographic approach made it possible for me to witness these interactions myself, which was central to addressing my research questions. On top of that, my ethnographic fieldwork comprised informal conversations and more formal qualitative interviews with visitors. This allowed me to go beyond my own impressions and understand what visitors made of the tours, which I consider crucial to understanding what the tours bring into being (see section 4.1). In what follows, I describe my ethnographic field more closely (section 5.1). After addressing ethical questions (section 5.2), I go into further depth on my methods of data collection (sections 5.3 and 5.4). Section 5.5 is devoted to reflecting on my own influence on the research. I conclude by discussing how I analyzed my data (section 5.6).

### 5.1 Constructing the Field

The “field” of an ethnography is commonly understood to be “the setting or population” (Delamont, 2007, p. 6) the researcher studies. Importantly, however, as Atkinson (1992) points out, this setting or population is not pre-given, waiting to be discovered by the ethnographer. Rather, the researcher actively “produces” (Atkinson, 1992, p. 9) the field as its boundaries, for instance, depend on what the ethnographer manages to negotiate access to and where they direct their attention. In what follows, I therefore not only provide information about the tours I went on but also describe how I shaped this field through my own actions.

Before starting my empirical research, I already knew from the information available on NPP Zwentendorf’s official website that since 2010, the EVN has been offering different kinds of tours at the plant: free public tours anyone can in principle sign up for, paid private tours you need to specially arrange with them, and tours specifically for schools and universities (EVN, n.d.-c). Originally, my plan had been to accompany different kinds of tours as I was interested in comparing what kinds of interactions and conversations emerge in slightly different settings. In my access negotiations with the EVN, it became clear, however, that I would only be able to go on public guided tours. In total, I accompanied six public guided tours between March and June 2023. These tours either took place on Monday evenings at 6 p.m. or Friday afternoons at 1 p.m. and lasted between 2 and 2.5 hours.

While I describe in detail how these tours typically went in my empirical analysis, here, I would like to provide some further basic information about them: As I had already known based on the information available online (EVN, n.d.-b), the public tours were exclusively in German. Each tour was guided by two tour guides, who usually did not share much information about themselves with visitors

other than their name. The number of visitors was limited to 25 per tour. However, in practice, there were usually fewer visitors due to no-shows. The most extreme case of this was one tour on a particularly hot day in June at which I only counted 11 visitors. While usually not everyone shows up, it is, at the same time, notoriously difficult to secure a spot on one of the public tours. My own experience was that when you open the online registration tool (EVN, n.d.-b), it usually tells you that all guided tours are currently fully booked. Similar experiences were recounted by the visitors I spoke to. Many of them told me that they had been waiting to go on a tour and checking the website irregularly for long periods of time, for instance, for “one and a half years”, as one visitor specified (I1). A larger group of people who visited together described to me how one of them had written a computer program which “tells [them] when there are free spots” (informal conversation). Signing up for a tour thus required significant efforts on the part of the visitors. This suggests that for many of those who did manage to get a spot (and showed up), visiting the NPP was something they very much wanted to do.

I experienced first-hand how difficult it can be to find a free place on one of the tours because I signed up as a visitor for the first two of the six tours I accompanied. This was because my access negotiations with the EVN took much longer than anticipated. While I was waiting for a response for weeks on end, my thesis supervisor suggested that I could also begin my empirical work by going on public tours like a regular visitor would and observing unobtrusively what was happening. As I was eager to get started, I followed this recommendation and managed to sign up for two public guided tours in March 2023 by checking the website several times a day. The fact that I joined these tours unofficially as a visitor rather than officially to do my thesis research fundamentally shaped the kinds of interactions that were possible with the field: On these first two tours, I informed neither guides nor visitors about my research project nor did I make any attempts to engage with them. While I was also not jotting anything down during these tours, I was continuously taking what Emerson et al. (2001) refer to as mental notes: I was actively paying attention to what was happening in order to remember and be able to write down as much as possible after the tour.

How I acted and thereby shaped the field changed fundamentally once the EVN officially agreed to my research project and to me engaging with visitors. On the four tours I accompanied after being granted access, the guides had usually been informed in advance that I would be coming. Oftentimes, they invited me to join them in their office while we were waiting for the visitors to arrive. I was also able to introduce myself and my project to the visitors at the beginning of the tours and could already announce that I was looking for visitors who would afterwards be willing to tell me about how they experienced the tour. Throughout the rest of the tours, I was constantly and very overtly jotting down keywords and phrases in a notepad but did not make any efforts to initiate conversations with visitors. This had been a demand by the EVN who had worried that interviews during the tour might

disturb it, detract from visitors' overall experience, and potentially pose a risk to their safety. The latter was probably a concern due to the floor of the plant being uneven in certain places and things sticking out of the walls, which is also why visitors (and guides) need wear helmets inside of the plant.

As soon as the tour was over, I started talking to the visitors around me, typically asking them, "Do you still have time for a few questions?". I also hung around in the parking lot and approached individual visitors or groups of people that had visited together when they were on their way to their car. Usually, the spontaneity involved meant that I could not put much thought into who I approached. In most cases, it was simply a matter of asking the people who were closest to me or who I ran into first. If people seemed interested but needed to leave right away, I offered that they could also give me their e-mail address so that I could contact them at another time. In exchange, I gave them a flyer with basic information about my project and my own contact details. While I initiated the conversation in most cases, some visitors also approached me on their own accord either during the tours or afterwards. They asked me about my project or master's program, shared their impressions, or wanted to give me their e-mail address. In total, I spoke informally to six groups of visitors, which consisted of one to five visitors. On top of that, I conducted four more formal interviews via Zoom a few days or weeks after the respective tour. The participants of the first three of these interviews I recruited personally on the tours I went to. The final participant reached out to me because she had seen my flyers, which I had decided to leave in the administration building after the final tour I accompanied.

Apart from talking to visitors, I had originally also planned to interview some of the people involved in developing and carrying out the guided tours. This would have included some of the guides as well as the head of EVN's corporate communication, Stefan Zach, who seems to have played a central role in setting the tours up (Schörghofer, 2022). The aim of these interviews would have been to better understand the intentions and processes behind the guided tours. I had, for instance, planned to ask Zach about what adaptations they had had to make to the plant to be able to carry out the tours and what difficulties they had met in this process. Discussing these issues with Zach would have helped me address [SQ2], which is why I mentioned in my access negotiations with the EVN that I would be interested to talk to guides and other people "involved behind the scenes". However, the EVN did not respond to this request and I decided against following up on it as I was realizing that I would not necessarily need these perspectives to answer my research questions. This was because my interest mainly lay with what actually happens and emerges during the tours which does, as follows from cultural studies theory, not necessarily correspond to the intentions of those responsible for making them (see section 4.1). In this case, the boundaries of my field were thus shaped by how the access negotiations went as well as my research interest.



## 5.2 Ethical Considerations

My interactions with guides and visitors and in particular my covert observations during the first two tours raise ethical questions that I address in this section. Although informed consent is considered “the bedrock principle of social research ethics” (Jensen & Laurie, 2016, p. 54), I decided that it would be ethically sound to make observations at these two tours without informing guides and visitors about my research and gaining their voluntary consent. This was because I defined the tours I went to as a public space. While you needed to register, the tours were open to anyone and involved people that did not all previously know each other. I therefore assumed that guides and visitors did expect that what they were doing and saying during the tours was seen and heard by strangers and thus not private. For this reason, as Jensen and Laurie (2016) also suggest, I did not require guides’ and visitors’ informed consent to observe them unobtrusively.

At the same time, it is important to consider that not every interaction in a public setting is automatically public and exempt from the need to secure informed consent. Jensen and Laurie (2016) illustrate this point by arguing that a conversation between a couple in a park is an activity in public that should nevertheless be treated as private. This example helped me decide in what situations it was ethical to listen in on what people were saying at the tours and what conversations should be entitled to privacy. I saw no issue with being attentive to the things guides or visitors were saying to or in front of the group as a whole since these utterances were clearly and consciously directed at a group containing strangers. Regarding conversations between individual visitors and guides or within families or groups of friends that visited together, I was more careful. Concretely, this meant that I did not go out of my way to overhear these kinds of conversations. I took note of what I could catch by simply being part of the group and going along but I refrained from getting closer when people were speaking too softly for me to hear. I also only listened in if people were speaking about the tour, the plant, or something else related to my research interest. If I overheard something unrelated or clearly personal, I consciously directed my attention elsewhere.

After I was officially granted access, I also became privy to conversations between guides and talked to them myself, for instance, when they invited me to their office before the start of the tours. In these situations, I took mental notes and later wrote down things the guides had said that were relevant to my research interest. I also asked them specific questions I was interested in, for instance, about preparations they needed to make before the tour or why they worked as tour guides at the NPP. While it had been the suggestion of someone from the EVN that I could arrive early and talk to the guides prior to the tours, in hindsight, I am not sure how clear it was to the guides themselves that these were not “regular” conversations for me but part of my research. To protect the guides’ privacy, I have therefore decided not to cite or paraphrase anything they shared with me in a private

conversation before, during, or after the tour. This seems particularly important because even though I have replaced identifying information, such as the guides' names, in my material, this might not be enough to conceal their identity from other guides and their employers at the EVN.

My informal conversations and formal interviews with visitors both contained specific informed consent procedures. In the case of the informal conversations, I opted for oral informed consent. This seemed appropriate and "natural" given the brevity and spontaneous nature of the interactions and the fact that I did not collect identifying information nor made audio recordings. For the formal interviews, I created an informed consent form detailing participants' rights and what I would do with their data. I sent this form to my participants beforehand and discussed it with them at the beginning of the interviews. As I agreed on with my participants, I pseudonymized the interview data. While I cannot rule out the possibility that guides or other visitors who were on the respective tour might recognize my participants from how I describe them below (see section 5.4), I expect that no one should at least be able to re-identify my participants' names. This is also due to the EVN committing to delete visitors' personal data three months after their visit on a data protection form that visitors need to sign at the beginning of the tour.

### 5.3 Combining Participant Observation and Auto-Ethnography

Having described my field and ethical considerations, I now elaborate on my methods of data collection. In this section, I explain in greater depth how I conducted my observations and why I chose to do so while the following section 5.4 focuses on my formal and informal interviews with visitors.

During the guided tours I went on, I was mainly engaged in participant observation. Delamont (2007) defines this staple method of collecting data in an ethnography as "spending long periods watching people, coupled with talking to them about what they are doing, thinking and saying, designed to see how they understand their world" (p. 2). In the context of my case study, this has, as I already described, meant accompanying six tours, observing what guides and visitors were saying and doing, and trying to initiate conversations with them. Doing a "proper ethnography" (Delamont, 2007, p. 2) of the guided tours, that is actually going on several tours and making observations as opposed to merely conducting interviews, was crucial to addressing my research questions: It made it possible for me to capture all kinds of conversations between visitors and guides, which allowed me to systematically analyze the knowledge produced and the versions of the past, present, and future rhetorically constructed. While my interviews with the visitors were useful in this context as they showed me, for instance, what pieces of knowledge visitors found particularly interesting, merely doing interviews would have never given me the same kind of overview over what was spoken about at the tours. Furthermore, my ethnographic approach allowed me to study the communicative construction of the space of the plant through embodied actions, such as looking and pointing at things (see section 4.3).

While they are, as we will see in my empirical analysis, central to how space is constituted at the tours, such gestures are also very much taken for granted in a setting like the guided tours, in which people show other people around a building. This, as is also described by Löw and Marguin (2022), makes it harder to elicit narrations about these kinds of processes in interviews. Making observations was thus also indispensable to investigating the making of space.

Participant observation is mainly about watching *others*; what they are doing and saying and in what ways. This is stressed by Delamont (2007) when she writes:

The term “participant” observation does not usually mean real participation: researchers do not usually catch fish, teach classes or dig coal, rather they watch these things being done, and “help” occasionally. ... So “participant” does not mean doing what those being observed do, but interacting with them while *they* do it. (p. 2)

Already when I was planning my empirical research, it seemed to me that this characterization of the role of the researcher would not entirely fit with my project. In fact, in my case, participating and non-participating in what visitors were doing appeared to be not clearly distinguishable. While I was, of course, doing things, such as note-taking, visitors were not engaged in, I was in many ways acting exactly as they were: Like them, I was listening to the guides, looking at things the guides were indicating, having a look around the rooms we were in, taking photos, laughing when the guides were making a joke, in short, I was also always partly experiencing the tour and the plant as a visitor.

For this reason, when planning my empirical phase, I decided that I would also be attentive to my own perceptions, thoughts, and feelings throughout the tours. In other words, I was not only observing others but also myself as I was experiencing the tours. Ethnographic attention to the self of the researcher has been referred to as “auto-ethnography” in the literature. While this term has several meanings (Marak, 2015), in recent years, it has usually been used to describe ethnographic endeavors that focus on the personal experiences of the researcher: Denzin (1997), for instance, defines auto-ethnography as “a turning of the ethnographic gaze inward on the self (auto), while maintaining the outward gaze of ethnography, looking at the larger context wherein self experiences occur” (p. 227). Similarly, Ellis et al. (2011) understand it as an “approach to research and writing that seeks to describe and systematically analyze (*graphy*) personal experience (*auto*) in order to understand cultural experience (*ethno*)”. As these definitions highlight, auto-ethnography is about the researcher themselves but also about more than that: It aims to study the social through one’s own individual experiences.

Auto-ethnographers’ interest in their personal experiences has often been coupled with a concern for the emotional and a sense that traditional sociological methods, such as participant observation or interviews, are not sufficient to capture the complexities involved (Emerson et al.; 2001, Marak, 2015). Ellis (1991), for instance, argues for auto-ethnographic approaches on the grounds that they

could allow sociologists to study what emotions actually feel like – a dimension that was lacking in sociological treatments of emotions at the time. Given this close connection between auto-ethnography and the emotional, it is unsurprising that my attention to my own experiences at the guided tours was particularly useful for addressing my overall sensitivity to the emotions that were present. Recording and analyzing my own feelings helped me make sense of noises visitors were making in response to some of the information the guides were sharing, for example. This allowed me to understand the atmosphere of the plant and how the knowledge made at the tours shaped and was shaped by the kinds of emotional experiences deemed appropriate in this setting.

Apart from that, not excluding my thoughts and feelings about what I was observing and experiencing allowed me to recognize some of my implicit assumptions about and biases towards the people and events I encountered. When I analyzed my data, I realized, for instance, that there were parts of my fieldnotes in which I made judgements about the guides (e.g., praising them as well-informed) or other visitors (e.g., complaining about them for being noisy during the guides' explanations). This reveals some of my tacit expectations about what makes good guides and visitors and what the guided tours should be about, namely the transmission of knowledge from knowledgeable guides to attentive visitors. This resonates with Ellis et al. (2011) who make the case for auto-ethnography by arguing that it "acknowledges and accommodates subjectivity, emotionality, and the researcher's influence on research, rather than hiding from these matters or assuming they don't exist". Being attentive to my personal experiences at the tours helped me see how my ethnographic data was shaped by my assumptions, reactions, and prejudices.

## 5.4 Interviewing Visitors

As I already mentioned in the previous section, apart from observations, talking to people to better understand what the actions and events observed mean to them is usually a core component of an ethnography (Delamont, 2007). While interviews and conversations are a staple in ethnographic projects and qualitative research more generally, it is nevertheless important to reflect on what kinds of knowledge we believe they can generate (Silverman, 2006). For the purposes of this project, I assumed that my interviews and conversations with visitors gave me access to their experiences of the guided tours. At the same time, I am aware that interviews and conversations necessarily produce particular representations of these experiences, which are also shaped by the shared ways of making sense of the world available to the participants (Silverman, 2006). This two-fold perspective fit well with my understanding of culture (see section 4.1) and tied my interview data to my research questions: Assuming that my interviews and conversations gave me (mediated) access to my participants' experiences allowed me to use their accounts of what pieces of information they found particularly interesting to address the question what knowledge is made at the tours. Similarly, visitors' descriptions of

how being inside the plant made them feel was an important component of analyzing the atmospheres that emerged during the tours. At the same time, also being attentive to the role played by broader discourses (e.g., about nuclear power or the significance of NPP Zwentendorf) in my interview material helped me understand how the past, present, and future were performed at and around the guided tours in relation to wider developments.

Having described my perspective on my interview data, I now provide further information about how I conducted my interviews and conversations. Both the informal conversations and the more formal interviews were semi-structured as I made use of a pool of open-ended interview questions, I had developed based on my research interests (Jensen & Laurie, 2016). At the same time, as is typical for a semi-structured interview (Jensen & Laurie, 2016), I readily departed from my pre-formulated questions if I wanted to follow-up on something interesting the participants had brought up. I began all conversations and interviews by asking how the participants had liked the tour. Usually, I also asked why they had wanted to go on the tour to understand the context of their visit. In the informal conversations, I then proceeded to ask any question that came to mind from my pool and seemed to fit with what we were talking about. Oftentimes, I asked the visitors what they had found particularly interesting or what parts of the plant had stuck in their mind the most. These kinds of questions were also usually part of my guidelines for the more formal interviews. On top of that, I added more specific questions to each of my guidelines for the longer interviews. Those questions were based on what had happened on the respective tour and about things that I was specifically interested in at that moment in time. In my first interview, for instance, I brought up a piece of information the guides had shared which had caused lots of audible reactions among visitors and asked my participant what she had thought in that moment.

Because I could engage in depth with visitors' thoughts, feelings, and experiences in the formal interviews, I now briefly introduce the participants of these interviews to provide some context for their statements cited in my empirical analysis. The same is not necessary nor possible for the participants of the informal conversations due to their brevity and more shallow nature. In the introductions of my formal interview participants that follow, the focus is on how they liked their visit, why they had wanted to go on a tour, as well as information they shared about themselves in the interview in order to explain their experiences to me. As we will see, in many cases, this was information about their relations to technology in general and/or the specific technologies of an NPP. What this means and what we can learn from it about my participants' implicit assumptions about the guided tours will be analyzed more closely in section 6.3.2 of my empirical chapter.

The participant of my first formal interview (I1) was an Austrian woman, who had visited the plant together with her boyfriend. She told me that she was an electrical engineer and repeatedly

stressed her technical interest throughout the interview. The “technology behind” the NPP and the unique opportunity to see it from the inside and “how it works” were the main things that fascinated her about her visit. She told me that she and her boyfriend were talking about “the technology” all night after the tour. They were looking up additional information about the nuclear reaction that takes place inside an NPP and drawing “sketches on a pizza box”. At the same time, this participant described herself as having “nothing to do with the topic [of nuclear power]”.

My second interview (I2) was with two people, brother and sister, who had gone on the tour together with their mother. All three of them were from another European country and neither of them spoke any German. They had nevertheless wanted to go on a tour and travelled to Austria to do so for two main reasons. First, nuclear power had been a “hobby” of the brother since he had been a child. He told me he had “always like[d] to read about” NPPs and how they produce energy which is why he wanted to visit. Second, the visit was to celebrate their mother’s 60<sup>th</sup> birthday and “dedicated to [her] professional activity”. She had worked in energy throughout her career and already been inside several NPPs in their home country in that capacity. Despite not speaking German, the three of them enjoyed the tour and were able to make sense of what they were seeing and what the guides were explaining. Because of his previous engagement with NPPs, the brother “knew what to expect” and “what [he] saw” inside the plant. Similarly, the mother was “naming the mechanisms” and explaining things to them as they were going through the plant. Furthermore, they used Google Translate to live translate what the guides were saying, which the sister thought worked well enough to catch the central points. This was especially useful for her as she was “not so involved in the topic” as the other two.

In my third interview (I3), I spoke to an Austrian man, who told me that he had a social science background and co-owned a business. He had visited together with his business partner and two other colleagues. He enjoyed seeing the plant with “all the technical aspects” from the inside as well as the “time-travel” in the plant’s control room, which he thought “looked very much like Simpsons from the 80s”. At the same time, he felt that the tour was “too technical for [him]”. While he described himself as “interested in technology and science”, he could not follow the guides’ explanations, which meant that he was mostly “looking around” without thinking much. He told me that before and after the tour, he and his colleagues had talked about whether they were pro- or anti-nuclear. My participant said that although he was “still pro”, the tour had made him “a little more critical”, which he had “maybe not been at all before”. He also thought, however, that “this does not mean anything” because he does not know enough about the topic.

My final interview (I4) was with a German woman. She was the only one I had not recruited in person after we had been on a tour together. Rather, she contacted me after seeing my flyers when she visited the plant. She reached out to me to participate in an interview but also because she wanted

to ask whether we could have a more general conversation about NPP Zwentendorf as she also had an academic interest in the site. This interest was also the direct reason why she had gone on a tour at that precise moment in time. She told me that she needed “some information” about the plant, which she hoped to get out of the tour. At the same time, she also mentioned that she had already been interested in visiting before she began her academic project about the NPP: She had already passed by the plant a few times and “always thought, okay, would be super interesting to take a look inside”. Seeing the plant from the inside was also one of the things she very much enjoyed about her visit. At the same time, she was fascinated by “the whole political history around the plant”, which she had also read up on after her visit.

## 5.5 Reflecting My Own Influence on the Research

In section 5.3, I already described how my own initial assumptions about what the tours should be like became visible in my fieldnotes. Reflecting these kinds of influences on the research rather than pretending they do not exist is central when writing from an STS perspective since we know at least since Haraway (1988) that knowledge production and the observations involved in it are inherently situated, that is tied to a particular embodied perspective. In this section, I therefore provide some further relevant information about myself similarly to how I previously introduced my interview participants. I also suggest ways in which this might have shaped the research.

I am a White, able-bodied woman and, at the time of writing, 27 years old. I am German and lived in Germany for most of my life before moving to Vienna, Austria, about two years ago to pursue my master’s degree in STS. Prior, I had studied English and Mathematics, which is relevant to this project as my exposure to Anglo-American cultural studies during my bachelor’s was one of the things that initially drew me to studying the guided tours in terms of meaning making. At the present moment in time, I do not have a strong opinion on nuclear power but have in recent years been interested by the renewed debates about it and whether it is environmentally friendly. On top of that, I was part of a group mapping the socio-scientific controversy about small modular reactors for a class in my STS master’s. This meant that I had some prior insights into the issues at stake in the ongoing broader controversy about nuclear power, which shaped my analysis of the concerns raised at the tours.

While I thus had some familiarity with the current debates about nuclear power going into this research, I have no sort of technical background. I also did not have any significant knowledge about the inner workings of an NPP prior to going on my first guided tour back in August 2022 (before I started my thesis project). Of course, I have learned a lot about NPPs from repeatedly accompanying the tours to the point where the guides and I were habitually joking about whether I would already be able to guide the tour myself. My knowledge about nuclear technology remains, however, more or less limited to what has been shared on the tours I went to. This means that while I can and have analyzed

what places within the plant were visited and what was discussed, it was difficult for me to imagine how the tours could be done differently; what other parts of the plant could be shown and what else could have been talked about. Overall, my research has thus mainly focused on studying what did emerge at the guided tours I went to as opposed to what was absent.

Among my personal features, being German was the aspect that I was most conscious of throughout this research. In my experience of living in Vienna, Austrians can usually tell very quickly that I am German when I speak to them, most likely due to my distinctly German vocabulary and pronunciation. This makes me suspect that my interview and conversation partners from Austria were also aware that I am German and that this might have shaped their responses. Concretely, I wonder to what extent moments in which Austrian participants told me about NPP Zwentendorf's significance in Austria were produced by me being German. One participant, for instance, explained to me that "everyone in Austria has heard of NPP Zwentendorf" (informal conversation) when I asked him for the reasons of his visit. It seemed to me like he was spelling things out for someone he recognized as being not from Austria. Conducting such "outsider research" (Jensen & Laurie, 2016, p. 51) is not necessarily a disadvantage as it can lead to things like the plant's significance being made explicit, which might otherwise be tacitly assumed. At the same time, outsiders typically understand the cultural group they study less well than an insider would (Jensen & Laurie, 2016). This means that certain jokes, references, or meanings might have gone over my head without me even noticing. There was also a situation in which I struggled to follow a conversation between two guides due to them speaking dialect.

## 5.6 Analyzing My Data

Towards the end of my data collection phase, I found myself with pages over pages of fieldnotes, verbatim transcripts of my interviews, as well as a document full of thoughts I had about my material but without a clear plan for how to analyze my data. At this point, my supervisor suggested consulting Charmaz's (2014) *Constructing Grounded Theory*, which turned out to be very helpful even though my research hardly qualifies as a "grounded theory study" (Charmaz, 2014, p. 16). This is because one of the core principles of grounded theory (GT) is that data collection and analysis should be simultaneous and iterative processes, informing each other (Charmaz, 2014). I, however, only began to properly think about how to analyze my data and to consider GT once my data collection phase was practically finished. Despite turning to GT merely for the purpose of data analysis rather than building on it throughout my whole research process, I found that many elements of Charmaz's constructivist grounded theory (CGT) fit well with my overall aim and approach. In what follows, I therefore briefly introduce (C)GT and describe how I made use of certain (C)GT strategies to analyze my material.

Since it was first introduced by Glaser and Strauss (1967), GT has been known as a deeply inductive methodology that aims at developing theory out of empirical material as opposed to using



empirical data to test hypotheses derived from pre-existing theoretical frameworks (see also Charmaz, 2014). While Glaser and Strauss originally aimed to challenge positivistic quantitative approaches, by the 1990s, scholars were pointing out a number of positivistic assumptions baked into the original version of GT (Charmaz, 2014). Early GT has, for instance, been criticized as assuming the existence of an external reality within empirical data that the researcher as a passive observer can discover. Against this background, Charmaz (2014) presents CGT as a version of GT that highlights the active role of the researcher in constructing and interpreting the data and therefore invites researchers to reflect on rather than erase their own influence on the research. CGT appealed to me because its open-ended approach to data, which Charmaz adopted from Glaser and Strauss (1967), seemed to complement my aim of studying openly the work that the guided tours are doing. At the same time, CGT's awareness of the active involvement of the researcher matched my overall acknowledgement of and attention to my own experiences at the tours and how I shaped the research.

In keeping with Glaser and Strauss's (1967) original aim of systematizing qualitative research, Charmaz (2014) provides "flexible guidelines" (p. 17) for analyzing empirical data through coding, which I followed as far as I found them useful. Given her constructivist approach, Charmaz understands coding as a process of actively naming and defining what data is about. Like Charmaz suggests, I coded my data in two stages. I began with what Charmaz calls "initial coding" (p. 109). In this step, I moved quickly through a subset of my material (fieldnotes of two tours and transcripts of two interviews) and came up with one or more codes for each line. As Charmaz advocates for, I decided to code in gerunds, which she thinks directs your attention to the underlying actions and processes. This was very useful as it felt like the gerunds gave me new perspectives on my data and made me scrutinize the taken-for-granted assumptions built into my fieldnotes. It helped me, for instance, recognize my own tacit expectations about good guided tours, guides, and visitors (see section 5.3).

I also and probably too much so followed Charmaz's advice to stick closely to the material during the initial coding as this step left me with a seemingly unmanageable number of codes, most of which were tied very closely to the words used by my participants or myself in my fieldnotes. To move forward, I employed the (C)GT strategy of comparison (Charmaz, 2014): I compared similar codes with each other and to those parts of my material that they referred to. In this way, I managed to reduce my number of codes and phrase them somewhat more abstractly. Akin to what Charmaz calls "focused coding" (p. 139), I then proceeded to use these codes to go through the rest of my material, adapting codes or creating new ones when it was necessary. I sorted the resulting set of codes by subordinate research question and came up with a structure for the sections of my empirical chapter from there.

## 6. Empirical Analysis

A guided tour through NPP Zwentendorf is at once sequential (different parts of the plant are visited one after another) and, as I demonstrate in this empirical chapter, multi-layered: Many different things happen at the same time and in one and the same move. To account for this dual character of the tours, I recount a typical guided tour in the first section of my analysis. The subsequent sections then each zoom in on one of the three aspects that are central to my research interest: In section 6.2, I describe how the space of the plant emerges and impinges on the tours. Afterwards, I take a closer look at what and how knowledge is produced at the tours (section 6.3). In section 6.4, I finally demonstrate how the present is performed, the past remembered, and the future envisioned at the tours. As we will see throughout, these three aspects do not emerge separately at the tours but are rather co-produced (Jasanoff, 2004). My three analytical sections therefore do not examine the emerging space, knowledge, and versions of the past, present, and future in isolation. Rather, each of them adds a new layer to my overall analysis of how NPP Zwentendorf is performed at the tours. The different sections are furthermore linked by my overall sensitivity to the role played by emotions in what the tours bring into being.

### 6.1 Experiencing a Visit

In this section, I re-tell what a visit to NPP Zwentendorf is like based on the ethnographic notes I took during and after the six guided tours through the plant I went on. There is one section for each of the places the tours usually stops at and each of these sections is named after where it takes place. These choices are due to my interest in the connections between what guides and visitors say and do and the emergent space of the plant. Structuring my summary of a typical tour in terms of the places stopped at allows me to highlight where and in what kinds of spatial arrangement certain conversations between visitors and guides occurred. At the same time, this way of re-telling the tour makes invisible other aspects: We do not see what happened in between stops, for example. While I incorporate some of the things hidden from view in the subsequent more analytical sections, this summary is clearly not a neutral or comprehensive representation of the tours. Rather, it is a selection and condensation of moments that occurred on the various tours I went to. The following account of the tours I went on is therefore also a performance: It brings a certain version of the tours into being.

#### 6.1.1 Entrance Hall of the Administration Building

When visitors arrive at the administration building in front of NPP Zwentendorf, they are greeted by two statues (see Figure 1) who are presented as living energy efficient lives and provide visitors with advice for how they can do the same: The left statue is holding a laundry bucket and on the sign in

front of it, it says “Anna S. washes energy-efficiently using the eco mode”<sup>2</sup> and that “if you wash your clothes at 40°C rather than 60°C, you save up to 25 Euro per year”. Similarly, the right statue is described as “cooking only with the lid on” and visitors are advised to use pots with a well-fitting lid to save money. Additionally, on both signs it says “climate protectors are everyday heroes”.



**Figure 1:** “Everyday heroes” statues



**Figure 2:** Entrance hall of the administration building

Once visitors make their way past the statues and enter the administration building, they are usually welcomed by one of the two tour guides giving the tour at one of the standing tables (see Figure 2). Visitors then need to fill in a safety and data protection form before there is usually time for them to look at the retro explanatory boards put up in the room (see Figure 2). They are, as some guides point out, originals from the 70s. Something else that usually captures visitor attention while they wait for the tour to begin are the tiles in the bathroom (see Figure 3).



**Figure 3:** 70s bathroom tiles

<sup>2</sup> Except for my second interview (I2) and the pamphlet published by the EVN (n.d.-g), which were in English, all the empirical material I collected was in German. What I quote from it in this thesis has been translated into English by myself.

In fact, these tiles came up on almost all of the tours I went to. For instance, on one tour, a woman and I were washing our hands at the same time in the bathroom when she said to me that these are “still the original tiles from what it looks like”. On other tours, one of the guides or visitors typically told (other) visitors to go to the bathroom “if they want a proper 70s experience”.

### 6.1.2 Conference Room

Once all visitors have arrived or it is time to start, the guides direct the group to an adjacent conference room. After the visitors have sat down in rows of chairs, the guides usually begin by announcing that they will show a short film and afterwards give a “historical introduction”. They typically call the film a “bizarre” advertisement for nuclear power from the time in which the plant was built. Some guides add that the film is a compilation of the “good scenes” of a longer film that they found in the basement of the plant. The film is ripe with claims that nuclear power plants are absolutely safe and would never “be able to blow up like an atomic bomb” as well as dystopian visions of what a future without nuclear power would look like: “Imagine a children’s hospital without power, yes, without power it gets quiet, very quiet”, says a voice-over while an image of a dark cemetery lit by candles flickers over the screen. This is paired with numerous sexual allusions: Shortly after the scene with the cemetery, a television host, for instance, announces that the broadcast has to be interrupted for the next three hours. In a more sensual voice, she recommends the viewers to consult the pamphlet “How do I entertain myself without power?”. This is followed by a scene in which a woman walks her fingers down a naked man’s chest while saying “Kernkraft, Kernenergie, kerngesund”. This is a pun on nuclear power translating to “nuclear power, nuclear energy, in top shape”. With its exaggerated safety claims and sexual content, the film always causes lots of amusement among the visitors as can be told from their audible laughs and amused headshaking.

Oftentimes, the guides call this film “the beginning of our time-travel into the 70s” or say that we have now already “immersed” ourselves in those times. This leads them to talk about the history of the plant: They usually begin by telling the visitors when the construction of the plant was begun and completed. They go on to explain that because there were so many protests against the plant, the then chancellor and nuclear proponent Bruno Kreisky decided to hold a referendum and firmly expected to get the public’s blessing. However, as the guides usually make clear, the referendum was not only about nuclear power but also a vote for or against Kreisky who had announced in a “bizarre sentence containing a triple negation” that he might resign in case the referendum rejected putting the plant into operation. As the guides explain next, the referendum did in fact decide against the NPP and Kreisky with a very tight majority of 50.47% and merely 30 000 votes difference.

The guides typically go on to talk about what happened next with the plant. They usually mention that the plant “was not immediately given up completely” but rather the decision was made to

wait and see “if the mood changes”. Until then, the guides point out, the plant needed to be maintained and preserved, which meant things like blowing air through pipes, slowly turning the turbine, and wrapping and unwrapping cable ends. Some guides joke that this was meant to be a “provisional solution” but lasted for seven years until 1985 when it got “too expensive” while others call this period of the plant’s history “bizarre”. Continuing the story of what happened with NPP Zwentendorf after the referendum, the guides at some point typically come to the EVN buying the plant in 2005. They oftentimes state that this begs the question why the EVN did so. In response to this, the guides point out that the site continues to be authorized for the construction and operation of a power plant. This makes, the guides claim, the site “an ace up EVN’s sleeve” as the company could build a new power plant there in the future.

### 6.1.3 In Front of the Bird’s Eye Photo of the Plant

After finishing their “historical introduction”, the guides lead the group back to the entrance hall where a black-and-white bird’s eye photograph of the plant is mounted to the wall (see Figure 4).



**Figure 4:** Bird’s eye photo of the plant

One of the guides usually stands right in front of the photograph while the visitors assemble around them in a rough semi-circle. The guide in the front typically announces that they will give “an overview” of the plant: They point at, name, and share information about the different buildings on the photograph. For instance, they explain that the tallest building is the reactor building<sup>3</sup> or that the stack is not a flue-gas stack but rather a ventilation stack because no flue gases are produced in an NPP. Some guides also use the photograph to provide a pre-view of the rest of the tour: They show the visitors how they will move across the yard and where they will enter the plant, say that “we will spend the most time and will see different stops” in the reactor building, and indicate where the control room is located, “which will be the last stop”.

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<sup>3</sup> To translate the terminology employed by the guides when talking about nuclear power (plants), I used Stattmann’s (1973) German-English and Brandenberger and Stattmann’s (1978) English-German nuclear power dictionaries.

Usually, the guides also use the bird's eye photo to point out the photovoltaic (PV) modules installed on the reactor building and in the open space next to the plant. The guides explain that the PV system began as a research project with the Vienna University of Technology and has in the meantime been expanded: All the roofs are now also full of solar panels, for example. At the same time, the guides oftentimes also point out that the PV system generates much less energy than the NPP would have: They explain that the NPP would have had a maximum capacity of 730 megawatt. To match that, the PV system would need to be 1400 times bigger, according to the guides. Since the sun does not always shine, as some guides added, the PV system would need to be 8000 times as big to achieve the output the NPP would have had over the whole year.

In front of the bird's eye photo, the guides also usually ask the visitors, "What is missing?". On most of the tours I went to, one or more visitors replied very quickly that there is no cooling tower. The guides then typically explain that a cooling tower was not needed here because the Danube could be used for cooling. In fact, the plant had, as the guides point out, the permission to heat up the Danube by 3 degrees. This piece of information usually leads to a lot of audible reactions among the visitors, such as gasping. Visitors seem to be astonished or shocked by how much the Danube could have been warmed up. This is reinforced by the guides who often point out that 3 degrees are a "utopianly" high value from today's perspective and that "you can be glad if you get 0.5 degrees today". Some guides conclude from this that environmental protection was "virtually unheard of" in Austria in the time when the plant was built.

#### 6.1.4 Entrance to the Controlled Area

Next, the guides lead the group across the yard to the entrance of the plant. Once inside, the guides stop at the entrance to the controlled area, where visitors usually assemble around them in a rough circle. Here, the guides explain the rules and procedures of entering and leaving the plant: They often begin by pointing out the radiation protection office, which the visitors have just passed (see Figure 5).



**Figure 5:** Radiation protection office



Usually, those visitors who have their back to the radiation protection office turn around to see what the guide is referring to. Some might choose to take a closer look at and take photos of some of the retro objects on display there (see Figure 5). Oftentimes, the guides say that this office is one of the most important places within the plant and that “even the owner could not just enter the plant” but would need to get clearance from the radiation protection. Most guides then explain that you need to carry two dosimeters, which measure the amount of radiation you are exposed to, when entering the plant: One of them measures the radiation dose you receive within one working day at the plant. The other dosimeter needs to be carried year-round both at and outside of work to measure the cumulative dose workers are exposed to per year.

Still explaining the procedures that need to be followed when entering and leaving the plant, the guides typically point out that “only the naked” worker is allowed inside: Nothing, not even your own underwear, can be brought into the controlled area. Instead, as the guides point out, the workers need to put on the plant’s uniform, which is hung up in the room (see Figure 6). Oftentimes, the guides make a joke about the old-fashioned underwear, saying, for instance, that “it gives away that it is not entirely new”. Some further comment on the glaring color of the underwear, which was chosen so that the underwear would be visible through the slightly transparent suits. In that way, workers are, as some guides point out, able to check whether their colleagues are wearing the plant’s underwear or their own. Before leaving this stop, the guides usually draw the group’s attention to the two full-body radiation detectors in the room (see Figure 7) and explain that workers need to get scanned when leaving the plant but also when entering it in order to establish a reference value. The guides typically further point out the sinks and showers you need to use in case a particle is detected.



**Figure 6:** Worker’s uniform and underwear



**Figure 7:** Full-body radiation detector

On some of the tours I went to, the guides then played a prank on the visitors. They asked whether someone would like to try out the radiation detector. Usually, there were a few volunteers. What

happened was that for one of the visitors who got scanned the detector flashed red, indicating a contamination. This captured most visitors' attention: For instance, on one of the tours, I overheard a visitor, who had just been talking to another visitor, break off in the middle of his sentence to let out an "oh" when the detector flashed red. To me, it always felt like a very interesting and perhaps a bit tense moment. Most visitors seemed suddenly a bit more alert. I was certainly always engrossed by what was unfolding. The guides typically pretended for a while that they did not know what was going on and that the visitor in question might actually be contaminated. They asked, for instance, where the visitor was from or for their partner to also get scanned. This usually resulted in the detector flashing red once more. I certainly fell for the prank the first time I witnessed it and many visitors did, too. This could be seen when they asked how often this happens or suggested that one of the visitors for whom the detector had not shown a contamination should try again to see if the detector is broken. At some point, the guides revealed a remote control that they had been hiding and explained that they had been controlling the detector. On the tours I went to, this loosened up the mood with visitors usually starting to laugh, making jokes, and talking to each other.

No matter whether the guides play the detector prank or not, some visitors usually take photos of their friends or family members on the detectors, pretending to get scanned. At some point, the guides typically announce that the group will now take the elevator to travel 39 meters up to the next stop, the refueling space. In this context, either a guide or a visitor typically draws the group's attention to the elevator control panel which curiously lists meters rather than floors (see Figure 8). As some guides explain, this is to be able to refer to locations within the plant unambiguously.

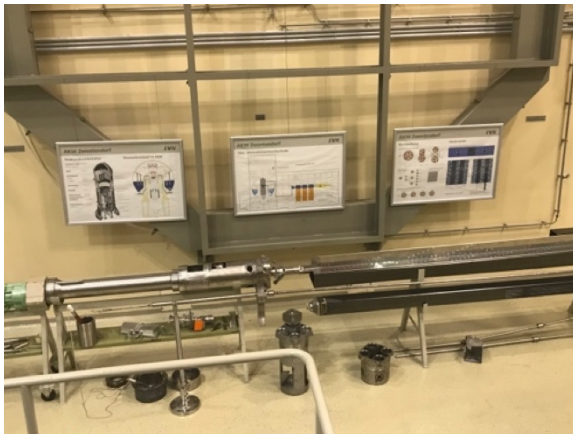


**Figure 8:** Elevator control panel

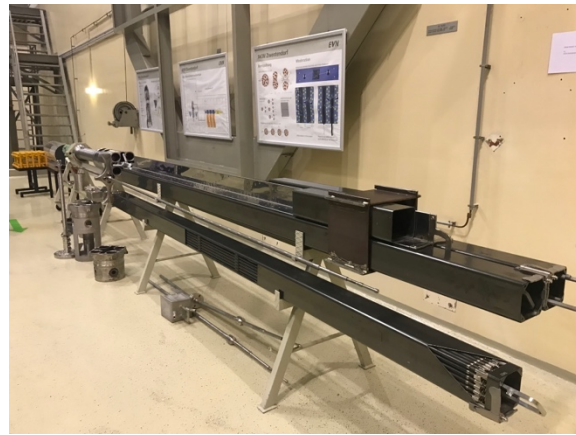


### 6.1.5 Refueling Space

After arriving in the refueling space, one of the guides usually comes to stand in front of three explanatory boards, which are hanged up close to the entrance (see Figure 9). The visitors typically assemble in a half-circle in front of the guide and the boards. Furthermore, there are several models and parts of the reactor core on display here, which I refer to as “exhibits”, such as an original core cell (see Figure 10).



**Figure 9:** Explanatory boards in the refueling space



**Figure 10:** Original core cell exhibit

At this stop, the guides oftentimes announce that they will give some technical explanations, saying, for instance, that “it will now get a bit more technical” or that “we will begin with the chemical and physical foundations”. Referring to the explanatory boards behind them and the exhibits in front of them, they go on to explain what is inside the reactor core and what happens there. They, for instance, indicate the fuel rods containing the nuclear fuel and the “cross-shaped” control rod in the original core cell exhibit in front of them (see Figure 10). The guides then explain how the nuclear chain reaction works and how it is controlled using water and the control rods. As the guides point out, inserting the control rods into the core slows down the chain reaction while withdrawing them speeds it up. On one of the tours I went to, a visitor drew the guides’ and group’s attention to another feature of the original core cell exhibit (see Figure 10): He pointed at an additional rod attached to the exhibit and asked the guide, “What does this do?”, to which the guide replied that this rod is a neutron detector and gave some further explanation.

When talking about the components of the reactor core, the guides oftentimes go into further depth on the fuel used in NPPs: They explain that it is composed of uranium-235 and uranium-238. Uranium as it is found in nature, the guides add, consists of around 0.7% of the easily fissionable uranium-235 and 99,3% of the much less easily fissionable uranium-238. As the guides point out next, in an NPP you need about 4 to 5% of uranium-235, which means that the uranium needs to be enriched. This leads some guides to argue that nuclear power is neither sustainable nor carbon neutral, which “it has recently often been claimed to be”. Uranium is, the guides explain, a finite resource, which

means that nuclear power cannot be sustainable. Mining and enriching the uranium requires lots of energy and resources and as one guide put it, “none of this uses green energy”.

While in the refueling space, most guides talk at some point about the “advantages” and “disadvantages” of nuclear power. On the tours I went to, several guides did so while referring to a second core cell exhibit a few meters away (see Figure 11). As I observed, the whole visitor group usually follows the guide over to this exhibit and re-assembles around the guide and the exhibit in a rough semi-circle. This exhibit is not an original core cell but rather a model, which also indicates the individual fuel pellets that would be stacked within the fuel rods. Pointing at the fuel pellets, some guides explain that three of them would provide enough energy to power a 4-person household for a year. According to the guides, this demonstrates “the advantage of nuclear power”, namely its efficiency.

However, the guides typically also bring up several “disadvantages” of nuclear power, which are, as one guide in particular put it, “often forgotten or played down”. In this context, they usually argue that “nuclear power plants can never be 100% safe” and bring up famous accidents, such as Three Mile Island, Chernobyl, and Fukushima to support this claim. This is something “the past has shown”, as one guide pointed out. Another “disadvantage” the guides typically mention is that of nuclear waste. They usually point out that some of the radioactive waste produced by an NPP needs to be stored for several hundred thousand years and that there is no proper solution yet or perhaps not ever for this kind of long-lasting waste. Most guides also bring up the question of how a final repository should be marked so that it could still be understood in hundreds of thousands of years. At this point, the guides usually ask the rhetorical question whether any of the visitors understand cuneiform before pointing out that this was only a few thousand years ago.



**Figure 11:** Core cell model with individual fuel pellets



**Figure 12:** Refueling platform

Before leaving the refueling space, the guides usually lead the group up to the refueling platform (see Figure 12) from where you can look down into the reactor. Once up, most visitors are keen to look

down over the railing and many take photos of the view of the reactor (see Figure 13). A few visitors, however, only dare to take a brief look before quickly taking a couple of steps back again. When I looked down, the reactor never felt particularly big or spectacular to me. However, on one tour, looking at the massive top head of the reactor pressure vessel on display in one corner of the refueling space (see Figure 14), I was suddenly struck by how big the opening at the bottom of the reactor well, which looks so small from high up, must actually be. I was very much impressed.



Figure 13: View into the reactor



Figure 14: Top head of the reactor pressure vessel

### 6.1.6 Equipment Hatch

Next, the guides usually lead the group down the stairs to the next stop, which is at an opening in what the guides explain is the containment (see Figure 15). This stop again features three explanatory boards, which are put up one next to the other. The guides typically mention here that the containment is one of several safety barriers. This leads them to explaining one of the explanatory boards titled “safety barriers in a nuclear power plant” (see Figure 16).



Figure 15: Equipment hatch

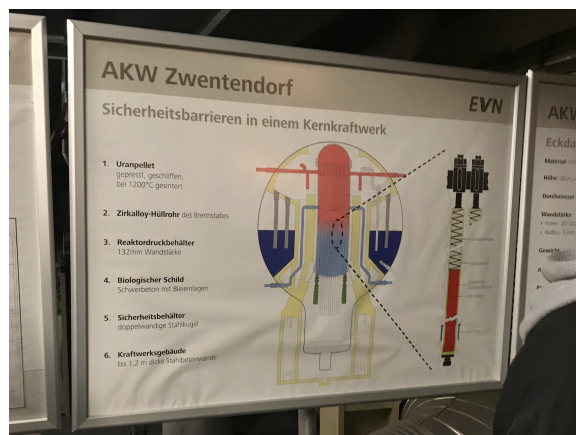


Figure 16: Safety barriers in an NPP

Based on this diagram, the guides usually explain different measures taken to keep radioactive materials from being released into the environment. “The first one”, as one of the guides put it, “is said to be the pellets themselves because they are so well pressed that nothing gets released”. However, as the guide added, “this is not true, things do escape the pellets”. The “first, real barrier” is, according



to the guides, the zircaloy cladding which encloses the fuel rods. Next and, according to some guides, “most important” is the reactor pressure vessel. Then comes the biological shield, which is, as the guides explain, called that way because “no biological life is possible inside of it”. After the containment, there are still the walls of the reactor building made from reinforced concrete, which, as one guide put it, “things also cannot get through easily”. At the same time, some guides conclude that “if all six pots have a hole, then it’s oasch” (informal Austrian German term for “ass”, meaning here that something sucks).

Having explained the various safety barriers, many guides also point out that if the visitors turn around, they can look into the turbine hall from here (see Figure 17), which some visitors have usually already discovered. They have taken a few steps away from the group to have a look over the railing and take a photo of what one visitor described to me as a “striking view”. Others are usually occupied with inspecting and taking photos of the equipment hatch. Another thing many guides explain here is that the two buildings, the reactor building and the turbine hall, are separate in order to protect the plant from earthquakes. On one of the tours, I shortly after observed a visitor inspect and poke the rubber joint between the two buildings. This visitor then called a friend over to show him the joint. They looked at it together and talked about it. Both seemed rather fascinated.



**Figure 17:** Striking view into the turbine hall

### 6.1.7 Pressure Suppression Chamber

The next stop, the pressure suppression chamber, is again a few flights of stairs further down in the reactor building. You enter it through an opening in the convex wall of the containment (see Figure 18). When beholding the various massive tubes hanging into the pressure suppression chamber from above (see Figure 19), many visitors share an immediate reaction. They exclaim “wow” or “oh, that’s cool”.

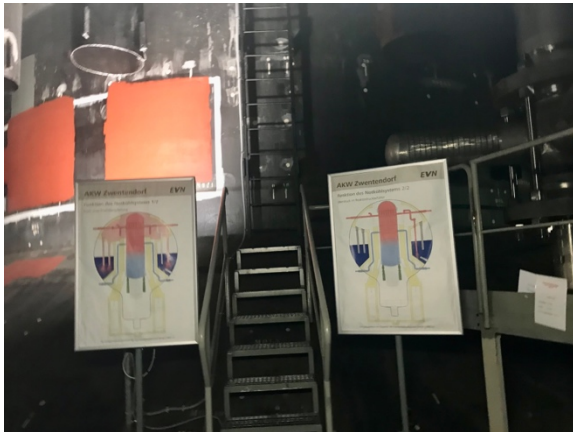


**Figure 18:** Entrance to the pressure suppression chamber



**Figure 19:** Tubes in the pressure suppression chamber

There are two explanatory boards here, facing the entrance (see Figure 20). One of the guides usually comes to stand on a couple of stairs in between them while the visitors arrange themselves on the small circular pathway that leads around the chamber (see Figure 21).



**Figure 20:** Explanatory boards in the suppression chamber



**Figure 21:** Small pathway around the chamber

The guides usually mention here that this place would have been “full of water” before explaining the purpose of the pressure suppression chamber in two kinds of emergencies: Referring to the left explanatory board, they point out that in case a main steam line breaks, the steam could be let out into this chamber through the tubes. Similarly, if the pressure in the reactor pressure vessel gets too high, the excess pressure can, as the guides explain, be released here. Sometimes, the guides add that some of the tubes have small holes in them to avoid all of the steam being released at the same time in the same place, which could be too much. On one of the tours I went to, this piece of knowledge was shared after one of the visitors had asked whether “the holes in the star-shaped tubes are so small in

order for the pressure to get out slowly”. On another tour, a visitor wanted to know how long the water in the pressure suppression chamber would last if steam was released into it to which the guide replied that this was only a temporary solution.

Furthermore, the guides usually draw the visitors’ attention to the opening through which they have entered the chamber (see Figure 18). They point out that this entrance originally did not exist but was added when the EVN bought the plant in 2005. At that time, there were, according to the guides, rumors that the EVN wanted to turn the plant on even though “Austria being nuclear-free” is, as some guides mention, part of the constitution. In other words, the guides were referring to Austria’s constitutional law banning nuclear power. The EVN’s reaction to these rumors was, as one guide put it, “to say, let’s destroy something”: While you could close the opening again, this would never be certified by the TÜV (renowned Austrian-German inspection association). For this reason, the opening is, as the guides share, also known as the “deathblow to Zwentendorf” which usually causes laughters and amusement among the visitors.

### 6.1.8 Control Rod Drive Chamber

The control rod drive chamber is a rather small round room full of cables, tubes, wheels, and all kinds of other things (see Figure 22), which I noticed more and more on the tours I went to. Upon entering the room, most visitors’ attention is first captured by what is above their heads, namely the control rod drives and a few remaining motors (see Figure 23).

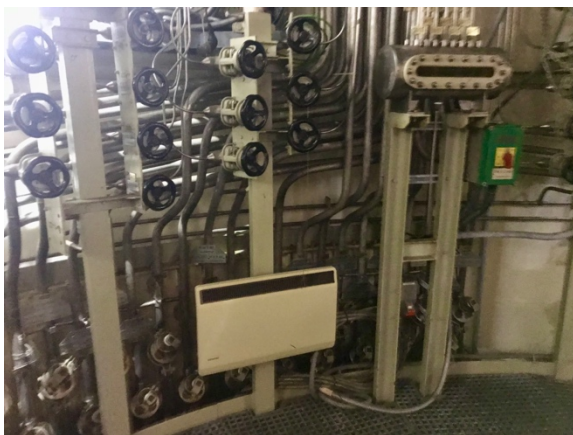


Figure 22: The cramped control rod drive chamber

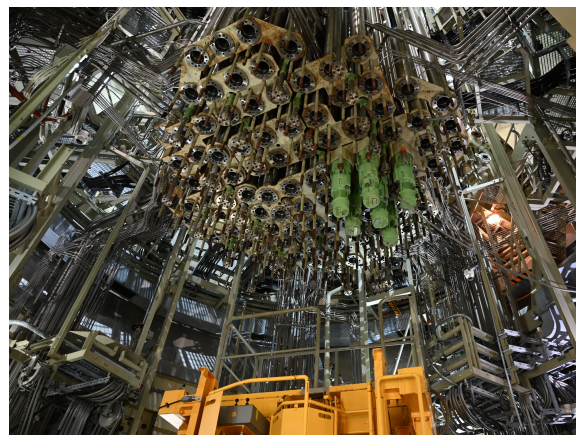


Figure 23: Control rod drives and motors

Usually, the guides explain that the radiation levels would have been high here as the reactor core is not far away. Nevertheless, as the guides point out, a worker would have had to briefly enter this room every day to check whether there is a leak on any of the control rods. The guides then typically demonstrate how the workers would have checked for leaks: They walk over to one of several cylindrical boxes (see Figure 24) and shine a flashlight into it. This reveals that all the thin tubes which lead into the box from above end inside of it. As the guides explain, “if something is dripping or running out of one of the tubes, you know there is a leak”.



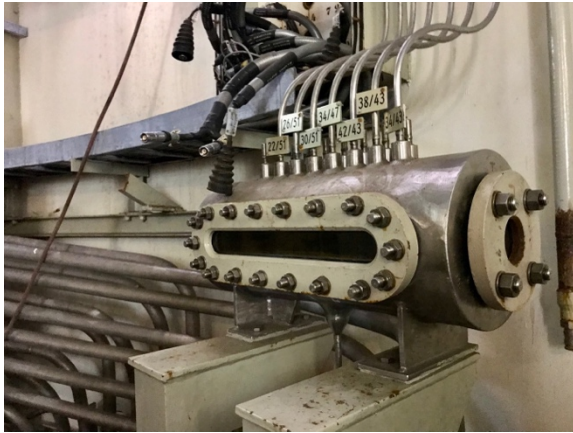


Figure 24: Leak checks

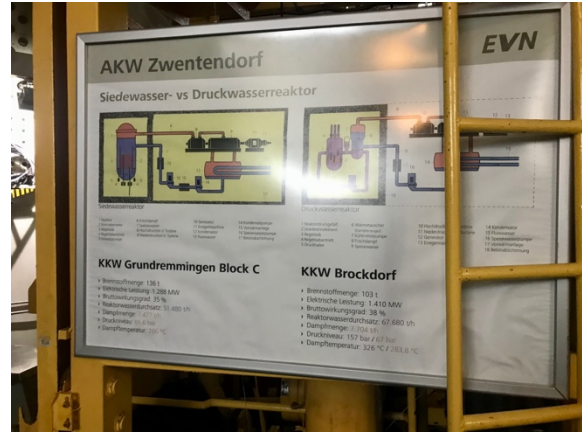


Figure 25: Comparing boiling and pressurized water reactor

After demonstrating how to check for leaks, the guides usually come the explanatory board in the middle of the room, which displays a diagram of a boiling-water reactor next to a diagram of a pressurized water reactor (see Figure 25). Referring to the board, the guides explain that there is this risk of leaks in boiling water reactors like NPP Zwentendorf because the control rods are inserted into the core from below as you need space above the reactor core for the steam dryer. As the guides add, in pressurized water reactors, the pressure in the reactor is increased so much that the water does not boil within it. The control rods can, therefore, be above the reactor core.

Next, the guides oftentimes walk back to the edge of the room to talk about a kind of thicker tubes that are used for emergency shutdowns. The guides point out that the motors driving the control rods need electricity to work. On top of that, as the guides mention, it takes about 3 minutes to insert the control rods into the core using the motors, which would be “way too long” in case of an emergency. That is why, the guides explain, if there is a blackout or the reactor needs to be shut down quickly, water would shoot up through these pipes and push the control rods into the core. This would, as the guides add, only take 2.2 seconds. In case that does not work out, there is, the guides mention, also the possibility of poisoning the reactor with boric acid. Some visitors usually had questions about these emergency ways of shutting down the reactor. They, for instance, wanted to know when you do this and whether the “boron button” exists in every NPP. On one of the tours, a visitor also asked what went wrong in Fukushima. Sounding somewhat impatient or perhaps even a little annoyed he pointed out: “We have now already heard about 100 000 fail-safes. What did not work in Fukushima?”.

At some point in the control rod drive chamber, the guides typically further draw visitors’ attention to something “funny”, as one guide put it. They point out that some of the wrapped-up cable ends from the period in which the NPP was kept in a ready-to-go-online condition can still be seen in this room (see Figure 26). The guides further usually talk about a small lock, the emergency personnel air lock (see Figure 27).



**Figure 26:** Wrapped-up cable ends



**Figure 27:** Emergency personnel air lock

They say that the much bigger main personnel air lock through which visitors have entered the room is powered electrically. To get out of the room during a power outage, the guides explain, you would therefore have had to use the small emergency lock which you can open and close manually. Apart from the control rods above them, this lock is also something that particularly catches the visitors' attention in this room. This was especially noticeable on one of the tours I went to when the door of this lock was opened much further than on the other tours. Right after entering the control rod drive chamber that day, I had overheard two visitors take notice of the lock. While one of them took a photo of the lock, the other one commented that it looked "scary". Similarly, just before leaving the room on another tour, I overheard a visitor talk about how she "would get claustrophobic in there".

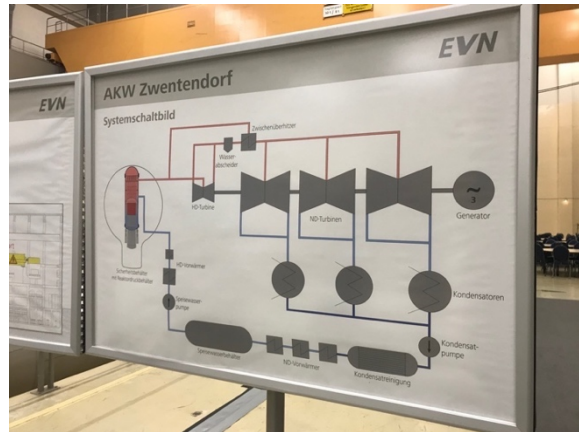
### 6.1.9 Turbine Hall

The next stop is the turbine hall, which forms quite the contrast to the control rod drive chamber. Rather than small and cramped, the turbine hall is large and feels almost empty in comparison (see Figure 17). Nevertheless, there are things to explore: Some visitors' attention was captured by three clocks on one of the walls, which curiously and wrongly display the time in South Korea, Austria, and Bavaria (see Figure 28). Others usually turn around to take photos of the openings through which they have looked down before (see section 6.1.6) or immediately approach the turbines.





**Figure 28:** Curious clocks in the turbine hall



**Figure 29:** Schematic representation of the steam circuit

While some visitors thus fall behind, the guides usually first make their way to another set of explanatory boards put up in the middle of the room. Here, they begin by explaining what happens to the steam generated within the reactor: They point out that the steam first passes through the high-pressure turbine. It is then reheated and passes through three low-pressure turbines before it is turned to liquid in the condenser and returns to the reactor as coolant. While giving this explanation, the guides usually both point at where the turbines are or would have been within the room and at one of the explanatory boards, which is a schematic representation of this circuit (see Figure 29). They also point out where the generator used to be located, which would have converted the mechanical energy produced by the turbines into electricity.

Next, the guides usually lead the group a few stairs up to a metal grating from where visitors can get a closer view of the turbine (see Figure 30).



**Figure 30:** Taking a closer look at the turbine

Once they are up on the grating, many visitors visibly want to get a good look at and/or photo of the turbine: They crane their necks and hold their phones or cameras on the turbine while making little adjustments to get the perfect shot. The guides usually seem to share the visitors' fascination as they

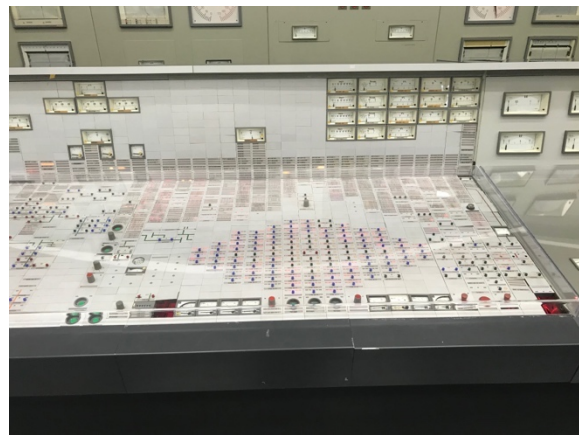
typically point out that “we are standing in front of a masterpiece of engineering”. As the guides point out, “the density, the distance” of the turbine blades, “everything needs to fit”. Without computers, some guides add, “everything needed to be calculated by hand” back then and that took “weeks and months”. While the group is up on the grating, the guides typically further mention that the turbines rotate at a speed of 3000 revolutions per minute or 50 revolutions per second. Oftentimes, this piece of information is met with an audible exhale by the visitors, indicating their surprise at how fast the turbine spins. I certainly was fascinated by this.

### 6.1.10 Control Room

The last stop of the tour is the control room (see Figure 31).



**Figure 31:** The control room

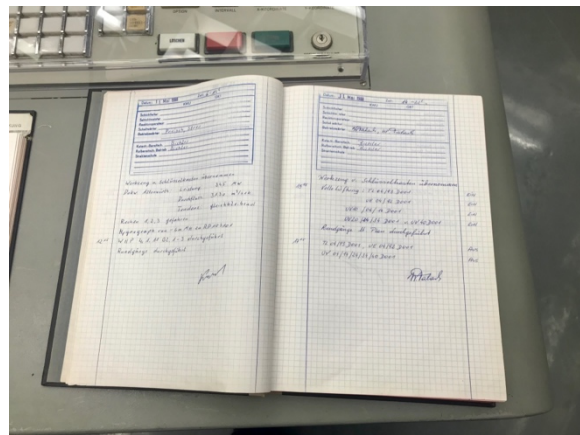


**Figure 32:** A benchboard

As soon as they catch sight of the control room, many visitors immediately share their first impressions: They comment on how “retro” everything looks, exclaim “oh look, that’s crazy”, or point out that it looks like a filmset. On some tours, the visitors seemed to be a bit mesmerized by this room at first: They stopped close to the entrance of the room and simply looked around for a while before more and more visitors started to walk around the room and look at things more closely. In any case, at some point, almost all visitors are usually spread out over the room and explore it by themselves: They, for instance, closely inspect the control panels mounted to the walls and benchboards (see Figure 32). Some also take close-up photos of them and might press a button. Others usually sit down in one of the desk chairs (see Figure 33), open the cabinet below the desk, leaf through the original logbooks from the 70s lying on the desk (see Figure 34), or pose for photos with one of the retro corded phones (see Figure 33). Still others take a look at the explanatory boards mounted to one of the walls.



**Figure 33:** Desk with desk chairs and corded phones



**Figure 34:** Original logbook

While many visitors are busy exploring, one of the guides usually stands in the middle of the room and talks about some of the things visitors can see. The guides, for instance, point out that one of the corded phones (the one in the bottom right corner in Figure 33) is red or, at least, used to be red. They say that this was a direct phone line to the chancellery, which Kreisky had demanded. One guide commented that she is, however, not sure what Kreisky would have done in the case of a meltdown before adding that she was just kidding. Others joked that, unfortunately, the phone line does no longer work: “We tried it out, it must have been cut”. Another thing the guides usually point out in the control room is that “a massive safety gap was overlooked” here. In this context, the guides draw visitors’ attention to the windows in one of the walls and the glass wall in front of them (see Figure 35).



**Figure 35:** Windows in the control room

As the guides explain, the windows exist because in the 70s when the “labor law was not yet like it is today”, this place was legally an office space and was therefore required to have access to daylight.

Next, the guides typically describe that on the first press tour through the plant, a journalist noticed a high seat through the window and asked, “What if someone shoots through the window and into the control room by accident?”. This, the guides add, led to the question, “What if someone shoots through the windows on purpose?”. In response to this, the glass wall made from bulletproof glass was added, which the guides usually refer to as being “in typical Austrian fashion” or “an Austrian solution”. Oftentimes, this story causes amusement among the visitors as does a joke the guides often make when they announce that this is the end of the tour: Usually, they tell visitors that they now return to the administration building where they should put their helmets into the mesh box rather than the shelf because they need “to decontaminate, no, disinfect” them.

### 6.1.11 Conclusion

This re-telling of the guided tours has not been a comprehensive or neutral summary of the tours I accompanied. Rather, I have laid the focus on the facets of the tours that I analyze more closely in the following analytical sections: I have highlighted that looking at and explaining the space of the plant are among the central activities that take place at the tour. We have seen this, for instance, when the guides explain the purposes of different tubes in the control rod drive chamber (see section 6.1.8) or when individual visitors examine a specific feature of the plant, such as the rubber joint between the reactor building and turbine hall (see section 6.1.6). I have also been attentive to how visitors and guides position themselves in relation to the objects they encounter on the tours and each other (see, e.g., section 6.1.4). Furthermore, I have described how certain parts of the plant such as the top head of the reactor pressure vessel made me feel (see, e.g., section 6.1.5). Such interactions with and effects of the space of the plant will be analyzed in further depth in the following section 6.2.

On top of that, my re-telling of the guided tours has emphasized the processes of knowledge production taking place there. I have described some of the information the guides provide about how the plant would have (been) operated. For instance, I have summarized the explanations they give about what would have happened inside the reactor and how it would have been controlled (see section 6.1.5). Furthermore, I have noted the arguments the guides make about nuclear power more broadly, such as the point that NPPs can never be completely safe (section 6.1.5). We have also seen that the guides do not only make statements about technical aspects but also about the history of the plant, for instance, when they talk about the “the deathblow to Zwentendorf” (see section 6.1.7) or the journalist who realized that the windows in the control room might be a safety risk (section 6.1.10). What and how knowledge is produced at the guided tours will be examined in section 6.3.

Lastly, I have already hinted at the versions of the past, present, and future constructed at the tours. I have summarized how the guides remember the events that led to NPP Zwentendorf not going online (see section 6.1.2). We have further seen how the time in which the plant was built is imagined

more broadly at the tours, for instance, as one characterized by a certain style of bathroom tiles (see section 6.1.1) or one in which environmental protection did not matter (see section 6.1.3). I have also recorded moments which suggest how the present is constructed: In section 6.1.5, for example, I mentioned that the guides often commented that nuclear power is not as environmentally friendly as “it has recently often been claimed to be”. This present will be analyzed more closely in section 6.4. Alongside the pasts and presents that emerge at the tours, I have also already been attentive to statements made about the future: I have, for instance, noted the guides mentioning that the EVN could build and operate a new power plant on the site in the future. The kind of future imagined here and in the context of the tours more generally is also part of my analysis in section 6.4.

## 6.2 Making Space

Interacting with the space of the plant is, as I just mentioned, one of the guides’ and visitors’ central activities during the tours. On top of that, it became clear in all four of my longer interviews that this space was central to how visitors experienced the tours. When I asked my participants how they liked their visit at the very beginning of the interviews, all of them said that they had greatly enjoyed it and mentioned the opportunity to see the inside of the plant in person as one of the main reasons for that. They told me, for instance, that “there were lots of interesting things to, like, see in person” (I2), that “being able to see everything from the inside is very cool” (I4), or that “looking into the plant itself was somehow very, very interesting” (I3). One participant further described being inside of the plant as “a wow moment” (I1) and mentioned that this is an opportunity you do not have anywhere else.

Due to the key role the space of the plant plays during the tours and in visitors’ experiences of them, this first more analytical section further examines aspects of space. In line with my theoretical approach to the making of space (see section 4.3), I begin by describing the physical arrangements that constitute the space of the plant (section 6.2.1) before examining how this space is given meaning to (section 6.2.2). In section 6.2.3, I finally turn to the question how the pre-existing spatial arrangements shape visitors’ feelings and experiences. Throughout all this, we see how the space of the plant is shaped by guides’ and visitors’ actions and how the emerging space, in turn, shapes the tours.

### 6.2.1 Constituting the Space of the Plant Physically

As we have already seen in my re-telling of the guided tours, guides and visitors “typically” do certain things in certain places. In other words, the tours perform the plant along a standardized route. This standardized path is achieved in various ways: In the conference room, the guides typically already warn the group to stay together because the plant has 1050 rooms and is a “maze”. Furthermore, how the two guides place themselves and move through the plant matters. One of the guides is always in front and leads the group to the usual stops. The second guide is either in the back making sure that



no one is left behind or chaperones visitors who want to take the elevator rather than the stairs. All of this means that everyone follows a certain pre-given route through the plant as opposed to visitors roaming around freely. There are, of course, slight variations from guide to guide and tour to tour: When entering the plant, one guide, for instance, stopped the group first right in front of the radiation protection office to talk about the importance of this place and the dosimeters before leading the group to the usual spot a few steps further into the plant (see section 6.1.4). However, as this example illustrates, the deviations are minimal and the guides generally follow the same path through the plant.

Along this route, there are what I refer to as “the pre-existing spatial features of the plant”, that is the things that were placed there when the plant was built. In the refueling space, you can, for instance, see the refueling platform which would have been used to replace the fuel elements (see section 6.1.5). Similarly, in the control rod drive chamber, there are the tubes and boxes that would have been used to check for leaks, for example (see section 6.1.8). On top of that, there are things which seem to have been added to the plant specifically for the tours. This includes barriers, chains, and signs saying “Kein Zugang für Besucher” (“no entry for visitors”, see Figure 36), which all contribute to keeping the visitors on the designated part. Furthermore, there is first aid equipment at every stop of the tour (see Figure 37). As we have seen in my summary of the tour, all stops further feature several explanatory boards, which consist mostly of diagrams and text (see, e.g., section 6.1.5). At some stops, there are also what I have been referring to as exhibits: objects which seem to have been placed there specifically to help the guides explain and show certain things. These include the clothes workers would have had to wear (see section 6.1.4) and the original core cell and the core cell model (see section 6.1.5).



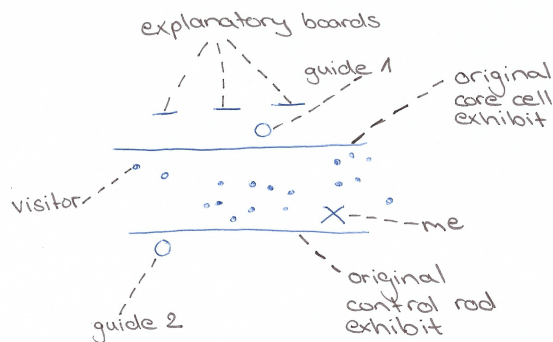
**Figure 36:** “No entry for visitors” sign



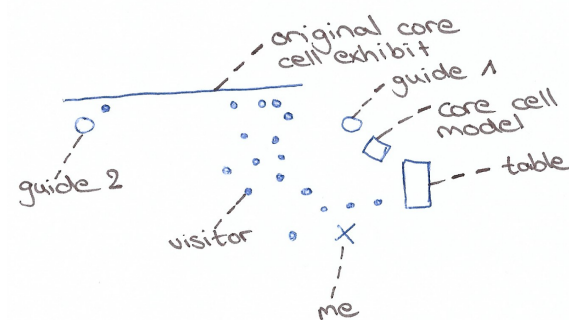
**Figure 37:** First aid equipment

In terms of the placement of bodies, we have already seen in my re-telling of the tours that there is a certain regularity in how guides and visitors position themselves: In many places, the guide who is

talking stands right in front of the explanatory boards and/or exhibits and interacts with them by pointing at them. As much as the pre-existing spatial arrangements allow, most visitors assemble around the guide and the respective exhibit or explanatory boards in a rough (semi-)circle (see, e.g., sections 6.1.4 and 6.1.5). Figure 38 provides an overview of this kind of arrangement around the exhibits and explanatory boards in the refueling space.



**Figure 38:** Visitors assembled around guide and boards



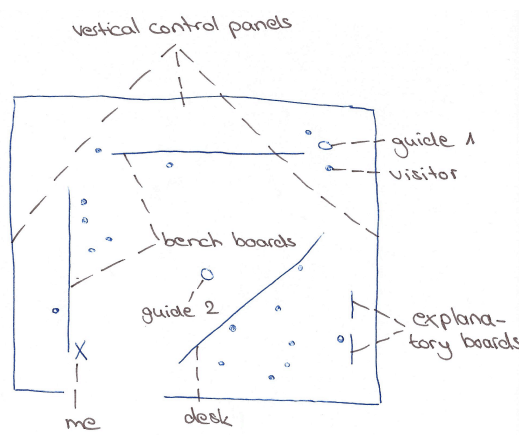
**Figure 39:** Visitors assembled around guide and model

When the guides move to a different location within the same room, e.g., from the explanatory boards to the model of the core cell in the refueling space (see section 6.1.5), the group follows, re-assembling around the guide. This can be seen in my sketch of this new arrangement around the model of the core cell (see Figure 39). The group furthermore tends to move when the guide draws their attention to something besides or behind the visitors. We have already encountered this, for instance, at the entrance of the controlled area, where, as I described (see section 6.1.4), the guides indicating the radiation protection usually makes visitors who have their back to the office turn around to have a look at it. In other cases, such as when the guides draw the group’s attention to the emergency personnel air lock in the control rod drive chamber (see section 6.1.8), visitors who stand in front of the lock do not only turn around to see what is being talked about but also shift to make space for the others to see the thing in question.

These observations lead me to think that most visitors aim to position themselves in a way that allows them to look at the guide and at what is being referred to, to hear what is being said but also to avoid blocking everybody else’s view. This strongly resonates with what Knoblauch and Steets (2022) call the “communicative construction” (p. 24) of space (see section 4.3). Just like these authors conceptualize the making of space, we can see spatial relations emerging from bodily performed interactions, such as pointing at things in the common environment, looking at them together, and speaking about them at the tours. In the case of the emergency lock, there is the additional dimension of anticipating the position and orientation of others and making space for them to see. Sometimes, this kind of communicative construction of space is, however, significantly constrained by the pre-

existing spatial features of the plant. We can see this especially in the pressure suppression chamber, where, as I described in section 6.1.7, visitors have to position themselves on the narrow path around the chamber. Paired with the reverberation in this room, this means that the visitors positioned the furthest away from the guide are usually unable to hear what they are saying.

At the same time, in most rooms, there are typically at least a few visitors who voluntarily pass up the opportunity to hear and see everything that is being said and shown. They turn and move away from the guide and the group to look around the room by themselves, read one of the additional explanatory boards, or take photos. In my re-telling of the tours, I have hinted at this, for instance, in section 6.1.4, in which I described how individual visitors often take a closer look at and photos of the radiation protection and the various things on display there. We have further already seen this at the equipment hatch (see section 6.1.6), where a few visitors usually turn away during the guides' explanations to enjoy the view of the turbine hall. These kinds of visitor behaviors are, however, most pronounced in the control room. As I described above (see section 6.1.10), here, most visitors tend to explore the room by themselves. After a while, visitors typically spread and move freely through the control room leading to a very different arrangement of bodies compared to the gathering around the guide that I noted in other parts of the plant. This is captured by my sketch of how bodies and objects were arranged in the control room on one of the tours I went to (see figure 40).



**Figure 40:** Spatial arrangement in the control room

## 6.2.2 Making Sense of the Plant

Having described the physical arrangements that typically emerge along the standard path through the plant, I now examine how space is given meaning to in those physical arrangements. Drawing again on Knoblauch and Steets' (2022) communicative construction of space, I first examine how space is being made meaningful in the conversations between visitors and guides. At the same time, we have also seen in the previous section that, in some cases, visitors explore the plant on their own. Drawing on Löw's (2016) notion of "synthesis" (p. 134), I understand this behavior as another way in which space is made sense of at the tours, namely in the perception and memory of individual visitors. I



further use the concept of synthesis to show how a larger space of the plant that transcends guides' and visitors' immediate surroundings emerges.

As I mentioned in section 4.3, Knoblauch and Steets (2022) argue that the basic meaning of the act of pointing at something is the referent, that is the thing that is being pointed at. This can also be observed at the guided tours, where instances of pointing and looking together at things in the plant are accompanied by the guides providing the name of the thing they draw visitors' attention to. As I described in section 6.1.4, in the case of the radiation protection office, for example, the guides usually say that this is the office of the radiation protection team when they gesture towards it. Another example is when the guides point out and name the various parts of the original core cell exhibit in the refueling space (see section 6.1.5). That naming things is a central way of giving meaning to the pre-existing spatial arrangement of the plant during the tours is also made explicit by the guides. On most of the tours I went to, they told the visitors at some point that "everything is called after what it does" in an NPP. In other words, if you know an object's name, you already have an idea about what it is for. One guide, for instance, shared this piece of information after telling visitors that the refueling platform is called that way and that this indicates that it would have been used to refuel. Another instance in which the importance of how things are called is often made clear by the guides is when they share that the stack is a ventilation stack rather than a flue-gas stack in front of the bird's eye photo. As I mentioned in section 6.1.3, the guides usually say that this is because no flue gases are emitted in an NPP, which again implies that there is a direct link between knowing the name of things and what their purpose is.

In most cases, the guides do not stop at providing the name of the things they draw visitors' attention to, but they typically go on to share additional information. Pointing out the radiation protection office, for instance, leads them to talk about everyone needing to get clearance from the radiation protection when entering the plant and the dosimeters workers would have had to carry (see section 6.1.4). What we can observe in this moment is how a space is made together with particular knowledge about the procedures in NPPs. A space is created and given meaning to based on the pre-existing spatial arrangement of the plant (i.e., the past construction of the radiation protection office in this particular place), the bodily performances of pointing at it, looking at it, and speaking about it, and the knowledge that is being shared about it. At the same time, constituting this space gives rise to certain pieces of knowledge about how you need to behave when working at an NPP being made. In my summary of a typical tour, we can see numerous other examples of this kind of co-production: In the refueling space, pointing out the individual fuel pellets in the model of the core cell leads many guides to speak about the "advantages" and "disadvantages" of nuclear power (see section 6.1.5). In section 6.1.7, I have described how the guides share the story of "the deathblow to Zwentendorf" after

drawing the group's attention to the opening in the containment wall. Shining a flashlight into the boxes for the leak checks is what brings the guides to explain some of the differences between boiling water and pressurized water reactors in the control rod drive chamber (see section 6.1.8).

Apart from emphasizing how central the communicative construction of space is to the tours, these examples illustrate that the knowledge made in relation to spatial features of the plant can go far beyond explaining the concrete things visitors can see: In the case of the radiation protection, they learn about the rules and procedure in a running NPP. An amusing anecdote is shared and gives meaning to an inconspicuous feature of the pressure suppression chamber while the demonstration of the leak checks leads to knowledge about the advantages and disadvantages of different reactor types being made. In the refueling space, broad arguments about the efficiency and safety of nuclear power are made in relation to a tiny detail of one of the exhibits. In all these cases, knowledge is produced while, simultaneously, objects are made sense of. At the same time, the last example from the refueling space also allows us to see how certain spatial features of the plant are drawn attention to in order to raise particular issues. As I will describe in section 6.3.3, the efficiency and safety of NPPs are among the central concerns expressed by the guides during the tours. In this case, pointing out the individual fuel pellets indicated on the model of the core cell can thus also be read as a way of instrumentalizing an object to make a particular issue.

The examples discussed so far further illustrate that the co-productions of space and knowledge emanate for the most part from the guides as part of their routine explanations. However, in some cases, it is also the visitors prompting communicative constructions through questions about aspects of the shared environment. One example of this, which we already encountered in my retelling of the tours, was the visitor question about the small holes in some of the star-shaped tubes in the pressure suppression chamber (see section 6.1.7). Another example was a visitor who, as I described in section 6.1.5, pointed at and asked the guide about an additional rod attached to the original core cell exhibit in the refueling space. Both visitor questions led to the guides sharing knowledge about the respective feature of the shared environment, which they would have likely not addressed otherwise. This holds true in particular for the question about the core cell exhibit as the additional rod was not discussed at any of the other tours I went to. What both examples show is how visitors can actively shape how space and knowledge are co-produced within the tours by drawing the guides' and groups' attention to a physical aspect of the plant and demanding information about it. In some cases, as with the question about the additional rod, this can also lead to the guides deviating from what they usually say.

While some visitors thus actively shape the co-production of space and knowledge that happened in the conversation between guides and visitors, not all visitors are at all times interested in or

part of this talk. We have already seen this in the previous section, where I described how a few visitors usually move and look around by themselves during the guides' explanations. My argument here is that visitors individually inspecting, touching, and taking photos of all kinds of details in the control room, for example, illustrates another way in which space is made sense of at the guided tours, namely within the minds of individual visitors. As I already mentioned (see section 4.3), for Löw (2016), it is absolutely crucial to the constitution of space that someone "synthesizes" (p. 134) or links the bodies and objects present in a specific place in perception, memory or imagination. I would argue that this is precisely what happens when visitors explore the plant on their own: Based on how they individually move through the plant and what they individually look at and take photos of, visitors "discover" certain things in the plant. These become linked to a space in their perceptions, their memories, and the photos they take. This is illustrated by section 6.1.8 of my summary of a typical tour, in which I describe how looking around the control rod drive chamber by myself, I started to notice more and more things around the room that the guides did not mention, such as numerous wheels and what could be an electrical heater (see Figure 22). These things became part of the control rod drive chamber in my perception and, aided by my photos, I remember them as such. While I am not sure what exactly these things are or what their purpose is, I still gave meaning to them, for instance, by associating them with objects I am familiar with, such as steering wheels or heaters. They have thus emerged as a meaningful space within my mind.

In this last example, different things located at the same stop of the tour became linked in my perception and memory. As in all the other instances I have discussed in this section so far, it was thus a case of an individual stop of the tour being made sense of and becoming a space. On top of that, Löw's (2016) notion of synthesis has also drawn my attention to moments in which a broader space of the plant that transcends visitors' and guides' immediate surroundings is constituted. We have already encountered several examples of this in my summary of the guided tours: In front of the bird's eye photo of the plant, the guides, for instance, point out to the group how they will move through the plant from one stop to the next (see section 6.1.3). Similarly, in section 6.1.4, I have mentioned that in front of the elevator, the guides usually tell the visitors that the next stop is located 39 meters above them. In these moments, the guides provide the visitors with information about how the different places they get to visit are linked to one another. In other words, the guides synthesize a specific version of the larger space of the plant based on the standardized path of the tours. The latter example is, as I have described in section 6.1.4, usually accompanied by the guides sharing more generally that meters are used instead of floors in the NPP in order to be able to communicate about locations within the plant unambiguously. In relation to this, one of my visitors told me that this information gave her the "impression, aha, so it's a separate type of, uh room" with a specific kind of "navigation" (I2). As

we can see, the conversation about the meters caused this visitor to imagine the broader space of the plant in certain ways, namely as one that is different from the ones she is familiar with.

Yet another instance of how a space that transcends the respective stop of the tour is constituted can be observed at the equipment hatch when the guides explain the various safety barriers of the plant with the help of a diagram (see section 6.1.6 and Figure 16). Most of these safety barriers except for the containment cannot be seen at that moment in time. Some of them, such as the biological shield, are not visible at all during the tours. However, visitors imagine and thus constitute these parts of the larger space of the plant in their mind based on the diagrams. That this happens became particularly clear when there were apparent mismatches between how visitors imagined things and the actual spatial arrangements of the plant. One visitor I interviewed spontaneously, for instance, told me that she had found it difficult to make connections between the diagrams and the actual plant. She was, for instance, “surprised by where the water would have been” because based on the diagrams, she would have expected it to be somewhere else. In other words, the diagrams caused her to imagine the space of the plant in certain ways which she later found to be inaccurate when the guides spoke about the water. On one of the tours I accompanied, a guide also mentioned that due to the biological shield being represented as two walls right and left of the reactor on the explanatory boards about the safety barriers, many visitors imagine it as such. As he pointed out next, this is in fact a misconception since the shield actually forms a ring around the reactor. In a similar vein, I caught myself expecting that the biological shield should be yellow because that is the color it has on the diagram. As these examples illustrate, individual visitors do not only constitute the space of the plant by perceiving and remembering it but also by imagining (parts of) it.

Overall, we have seen in this section that the space of the plant is constituted and made meaningful both in bodily performed interactions between guides and visitors as well as in the minds of individual visitors. Both, Knoblauch and Steets’ (2022) notion of the communicative construction of space and Löw’s (2016) operation of synthesis are thus relevant to how space is constituted at the guided tours. This section has further shown that both processes are not only present at the guided tours, but they are also complementary: Things individual visitors perceive, such as the additional rod in the refueling space, can become part of the conversation between guides and visitors and thus shape what others (or at least what I) perceive and remember. What the guides say, for instance, with regards to meters being used to denote height instead of floors, can cause visitors to imagine the larger space of the plant in certain ways. Furthermore, visitors’ individual explorations of the plant can involve communicative constructions. An example for this is the visitor who pointed out the rubber joint between the reactor building and the turbine hall to another visitor (see section 6.1.6). These visitors

were exploring the plant by themselves and thus constructing individual spaces, but they also did so together through bodily performed interactions.

### 6.2.3 Feeling the Space of the Plant

As we have already seen in my retelling of the tours, when visitors first see certain parts of the plant, some have a visceral reaction: They exclaim “wow” or how “cool” it is when entering the pressure suppression chamber (see section 6.1.7) or comment on how “sick”, “crazy”, or “retro” the control room looks when they first lay their eyes on it (see section 6.1.10). Clearly, these visitors are immediately affected by these spaces. Having described how the space of the plant is arranged physically and given meaning to within the tours, I now take a closer look at how the spatial arrangements that emerge on the tour make visitors feel. In other words, this section is concerned with the atmosphere (Löw, 2016) of the plant.

One aspect of the space of the plant that fundamentally shapes many visitors’ experiences of it is its size. This is already hinted at in my summary of the guided tours where I describe how I was struck by how big the reactor must actually be when I saw the top head of the reactor pressure vessel on one of the tours (see section 6.1.5). Several interviewees described similar moments in which they became aware of how big the plant is. One participant, for instance, told me how she realized how deep the reactor well is when she looked down: “And then looking down, how deep that goes, was also, uhm, was also crazy” (I4). Another one had a similar experience outside of the plant: “I mean, it is simply insanely big (laughs), if you look up there, oh my god (laughs), it seems like a gigantic, fat bunker” (laughs)” (I1). A third visitor described a “powerful” experience of feeling small in the face of the plant:

Somehow, I got this feeling of, uh, that, that is the scale of this place, is so huge that you kind of like, uh, as a, as a human, you would, when you would work there, you are just a tiny, little (laughs) thing in, in the whole, uh, area. (I2)

What these quotes show is that some visitors seem to have a sublime experience when they are struck by how big the plant is. At the same time, we can see that feeling the size of the plant is very much an embodied experience. These visitors became aware of the scale of the plant when they were looking down into the reactor well or up the building or comparing it to the size of their own body. The vastness of the plant is thus not something that merely passively affects them, but the experience depends on their own presence, placement, perception, and awareness of their own body. This fits very well with Löw’s (2016) description of atmospheres as emerging from the interactions between people and things and needing to be “actively picked up” (p. 172).

This quality of atmospheres is further highlighted by the fact that not everyone I spoke to experienced the size of the plant in the same way. In one of the informal conversations, a participant

pointed out that the plant had felt surprisingly small to him, smaller than he had expected. Other visitors found aspects, such as the deepness of the reactor well, frightening rather than being in awe of them. I already hinted at this in my re-telling of the tours when I described my observation that some visitors only take a quick peak into the reactor before quickly stepping back (see section 6.1.5). These observations were confirmed by a visitor who shared in one of the informal conversations that she had “only briefly looked down” into the reactor well because it had made her feel “almost dizzy”. As these examples show, the scale of some of the pre-existing physical features of the plant are also a source of fear for some visitors. Still other visitors explained to me that they were more affected by the smaller, cramped parts of the plant, such as the control rod drive chamber, than the large rooms. This came out in particular in one of the interviews in which a participant described his experience as follows:

I think this area, could be described as having kind of the, uh, most, like the, the highest quantity of various mechanisms and junctions and, uh, you know, stuff. So, it's, uh, very kind of impression intense in this regard because in the central hall, uhm, you know, it's a, a big hall and then you can walk and see some, some mechanisms. But, uhm, and maybe it's also not, not few of them, but they are kind of distributed in the big area. But there in this cramped area ... you, you, you feel that intensity because everything is so cramped and located together and in one place and you observe everything, everything at the same time. (I2)

As this visitor describes, seeing lots and lots of things at the same time in the same tiny place affected him more than experiencing the large scale of the plant. How the space of the plant makes visitors feel is thus also a question of their individual perception.

At the same time, there are patterns in visitors' experiences of the space of the plant. For instance, both the size of the plant and the crampedness of certain places instilled admiration for the ingenuity involved in building these structures in some visitors. This can, for instance, be seen in the following interview excerpt in which the participant links her experience of feeling small in the face of the plant to a sense of amazement at humanity's technological capabilities:

[T]he whole feeling of being a small, tiny particle in this whole machinery that for me was quite powerful experience that, uh, as a humanity that we can create such, uh, amazing structures that are controlled in a way that, uhm, it's one person who would be working there. (I2)

Similarly, a visitor described how in the cramped, “inner rooms” where “everything gets pretty hot”, he was fascinated by “how everything was joined and fit together” (I3). Another part of the pre-existing space that typically causes both visitors and guides to feel wonder at the ingenuity of the technology involved is the turbine. As we have seen in my summary of a typical guided tour (see section 6.1.9), the guides usually praise the turbine as a “masterpiece of engineering” and emphasize how difficult it

was to build the turbine and how fast it would have rotated, which is often met with surprised reactions by the visitors. Similarly, several visitors mentioned the turbine in the interviews or informal conversations as a particularly “cool” (I3) part of the tour. One interviewee also described the turbine as “made by master hand” (I1).

What can also already be seen in my summary of the tour is that not only the deepness of the reactor well, but also other aspects of the plant can have a slightly frightening quality to them. As I mentioned in section 6.1.8, the emergency personnel air lock in the control rod drive chamber is one of the things in this cramped place that particularly captures visitors’ attention, but it is also experienced by visitors as “scary” or as a place where they would “get claustrophobic”. This lock was also brought up by one of my interview participants when I asked her which of the places that we visited had stuck in her mind the most. Shortly after talking about the lock, this participant mentioned how being inside the plant had made her think about the fact that this could be a “potentially dangerous place” where “if something goes wrong, you are trapped” (I2). The other participant of this interview agreed with this and described that there is “kind of a very, very, very, uhm, low level of scariness ... present” in the plant which stems from “imagining yourself in there” (I2). Similar thoughts were also expressed by a third participant who felt that the visit also had a “dystopian” quality to it:

[W]hen you stand there between gigantic steel walls and no daylight and, uh, you also do sometimes imagine how it is in, in, well, in plants that are actually, actually on, so, so, sort of, yes, always have to be prepared for the incident. (I4)

What these moments and quotes show is that for these visitors, being inside the plant comes with a slightly scary feeling. This is connected to these visitors imagining something going wrong and/or themselves getting trapped in an NPP or having to crawl through a “claustrophobic” emergency lock to get out. This quality of the experience thus seems to be very much connected to the fact that it is a *nuclear* power plant they are visiting, where something going wrong could have disastrous consequences. However, this component of the visit also seems to be something that at least some visitors enjoy about the visit: It is, as one participant put it, “also part of the interest” (I2).

Finally, as I already hinted at in my retelling of the tour, visitors also seem to be particularly affected by those parts of the plant that are visibly from the 70s. Examples of this from my summary of the tour are the 70s bathroom tiles (see section 6.1.1), the underwear which “gives away that it is not entirely new” (see section 6.1.4), and the “retro” looking control room (see section 6.1.10). As I described above, many visitors immediately recognize that the bathroom tiles are from the 70s and recommend them to their friends and family “if they want a proper 70s experience”. This suggests that visitors “want” and enjoy seeing the things from the 70s. This is further supported by the fact that the control room with the “the old stuff” (I2) and the “technology from back then” (informal conversation)

were among the things many visitors brought up when I asked them what parts of the plant had stuck to their mind. For some visitors, experiencing these “retro” spaces seemed to transport them into the 70s: It allowed them, as several visitors put it, to “time-travel” (e.g., I3). Such comments further imply a view of the 70s as an independently existing part of the past with certain fixed characteristics, such as a certain style of bathroom decor, that can be metaphorically travelled to. This connects to a broader performance of the 70s as a certain kind of time different from today, which I will analyze more closely in section 6.4.3.

### 6.3 Making Knowledge

In addition to seeing and experiencing the inside of the plant, many visitors also told me that they liked their visit because of the knowledge shared during the tours. They described the tour, for instance, as “very informative and interesting, a comprehensive lesson in chemistry and physics” (informal conversation), told me that there were many “very interesting and surprising facts” (informal conversation), or praised the guide for knowing “an insane amount of details” (informal conversation). Clearly, the explanations given by the guides were a central part of the experience for these visitors. This highlights the need to devote attention to the processes of knowledge production taking place at the tours.

Throughout my empirical material, there is a widely shared belief that two different kinds of knowledge are shared during the tours, namely “historical” and “technical” knowledge. We can see this already in my summary of the guided tours, for instance, when the guides announce that they will give a “historical introduction” in the conference room (see section 6.1.2) or that “it will now get a bit more technical” in the refueling space (see section 6.1.5). On another tour, a guide, who took the lead from the bird’s eye photo (see section 6.1.3) to the end of the tour, announced that he was responsible for “the technical part” when he started talking in front of the photo. The distinction between the “historical” and the “technical” was also present in my interviews: Sometimes, this was introduced by my participants themselves, for instance, when two visitors agreed in one of the informal conversations that “the tour was more about the history than the technical details” and that they would have had “more questions about technical stuff”. In other interviews, this distinction emerged in the conversation between myself and the participants: One time, I asked a participant whether she remembered any of “the anecdotes that had been shared from the plant’s history”, which the interviewee said no to and added that she was probably “too technical” (I1) to remember any anecdotes.

These quotes and moments further illustrate where and how these two kinds of knowledges are thought to be shared: “History” is believed to be primarily talked about in the “historical introduction” in the conference room while “technical” knowledge is thought to be mainly discussed after leaving the conference room: in front of the bird’s eye photo, while visiting the plant and, especially, in the refueling space. At the same time, as we have seen in my re-telling of the tours, brief stories from the



history of the plant are shared throughout the whole tour. Examples of this are when the guides speak about “the deathblow to Zwentendorf” in the pressure suppression chamber (see section 6.1.7) or tell the story about the window and the bulletproof glass in the control room (see section 6.1.10). Anecdotes like these being shared throughout the whole tour might be what led some visitors to think that, as I mentioned above, the tours were primarily concerned with “history”.

As I already hinted at in my summary of the tours, in their “historical introduction” in the conference room, the guides provide a version of the developments that prevented the plant from being turned on. They further talk about what happened to the plant afterwards and what plans the EVN has for the site in the future (see section 6.1.2). This is directly relevant to how the past and future are performed at the tours, which is why I will examine the “historical introduction” more closely in section 6.4. Here, on the other hand, I focus on the anecdotes shared as well as the “technical” knowledge made throughout the rest of the tour. I identify several contextual factors that are embedded in and embed these knowledges. In other words, I analyze the kind of knowing space the guided tours are (Law, 2017; see section 4.2).

Previously, I have already demonstrated how certain anecdotes and pieces of knowledge about the NPP and nuclear power more generally are shared in relation to the emergent space of the plant (see section 6.2.2). We thus already know that the pre-existing spatial features of the plant, the objects that were placed there specifically for the tours, and guides’ and visitors’ bodily performed actions are part of the “heterogeneous array” (Law, 2017, p. 47) which makes up the tour’s knowing space. In the following sections, I add to this by examining other aspects implied in and shaping the knowledge made at the tours: Section 6.3.1 discusses how this knowledge is co-produced with certain emotional experiences the visitors are intended to have at the guided tours. I illustrate this by interpreting the anecdotes as part of a wider effort to entertain and amuse visitors. In section 6.3.2, I focus on assumptions about what kind of knowledge should flow in what directions implicated in the “technical” knowledge made at the tours. Drawing on Latour’s (2004) MoC (see section 4.2), I finally examine the kinds of concerns the knowledge shared at the tours addresses and reinforces in section 6.3.3.

### 6.3.1 Sharing Anecdotes, Entertaining Visitors

What I have been referring to as “anecdotes” are short narratives that the guides share about notable incidents from the plant’s past. I already mentioned “the deathblow to Zwentendorf” (see section 6.1.7) and the journalist recognizing that the windows in the control room might be a safety risk (see section 6.1.10) as two examples of these kinds of incidents that came up on all the tours I went to. Another regular example is the story about the direct phone line to the chancellery and how it does no longer work, which the guides bring up in relation to the red-white-red corded phone in the control room (see section 6.1.10). Some guides further mention that in the time in which the plant was kept

in a ready-to-go-online condition, NPP Zwentendorf won four times in a row at football tournaments between German-speaking NPP workers probably because the Zwentendorf team “had lots of time to train”. Other guides talk about how some of the nuclear engineers who came to the plant for a training had tears in their eyes when they climbed into the reactor pressure vessel because they had only ever seen this on videos and diagrams (due to the radiation in running NPPs).

Such stories are perceived to be different from the “technical” knowledge – the “facts” (informal conversation; see also section 6.3.2) – shared at the tours. As I already mentioned above, this became particularly clear in one of my interviews in which the participant, who had expressed her fascination for the technical details several times throughout our conversation, described herself as “too technical” (I1) to remember any anecdotes. That anecdotes are a type of knowledge that is different from scientific facts and expertise is also noted by Felt (2020), who examines how personal stories in news articles about obesity bring this phenomenon into being. Reflecting on the ambivalent status of anecdotes as a type of evidence, she writes that anecdotes “might be understood in a similar way as myths, always containing both fact and fiction” (p. 134). As is also noted by Michael (2012), anecdotes imply that they are about real people and events. There is a sense that what they recount was actually experienced by someone at some point. This quality, however, also means that anecdotes evade scrutiny and questioning. Because they appear to report someone’s lived experiences, there is ultimately no way of refuting or verifying the claims they make which gives them their myth-like character (Felt, 2020). That this applies to at least some of the stories the guides tell from the history of the plant was suggested on two of the tours I went to. On these tours, the guides shared in the pressure suppression chamber that when the room was filled with water, workers rode around it in an inflatable boat. One guide introduced this anecdote by saying this is something she had heard and later commented that she does not know if it is true. Another time, a guide similarly called this a “legend” and thus implied that he cannot tell whether this story is true. As these statements suggest, at least some of the anecdotes shared at the tours cannot be verified by guides and visitors, which distinguishes them from the “facts” (see section 6.3.2) discussed in other moments of the tours.

As Michael (2012) points out, anecdotes often serve the purpose of amusement. This is also the case at the guided tours which can be told from the audible reactions visitors usually have to them: When the guides speak about “the deathblow”, the windows in the control room, or the workers’ success in football tournaments, some visitors usually laugh audibly. These effects were also visible in my interviews in which the participants were usually laughing when they brought up some of these stories, for instance, when they were talking about the “deathblow”: “I think that's cool too, just break it, then you can't put it into operation again (laughs)” (I1). The knowledge shared in the form of anecdotes thus creates amusement. Going beyond that, I would argue that these effects are precisely the

reason why these stories are shared at the tours. They are part of a wider effort to provide visitors with an entertaining and fun experience. That this is an aim of the tour and the guides becomes visible in myriad ways: It was made explicit when one guide stated at the end of the tour that he hoped it was “interesting, informative *and entertaining*” (my emphasis) or when another guide announced the wrapped-up cable ends as something “funny” visitors can see in the control rod drive chamber (see section 6.1.8). Other testaments to this wider effort are the puns some of the guides make about radiation when say that they need to decontaminate the helmets at the end of the tour (see section 6.1.10) or tell the visitors to “radiate” (to radiate is a synonym for smiling joyfully in German) before taking a group photo. Such puns are usually met with laughters by the visitors as are some of the other jokes some guides make about the old-fashioned underwear, for example (see section 6.1.4).

Another element of the tour meant to entertain visitors is the prank some guides play on them with the radiation detector. As I described in my summary of the tours I went to, when this happened, it was usually an exciting and thrilling moment that captured visitors’ attention (see section 6.1.4). This was echoed by one of my interview participants who described this episode as “a surprise moment ... at first, such a what's happening right now (laughs), but then it was really positive, yes, a bit enlivening” (11). That this is the desired effect can be seen from the comments one guide made after revealing the remote control. He shared that he used to play this prank when exiting the plant until one time “a woman became furious” because she believed that this was not something you make jokes about. Since then, this guide explained, “they are actually not supposed to do this anymore” and that they “may only do it when entering the plant and when [they are] certain that the group is fun”. Clearly, the prank is thus meant to be an overall fun and enjoyable experience as opposed to one inducing fear and anger. That these latter emotions are to be avoided in this kind of setting was tacitly assumed by guides and visitors, which became clear in one of my interviews during which the participant pointed out that “if someone panics or something, that would *of course* be rather bad” (my emphasis).

What these various examples illustrate is that a particular kind of emotional experience that involves the visitors feeling entertained, amused, and perhaps a bit thrilled is aimed for at the tours while other emotions such as fear, anger, or panic are considered unsuitable. As we have seen, the desired emotional experience is achieved in a variety of ways; one of them being the surprising or amusing anecdotes the guides share from the plant’s history. The emotions believed to be adequate at the tours are thus shaped by but also lead to a certain type of ultimately unverifiable, anecdotal knowledge being produced. The emotional experiences visitors are intended to have are thus part of the tours’ knowing space. While this section has focused on analyzing this kind of relationship with regards to the anecdotes, their entertaining effects, and ambivalent status as a form of evidence, it can also be observed in other kinds of knowledges made and emotions experienced at the tours.

In fact, we have already encountered examples of “technical” knowledge being co-produced with particular emotional experiences in section 6.2.3, in which I described how the emerging space of the plant affects the visitors emotionally. I mentioned, for instance, how the emergency personnel air lock in the control room instills an enjoyably scary feeling in some of the visitors. I also described guides and visitors marveling at the technical ingenuity of the turbine. These effects are, however, not only caused by these objects but also shaped by the knowledge the guides share about them. In the case of the emergency personnel air lock, the guides explain that this is what workers would have used to get out of the room during a power outage (see section 6.1.8). This information clearly contributes to visitors imagining themselves getting trapped in the control room and having to crawl through the small opening, which is part of what they find frightening about the lock. Similarly, the large numbers the guides provide when talking about how fast the turbine would have spun (3000 revolutions per minute, 50 per second) shape visitors’ amazement at the turbine. This can be seen from the fact that this information oftentimes causes visitors to gasp in surprise and how much it fascinated myself (see section 6.1.9). In both cases, specific pieces of knowledge are thus mutually constituted with certain emotions. That these are emotional experiences the guides want the visitors to have is, in case of the slight scariness, indicated by the thrilling prank the guides play with the radiation detector. A guide also once mentioned that there are many things sticking out of the walls of the plant which you might miss “when you are admiring something” when telling visitors that they need to wear helmets. Amazement at the plant’s technology is thus another emotion visitors are expected to feel during the tours.

### 6.3.2 Providing “Lay” Visitors With Basic “Facts”

Having focused mainly on the anecdotes and how they are co-produced with a particular emotional experience in the previous section, I now turn to the “technical knowledge” made in the conversations between guides and visitors. In this section, I identify assumptions about what kind of knowing does and should occur at the guided tours. Continuing to examine the tours as a knowing space, I show how ideas about what kind of knowledge ought to flow from whom to whom are implied in and shape the knowledge that is produced.

Fundamental assumptions about what kind of knowing takes place at the guided tours are already visible in the comments by the visitors which I quoted at the beginning of section 6.3. As I mentioned, my conversation partners thought that “facts”, “details”, or the kind of knowledge you would find in a “lesson in chemistry and physics” (all informal conversations) were shared at the tours. This implies a view of this knowledge as solid, unbiased information. The visitors I spoke to further imagined this knowledge to flow primarily from the guides, who they mostly perceived as knowledgeable, to themselves, who they predominantly performed as lacking knowledge (see also section 5.4). This can be seen from their praise of the guides. As I mentioned above, one visitor I interviewed

informally, for instance, remarked that the guide knew “an insane amount of details”. I also overheard a group of visitors tell a guide that the tour was “really great” and ask him, impressed, “how [he] can remember all of that”. Clearly, these visitors perceived the guide as possessing a lot of detailed knowledge. Several visitors further commended the guides for their ability to explain things in a way they could understand. One of my interview participants, for instance, said that she had “nothing to do with the topic”, but the guide “explained it so well that you could nevertheless understand it” (I1). Similarly, a visitor I spoke to informally mentioned that the guides “did a good job” because she “didn’t feel too much like a layperson” and “could follow well”. These comments by the visitors connect praise of the guides with a performance of themselves as having not much knowledge about the topic. Overall, stable facts were thus believed to be transferred from knowledgeable guides to ignorant visitors and this was considered a strength of the tours. This clearly implies a deficit-model-like imagination of the tours which also corresponds to my own initial assumptions about them (see section 5.3).

The sense that a good guided tour should involve a flow of information from the guides to the visitors was further shared by two of my interviewees even though they had different sorts of experiences when they visited the plant. As I already mentioned in section 5.4, one visitor I spoke to told me that he struggled to follow the guides’ explanations because they were “too technical” (I3) for him. He would, however, have wanted the guide to explain things in a way more accessible to him: “I would have liked it if he just went into himself a bit and said, concentration, that’s an important point now. We are now here and the main task of this thing is, for fuel rods, for, whatever” (I3). As in the other cases, this was coupled with a view of himself as not having much knowledge about “technical” things. While he did not feel like he could digest the information provided by the guides, he shared the belief that the guided tour should ideally allow for knowledge to be transferred from knowledgeable guides to ignorant visitors.

A similar view of what makes a good guided tour was further expressed by another one of my interviewees even though in contrast to the others, he saw himself as possessing lots of relevant previous knowledge. As I already mentioned in section 5.4, one of the participants of my second interview told me that nuclear power was his “hobby” (I2) since he had been a child and that he had read a lot about the topic. This meant that “he knew what to expect” inside of the plant and could “absolutely” (I2) tell what he was looking at despite not understanding what the guides were saying in German. Nevertheless, he would have preferred it if there was also a guided tour in English because that would have allowed him to “ask more questions” and “get into more details “in regards to every specific place” (I2). Despite perceiving himself as knowing a lot about the topic and being able to make sense of the plant himself, he thus would have liked to receive further information from the guides. The basic

idea of the deficit-model, namely the one-directional flow of information towards the public, was thus also present in this visitors' wish for an English-language guided tour.

My central argument in this section is that these kinds of deficit-model-style assumptions are also implied in how the guides act at the tours and, crucially, the kind of "technical" knowledge they share about the plant. During the tours, the guides are almost constantly speaking. Although there are questions by the visitors, most of the time spent at the stops consists of the guides talking and the visitors listening (or at least being relatively quiet while looking around on their own). Some guides also continue their explanations and stories in between stops. Several guides, for instance, walked backwards from the administration building to the entrance of the plant, which allowed them to face the group and keep talking to them. One on tour, a guide described his job as having to talk like a "machine gun" by which he meant that he is constantly firing off information. All this indicates that the guides share the assumption that a good guided tour involves as much knowledge as possible flowing from the guides to the visitors.

From what the guides say, we can further derive what kind of knowledge they believe the visitors have, lack, and want: In this context the questions the guides ask the visitors in certain moments of the tours are relevant. As I already mentioned in my re-telling of the tours, in front of the bird's eye photo the guides ask the visitors, "What is missing?", and expect them to reply, "the cooling tower" (see section 6.1.3). On one tour, a guide also began his explanations in the refueling space by asking the visitors, "What makes uranium uranium?", and added, "Who paid attention in school?". Another question can typically be observed in the turbine hall where the guides usually ask the visitors, "Why precisely this number?", when explaining that the turbine rotates at a speed of 3000 revolutions per minute. Here, the expected answer is "50 Hz", the utility frequency. What these questions show is that the guides expect the visitors to possess certain kinds of knowledge. In the case of the cooling tower, it is commonsense knowledge that the visitors are imagined having. This can be seen from one guide introducing the question, "What is missing?", by saying that this is an issue that always comes up. The guides oftentimes also explain afterwards that contrary to what people commonly think, cooling towers are in fact not typical for NPPs but used in all kinds of thermal power plants. Clearly, these statements frame the idea that NPPs usually have cooling towers as something most people know, which is why the guides expect people to notice its absence at NPP Zwentendorf. In the other two examples I provided above, the knowledge visitors are assumed to possess is slightly more specialized. The comment, "Who paid attention in school?", demonstrates that in this instance, the guide expected the visitors to have the kind of knowledge about chemistry and physics you gain in school. With regards to the question about the turbine speed, one guide remarked that this is something "the electrician knows". This suggests that in this case, the expectation is that there are visitors in the group who work

in electrics and therefore know basic facts about the power grid. Overall, there is thus an assumption that the visitors have relevant knowledges either due to them being considered matters of commonsense or because the visitors are expected to have gone to school or have a certain profession.

At the same time, it is implied in the information the guides provide that visitors are expected to have little previous knowledge about NPPs and that this is what they want to learn about in the context of the tours. One outcome of my analysis of what the guides say on the tours was that a large portion of the knowledge they share is basic information about how the plant would have worked and what the things in the plant would have been used for. I have already mentioned in my re-telling of a typical guided tour that the guides, for instance, explain the nuclear chain reaction that would have taken place in the reactor (see section 6.1.5): They point out that when a neutron hits a Uranium-235 atom, its nucleus splits into two parts, which produces heat, radioactivity, and more free neutrons. At least some of these neutrons, the guides add, hit other Uranium-235 atoms and so on. They also explain how this reaction would have been sustained and controlled. Later, in the turbine hall, the guides further share how the steam produced within the reactor passes through the turbines to generate electricity (see section 6.1.9). The guides thus talk about the basic function of the plant, which shows that they imagine an audience that is not necessarily aware of this. This is further highlighted by one guide calling the (boiling water) reactor a “giant kettle”. By comparing it with an everyday object, he attempted to explain what the reactor would have done, namely boiling water and producing steam, in an easily comprehensible way.

Apart from this, the guides also share, as I described in detail in section 6.2.2, a lot of information about what certain objects in the plant are and do. I mentioned, for instance, that the guides point out the refueling platform and say that this would have been used to replace spent fuel. What makes this relevant here is that such explanations again imply an imagination of the visitors as having little previous knowledge about NPPs. If the guides, for instance, expected all of the visitors to be able to “name the mechanisms” (12) as the mother of two of my interview participants did, the tours would surely be different. Underlying the tours is thus a version of the deficit-model: Both visitors and guides appear to assume that the guided tours are good if they allow for the flow of lots and lots of factual knowledge from guides to visitors. This knowledge should be accessible for visitors who are imagined and, for the most part, perceive themselves as knowing little about NPPs. As I described, these kinds of assumptions are also visible in and shape the knowledge that is shared during the tours about how the NPP would have worked. They thus form an element of the knowing space that emerges at the tours.

At the same time, I want to briefly point out here that there are, of course, also more visitor-led forms of knowledge production taking place at the tours. As I already mentioned, visitors

usually also point out some of the spatial features of the plant to each other and discuss them (see section 6.1.6). This shows that they have their own things to share about them. The extreme case of this was the mother who, as I mentioned previously, explained things to two of my interview participants and thus took on the role of the guides herself. Furthermore, as I already described, visitors also contribute to the conversation between guides and visitors by asking questions or, sometimes, contesting things the guides say. One visitor, for instance, challenged the guides' point that the marking of final nuclear waste repositories was a problem by asking whether this was not "a purely rhetorical or philosophical question". This visitor was not simply accepting the knowledge provided by the guides but providing his own take. While deficit-model-style assumptions shaped the tours and were employed by visitors to make sense of their experiences, knowledge was thus not only flowing from the guides to the visitors and not always accepted by them unquestioningly.

### 6.3.3 Raising Issues, Making Arguments

While a large portion of the "technical" knowledge made at the tours is concerned with explaining the basic function of the plant, I also found that this knowledge speaks to and reinforces certain concerns about NPPs. In this context, my fieldwork and analysis were guided by Latour's (2004) MoC (see section 4.2). We have already encountered several examples of concerns being raised in my re-telling of a typical guided tour. I described, for instance, how the guides declare the question of how to deposit of nuclear waste an unsolved (or perhaps even unsolvable) issue (see section 6.1.5). In this context, they also problematize the marking of disposal sites which was, as I just discussed, challenged by a visitor on one of the tours I went to. In what follows, I focus on three issues that were particularly salient in that they, more so than the question what to do with nuclear waste, came up over and over again during the tours as well as in the interviews. In section 6.3.3.1, I describe how a concern with how safe NPPs are centrally shapes the knowledge shared at the tours. Afterwards, I discuss the knowledge made in relation to the question how much energy we can get out of an NPP which, as we will see, relates to broader concerns about how we can generate enough energy (section 6.3.3.2). Finally, section 6.3.3.3 is devoted to debates around the question how environmentally friendly NPPs are. Especially, in the latter two sections, we will see that, as in the nuclear waste example, it is not uncontested in the context of the tours what the issues are and what position to assume in relation to them.

#### 6.3.3.1 Making the (Un)Safety of NPPs the Paramount Issue

Throughout my analysis of my empirical material, the safety of NPPs emerged as the paramount concern guiding the knowledge made at the tours. We have already encountered one central moment in which this concern is expressed during the tours in my summary of a typical tour: As I mentioned, when talking about the "disadvantages" of nuclear power in the refueling space, the guides oftentimes



make the case that NPPs can never be completely safe (see section 6.1.5). Most guides refer to famous nuclear accidents, such as Chernobyl, to support this statement and point out that something like that “can always happen again”. The guides thus argue that there is an inherent uncertainty to the operation of NPPs: Accidents can never be completely ruled out. The central importance of concerns about the (un)safety of NPPs to the tours was also picked up by one of my interview participants who described what he took away as follows:

Well, I mean, [the guide’s] main point, you know, always was, it is total oven, it is a total stove, nothing must go wrong there, and you make a bet that something could go wrong.

And that’s why, yes, that bet must not go wrong, because otherwise, if something happens, then it’s bad. (I3)

Clearly, this participant perceived the idea that NPPs can never be absolutely safe to be the main message of the tour. His perspective supports my analysis that the question how safe and unsafe NPPs are and can be is the main issue made within the guided tours. In the remainder of this section, I demonstrate how this core concern shapes and is implicated in the knowledge made at the tours.

The underlying concern with the safety of NPPs can be seen in the focus the guides lay on various measures that were taken to ensure that NPP Zwentendorf is safe. One aspect of this are the guides’ abundant explanations about things that were done to prepare for or prevent different kinds of emergencies that might threaten the safety of the plant. We have already seen several examples of this in my re-telling of a typical tour: For instance, I have mentioned that the guides usually point out the rubber joint between the reactor building and turbine hall meant to protect the plant in case of an earthquake (see section 6.1.6). Another example is when the guides explain the purpose of the pressure suppression chamber as a place where excess steam can be released in two kinds of emergencies in which, as one guide put it, “the reactor pressure vessel would not be able to take the pressure” (see section 6.1.7). We have furthermore seen the guides mentioning different ways in which the reactor could be shut down if there was a blackout, for example, and how workers could get out of the control rod drive chamber in that case (see section 6.1.8). On top of that, in front of the bird’s eye photo, the guides usually point out the building housing the emergency generators, which would have supplied the plant with power in that case. At this stop, they further oftentimes explain how the plant is protected against flooding. At the equipment hatch, the guides typically mention that the containment would have been filled with nitrogen to prevent fires and hydrogen/oxygen explosions. Lastly, in the turbine hall, many guides also mention that the turbines were placed the way they are so that they do not hit the reactor building if they explode. While there are more examples, this selection should suffice to demonstrate how ubiquitous talk about measures designed to keep the plant safe in certain

situations is at the tours. The fact that this kind of knowledge is shared at almost every stop is a testament to how central concerns about safety are to the tours.

On top of that, the concern with safety is also visible in the many explanations the guides give about what was done to prevent radioactive materials from getting out of the NPP. The central example of this is the knowledge the guides share about the “safety barriers” of the plant. As I described in section 6.1.6 of my summary of a typical guided tour, the guides usually name various parts of the plant, such as the biological shield or containment, which are designed to keep radioactive materials from being emitted into the environment. Clearly, these explanations relate to concerns about how what is outside of the plant would have been protected from radioactive releases. We can furthermore see this kind of concern shine through in the knowledge the guides share about the procedures that need to be observed when leaving the plant. As I mention in section 6.1.4 of my re-telling of the tours, at the entrance to the controlled area, the guides, for instance, point out the radiation detectors, sinks, and showers the workers would have used to make sure that they do not carry any radioactive contamination. While this clearly also relates to issues of workers’ safety, these kinds of statements are also again about the question how radioactive particles are prevented from leaving the plant and thus speak to concerns about how the environment of the plant is kept safe from radioactive releases.

The concern with how (un)safe NPPs are and how (un)safe NPP Zwentendorf in particular would have been is also addressed in moments in which the limits of the safety measures and safety weaknesses of the plant are discussed. Again, we have already seen this in my summary of a typical guided tour: In section 6.1.6, I described that the guides do not only explain the different safety barriers but oftentimes also comment that the fuel pellets are not a “real barrier” because they do release radioactive material. Furthermore, I mentioned that, at this stop, some guides also introduce the possibility that none of the barriers might be sufficient to prevent a potentially catastrophic accident (see section 6.1.6). Similarly, at other points of the tour, the limits of the preparation and prevention measures come up: Some guides, for instance, mention that the emergency generators can only safeguard the power supply of the plant for a maximum of 24 hours. Furthermore, as I pointed out in section 6.1.10, the control room is oftentimes framed as a “safety gap” of the plant because of its windows through which someone could shoot. Some guides add to this that the plant also does not have an emergency control room which makes it even more dangerous if someone were to attack the control room. As these examples show, apart from explaining safety measures, the guides also question the effectivity of some of them and regularly discuss potential sources of danger during the tours.

Based on my material it seems that what could go wrong in this plant and NPPs more generally is something that many visitors particularly care about, perhaps more so than hearing about all the measures that were taken to protect the plant. I already hinted at this in section 6.1.8 of my re-telling

of the tours I went to, where I described how one visitor appeared to be impatient or maybe even slightly annoyed with the talk about the “100 000 fail-safes”. As I mentioned, he rather wanted to know what did *not* work out in Fukushima. The accidents in Chernobyl and Fukushima and what caused them is something that many visitors are interested in: On several tours, I overheard visitors ask one of the guides about them. Furthermore, I observed visitors bring up the limits of the safety measures during the tours. We have already seen this in section 6.1.7 where I mentioned one visitor who wanted to know how long the water in the pressure suppression chamber would last if pressure was released into it. On top of that, the plant’s safety weaknesses and limits are also something that many of the visitors I spoke to brought up in the interviews: Several participants, for instance, mentioned the possibility of someone attacking the control room through the windows as a piece of information that had particularly stuck to their mind (e.g., I2 and I3). What we can see is that safety and particularly (potential) causes of accidents is also something that visitors are concerned about. This shapes how they influence the knowledge produced at the tours through questions and what they take away from them.

#### 6.3.3.2 Debating the “Efficiency” of NPPs

Apart from safety, there is another concern that is usually picked up on several occasions throughout the tour and that some of my participants reflected on in the interviews, namely how “efficient” nuclear power is and can be. As I show in this section, this is mainly about the question how much energy we can get out of an NPP and connects to the wider issue of how we can produce large enough amounts of energy.

In my summary of a typical guided tour, we have already encountered a moment in which nuclear power is explicitly performed as a very efficient energy source: As I mentioned in section 6.1.5, many guides call its “efficiency” the one “advantage” of nuclear power at some point in the refueling space. Taking a closer look at the context in which this kind of statement is oftentimes made reveals both what is meant by “efficiency” and what kind of knowledge is produced here: The guides typically highlight the “efficiency” of nuclear power after pointing out that three of the small fuel pellets could power a 4-person household for a year. When saying that nuclear power is efficient the guides thus mean that a lot of energy can be produced from a very small amount of nuclear fuel. To make that point, they provide a tangible measure for the large amount of energy we can get out of three small pellets. This kind of knowledge is thus shaped by and reinforces an underlying concern with how we can produce lots of energy and performs nuclear power as being able to do so.

This issue also surfaces when the guides compare the amount of energy NPP Zwentendorf would have generated with the output of the PV system now installed on the premise. As we have seen in my summary of the tours, this happens in front of the bird’s eye photo (see section 6.1.3): After pointing out the solar modules in the photo, the guides oftentimes perform the PV system as producing

much less energy than the NPP would have by saying how many thousand times bigger the PV system would need to be to match the output of the plant. On one tour, a guide further emphasized the difference in outputs by mentioning that the PV system provides “about enough for the light in the plant”. As in the case of the guides mentioning the amount of energy stored in nuclear fuel pellets, there is a sense that NPPs are particularly good at producing large amounts of energy, here, in comparison to solar photovoltaics. To make that argument, the guides once more provide numerical information and make it more tangible, for instance, by translating the difference between the output of the NPP and the PV system into a big, catchy number of times the PV system would need to be bigger.

On one of the tours I went to, this piece of information was shared after a visitor had asked about the output of the PV system and whether it is “equal to the output the NPP would have had”. This indicates that the question how much energy we can get out different kinds of energy sources is something that at least some visitors care about. This is supported by the fact that the comparison between the output of the NPP and the PV system also stuck with several of the visitors I spoke to. One interview participant, for instance, described how the comparison inspired her to consider the “efficiency” of different energy sources:

Maybe something that also made me reflect a little bit about the energy efficiency and so on was what the, our tour guide said, that, about, you know, using nuclear energy versus solar, so currently the solar energy, solar panels that they installed, they produce enough energy to provide the lights for the station, so to, to light it up, so how it's important to have alternatives, uh, alternative, energy sources, but then, to, to understand the efficiency as well. (I2)

What the guides said about the energy output of the PV system and the NPP made this participant think that the amount of energy different kinds of energy sources can produce is an issue that needs to be considered. Similarly, the second participant of this interview recalled the guides speaking “about a magnitude, of, I think, uh, a thousand times” (I2) when explaining how much more energy the NPP would have produced compared to the solar panels and called this “a challenge for humanity” (I2). This participant thus connected the knowledge about how the PV system compares to the NPP to the idea that producing large enough amounts of energy is a “challenge”.

While the comparison between the output of the NPP and the PV system can create the impression that nuclear power is much better at producing big amounts of energy than other power sources, on some tours, this was also a moment in which this characteristic of NPPs was called into question: After stating how much bigger the PV system would need to be to produce as much energy as the NPP would have, one guide went on to call this a “Kronen Zeitung” comparison (Kronen Zeitung is Austria’s main tabloid newspaper). This guide argued that you need to be careful about what you are comparing and that there has been and continues to be a lot of progress in photovoltaics. He thus

casted slight doubts on whether the difference in “efficiency” between nuclear and photovoltaic solar power is actually as big as the comparison between this NPP and this PV system makes it appear. Clearly, this piece of knowledge again speaks to a sense that it is an advantage if we can get lots of energy from a specific energy source, but here the question is raised whether other energy sources might be able to compete with the “efficiency” of nuclear power.

On another tour, the ability of NPPs to generate large amounts of power was contested even more directly when a guide shared that “regarding the energy balance of nuclear power”, he had recently learned that “the decommissioning of a nuclear power plant consumes 25% to 30% of the energy produced” by the plant. This piece of information was met with surprised noises by the visitors and recalled later on by several of my participants as one thing they found particularly interesting (e.g., 14). One interviewee further described how it had made her think that “all these energy balances are so relative” (informal conversation). While the knowledge produced about the amount of energy stored in nuclear fuel pellets or the output of the PV system served to present nuclear power as a particularly “efficient” energy source on many tours I went to, a different view of nuclear power emerged at this tour: Here, the knowledge shared about how much energy decommissioning an NPP consumes created the impression that nuclear power was much less capable of producing large amounts of energy than guides and visitors had perhaps believed. Overall, we can thus see that the knowledge produced in relation to the question how we can produce large amounts of energy and how much energy we can get out of an NPP causes conflicting views on how “efficient” nuclear power is to emerge at and around the tours.

### 6.3.3.3 Framing Nuclear Power as (Non-)Eco-Friendly

Apart from claiming that NPPs can never be completely safe and arguing for or against the exceptional “efficiency” of nuclear power, some guides also make the case that nuclear power is not as environmentally friendly as it has “recently often been claimed to be”. More precisely, as I already mentioned in my summary of a typical guided tour, some guides argue that nuclear power is neither carbon neutral nor sustainable (see section 6.1.5). They thus seem to raise two subordinate issues relating to the overarching question of how eco-friendly nuclear power is. After taking a closer look at how these issues are made, I also show that this understanding of environmental friendliness is, however, not uncontested at the tours. Rather, the very question what it means for an energy source to be (non-)eco-friendly is as much at stake as the question how green NPPs are. In other words, the boundary between eco-friendliness and non-eco-friendliness is being negotiated.

In section 6.1.5 of my re-telling of the guided tours, we can nicely observe how the argument that nuclear power is neither sustainable nor carbon neutral is co-produced with knowledge about the fuel of NPPs. As I described, at some point in the refueling space, most guides compare the uranium

that would have been used in NPP Zwentendorf with natural uranium and explain that you need a bigger share of the easily fissionable uranium-235 in an NPP than uranium naturally consists of. As the guides conclude, this means that the natural uranium needs to be enriched. Making this point, on the one hand, allows the guides to argue against the notion that NPPs are carbon neutral: While they concede that NPPs do not emit any carbon while they are in operation, the guides oftentimes point out that enriching the uranium consumes “insanely” large amounts of energy. One guide made the argument even clearer by adding that “none of this uses green energy”. Oftentimes, the guides further mention that the building and de-commissioning of the plants also needs to be taken into account. Overall, their argument thus is that the whole life cycle of NPPs and their fuel must be considered. At the same time, talking about the fuel of NPPs leads some guides to add that uranium is a finite resource, which means, they argue, that nuclear power simply “cannot” be sustainable. The knowledge the guides share about the fuel of NPPs and how it is composed thus clearly speaks to concerns about how eco-friendly nuclear power is while it simultaneously allows the guides to assume a certain position, namely that nuclear power is neither a carbon neutral nor sustainable form of energy production.

On one of the tours I went to, a visitor responded to this by asking how the amount of carbon emitted by an NPP over its whole life cycle compares to the life cycle emissions of a coal power plant. While the guide responded that there is no general answer to this, the visitor went on to say that he has “a number in [his] head”, namely that, over the whole life cycle, NPPs produce 1/7<sup>th</sup> of the amount of carbon emitted by coal power plants. Several conclusions can be drawn from this moment: Firstly, this visitor question indicates that the amount of carbon NPPs emit is an issue at least some visitors also care about. Secondly, I would argue that this question, however, also slightly reframes the issue at stake. While the fact that NPPs are not carbon *neutral* seemed to be what mattered for the guide when it comes to the question how eco-friendly nuclear power is, this visitor also deemed important how much *less* carbon NPPs emit compared to other energy sources. In the moment described above, we can thirdly see how the additional or slightly different concern this visitor seemed to have shaped the knowledge produced during this tour: Not only did this visitor raise this concern, but he also shared his own knowledge about how much carbon NPPs emit compared to coal power plants.

The view that nuclear power might be better for the environment than other energy sources was also present in one of my interviews, in which a participant argued that when thinking about the environment, nuclear power might be one of the energy sources “we as humanity can afford ... what would be more environment friendly” (I2). This visitor was again considering different kinds of energy sources and concerned with the question whether nuclear power might be more environmentally friendly compared to others. This train of thought led this visitor to judge the nuclear as “still a good option to some extent” (I2) rather than rejecting it because of its lack of carbon neutrality. Here,

nuclear power thus emerged as an eco-friendly energy source because it produces less carbon than the available alternatives. Furthermore, the question of sustainability which was raised by the guides when they pointed out that uranium is a finite resource did not seem to play a role in this position on whether NPPs are environmentally friendly. This illustrates that the broader question what it means for an energy source to be eco-friendly and non-eco-friendly is as much at stake at the guided tours as the issue how environmentally friendly NPPs are.

## 6.4 Connecting Past, Present, and Future

As we have seen in the previous section, some of the central concerns addressed and reinforced throughout the tours are with how safe, efficient, and environmentally friendly NPPs are. Here, I first show that these concerns do not emerge in a vacuum but in conjunction with a particular perception of what is at stake in the present moment in time (section 6.4.1). After discussing how the present time is performed at the tours, I describe how the past is remembered and assessed at the tours. More precisely, I examine how the developments and decisions that led to NPP Zwentendorf not being turned on are made sense of in section 6.4.2 while section 6.4.3 more broadly looks at how the time in which these things happened is performed at the tours. In section 6.4.4, I finally turn to how the energy future is envisioned at and around the tours and what future roles are assigned to nuclear power and NPP Zwentendorf in this context. Throughout these sections, we see how the past and future are imagined and assessed in relation to the concerns guides and visitors have *right now*. This resonates with the idea that the past and the future emerge from the present rather than being situated on a line (see section 4.4). At the same time, the notion of trajectorism (Appadurai, 2012) draws my attention to ideas of progress and evolution between past, present, and future embedded in my material.

### 6.4.1 Addressing What is at Stake in the Present Moment in Time

As I described above, the tours' core concerns with how safe, efficient, and eco-friendly NPPs are connected to broader questions, such as how we can produce enough energy and what it means for an energy source to be environmentally friendly. This already indicates that the concerns raised and the knowledge made at the tours speak to issues at stake in wider society at the present moment in time. In this section, I take a closer look at how the present time is perceived and performed at the tours and how this shapes the concerns and knowledge expressed throughout them.

The present moment in time is explicitly described and addressed on the tours when the guides claim that nuclear power has “recently” been claimed to be sustainable and carbon neutral (see section 6.1.5). Similarly, one of my interview participants described the present-day context of the tours as one in which “voices in Germany were again being raised, okay, yes, now, that would be so,

well, if it is now only about reducing carbon emissions, then we should keep the, these [nuclear] power plants running” (I4). As these examples show, at the tours, the present moment in time is perceived and performed as one in which the question how we can decarbonize energy production is at stake in wider society and in which nuclear power has seen renewed support due to its alleged eco-friendliness. At the same time, this view on what matters right now clearly shapes the tours: We can see this in the guides explicitly arguing against the “recently” more and more widespread idea that nuclear power is eco-friendly or visitors thinking that nuclear power might be quite a good option due to NPPs producing less carbon than other energy sources (see section 6.3.3.3).

How the present moment in time is perceived and performed does, however, not only shape the discussion about the (non)-eco-friendliness of nuclear power but also shines through in the debates about the “efficiency” and safety of NPPs. We can see this in some of the visitors I spoke to connecting the idea that NPPs are environmentally friendly to concerns about efficiency:

When you be environmentally aware, you start to realize that, okay, but, uhm, maybe [nuclear power] would be still a good option to some extent, so, it's a little bit of this, uhm, it got me to think of energy sources that we as humanity can afford and to, to, so, what would this, what would be more environment friendly if you look into the big picture and so, in, to some extent that nuclear energy is still quite, uhm, efficient. (I2)

What made nuclear power a good option in this visitor’s eyes was her belief that NPPs are both eco-friendly *and* produce large amounts of energy. The concern this visitor harbored was thus with how we can produce enough energy in more eco-friendly ways. This became even clearer later in the interview when the same participant remarked that while it is important to have eco-friendly “alternative energy sources” (I2), such as solar photovoltaics, there is also a need to look at how much energy we can get out of them (see section 6.3.3.2). She made this comment based on what the guides had said about how the output of the PV system compares to that of NPP Zwentendorf. This shows that what is perceived as mattering in the present moment in time, namely the question how we can decarbonize the energy sector, also underlies the discussion about the efficiency of different energy sources that emerges at the tours. Similarly, the perceived renewed support for the nuclear is likely what prompted one of the guides to remark that the “disadvantages” of nuclear power are “often forgotten or played down” before he made the point that NPPs can never be completely safe (see section 6.1.5). How the present moment in time is performed at the tours thus shapes the conversation taking place at and around the tours in relation to all three of the core concerns I found the tours to address.

While the climate crisis and the question how we can decarbonize the energy sector thus emerge as the central issues at stake right now, references to the then ongoing global energy crisis, which had escalated after Russia’s invasion of Ukraine in February 2022, were practically completely



absent from the tours I went to. This is surprising given that this crisis came with soaring electricity prices and fears about gas shortages in Europe (McHugh, 2022) and EVN's head of corporate communication, Stefan Zach, reported that more and more visitors were asking whether it would be possible to turn the NPP on in an emergency back in October 2022 (Sica, 2022; see chapter 1). Yet, no connections at all were made to these current issues on the tours I went to – not when guides and visitors talked about the capacity of nuclear power to produce large amounts of energy and neither when one of the guides explicitly argued that nuclear power is not as cheap as it might appear.

The only time the increased energy prices were alluded to at the tours was when I overheard a visitor group joke with the guide that they are electricians, have tools in their car, and could turn the plant on if that meant that they would get cheaper electricity. This interaction happened in the entrance hall of the administration building while we were waiting for the rest of the visitors to arrive. Clearly, the energy prices were thus an issue these visitors cared about and arrived with at the tours. At the same time, however, they did not bring this issue up again during the tour nor when I informally interviewed them afterwards. This could indicate that while they were in principle concerned about the energy prices, this was not an issue they thought related to the discussions that took place on the tour. For other visitors I spoke to the energy crisis was simply not so much of an issue which became clear in one of my interviews in which I specifically asked the participant whether she saw any connections between the tour and the energy crisis. The interviewee responded that the energy prices “only peripherally affected” (I1) her due to her own PV system. Another reason for the absence of this topic from the tours might be that by the time I conducted my research (March to June 2023), we were already more than a year into the energy crisis and the first winter had been faced without worst case scenarios, such as shortages or rationing, occurring. Perhaps the concerns about energy shortages and prices were not as acute as in the previous year when visitors did seem to bring these issues up during the tour (Sica, 2022).

#### 6.4.2 Remembering and Assessing the Decision Against the NPP

As I described in the previous section, the present moment in time is performed at the tours in certain ways, namely as characterized by concerns about the climate crisis, the question how we can decarbonize the energy sector, and renewed support for nuclear power. At the same time, the tours produce a particular version of the past. In this section, I focus on how the developments and decisions that led to the NPP not going into operation are remembered and assessed at the tours. I demonstrate that the tours in many ways reproduce the way in which these events are made sense of in Austria more broadly. There is, however, also room for visitors to come to diverging assessments of what happened with the plant based on certain things the guides say. As we will see, visitors' present concerns about the safety and environmental friendliness of NPPs are among the things visitors draw on when making

these assessments. This illustrates how the past is remembered based on present needs (see section 4.4) and raises questions about how the relations between the past and present are performed at the tours, which I turn to in section 6.4.3.

As I mentioned above, the guides mainly talk about how it came about that the NPP was not turned on in their “historical introduction” in the conference room. In my summary of a typical guided tour (see section 6.1.2), we have already seen that the guides usually emphasize the role of the anti-nuclear protests in this part of the tour. They typically highlight how much protest there was by explaining that because of the many protests, various security precautions were tightened up: A barbed wire fence was, for instance, erected around the plant and the fuel was delivered using helicopters. The guides then typically frame the protests as the reason for the referendum when they say that the increasing protests “led to” Kreisky suggesting the referendum or that a referendum was necessary “because of” the many protests. They make causal connections between the protests, the tightening up of the security measures, and Kreisky’s decision to hold a referendum. This clearly corresponds to the way in which the referendum is generally remembered in Austria, namely as a result of the population protesting nuclear power (Bayer, 2013, 2014; see section 2.2.2).

Another event that is, according to Bayer (2014), firmly anchored in the nation’s collective memory is Kreisky’s roundabout offer to resign in case the referendum voted against NPP Zwentendorf (see section 2.2.1). As Bayer (2014) points out, this statement is usually believed to have turned the referendum into a party political matter. Accordingly, Kreisky is generally made personally responsible for the results of the referendum. As we have seen in my summary of the guided tours (see section 6.1.2), this interpretation is again also reproduced by the guides when they explain that because of Kreisky’s statement, the referendum was not only about the NPP but also about Kreisky’s future as a chancellor. This created, according to the guides, “big discussions” or “a whole hodgepodge” with some people being for nuclear power but against Kreisky and vice versa. On several tours I went to, the guides referred to this as a “mistake” Kreisky made, which shows that they reproduce the view that Kreisky might have brought about the outcome of the referendum himself. The guides’ “historical introduction” sticks thus once more closely to how the events leading to the NPP not being turned on are made sense of within Austria more generally.

At the same time, the guides also do depart from the version of events inscribed in Austria’s collective memory. As I described in State of the Art, the dominant interpretation also makes a direct connection between the referendum and Austria’s consensual rejection of nuclear power. This, I argued, can be seen as diverting attention away from how narrow the referendum was, the many attempts that were made to put the plant into operation until the Chernobyl disaster, and the renewed support nuclear power saw in this period (Bayer, 2013; see section 2.2.2). On all the tours I went to,

the guides did, however, make the tightness of the referendum very clear. They usually provide, as we have seen in my re-telling of the tours (see section 6.1.2), the referendum results down to the basis point and further emphasize how small the difference was by using absolute numbers: As the guides point out, only 30 000 votes tipped the balance. Furthermore, during their “historical introduction”, the guides draw attention to the efforts that were made to keep the plant in a state that would have allowed for it to be turned on until 1985. This typically also comes up again in the control rod drive chamber in relation to the wrapped-up cable ends which serve as a physical reminder of that period (see section 6.1.8 of my re-telling of the tours). The guides explain the plant was preserved because the owners hoped that the mood would change again and thus at least hint at the fact that the debate was not settled once and for all with the referendum. What was, however, not mentioned on any of the tours I went to was that, as I mentioned in the State of the Art, public support for nuclear power did indeed increase again until the Chernobyl disaster (Bayer, 2013; Kriechbaumer, 2008; see section 2.2.1). Here, the guides’ “historical introduction” thus partly reproduces but also partly challenges the way in which these events are usually remembered.

The biggest difference I saw between the interpretation of the events that emerged at the tours and the version inscribed in Austria’s collective memory was that the decision against turning NPP Zwentendorf on was not celebrated as a victory of the Austrian public or a proof of their foresight. Instead of using this very positive framing, there was oftentimes a sense that the events around the plant were absurd or weird. We can see this in my summary of a typical guided tour, for instance, when the guides call Kreisky’s triple negative statement and the fact that the plant was preserved for several years “bizarre” during their “historical” introduction (see section 6.1.2). Another example of this was when I overheard a man talk to one of the guides about the conversation he and his group had had in the car on the way to the plant. The visitor told the guide that his son, who I estimated was in his early 20s, found it “unbelievable” that the plant was completely built but never turned on. In these instances, the events around the NPP and especially the decision against putting a plant that was turnkey into operation were performed as having a bewildering quality that made them hard to grasp. If the decision against the plant was described in explicitly positive terms, it was rather referred to as “a lucky choice” (“Glücksgriff”) and thus as something that turned out to be a good decision but that could not have been expected or predicted as such. Similarly, in the conversation between the father and the guide, the father went on to say “in hindsight, we are glad” that the plant did not go online to which the guide replied that “you can never know this in advance”. While the decision against the plant was retrospectively judged positively in these moments, these performances rule out the idea that the Austrian public could have foreseen what was the right thing to do back in 1978.

In the conversation that framed not turning the plant on as a “a lucky choice”, there was a sense that this decision distinguishes Austria from other nations: The statement that the plant not going online was a “lucky choice” was made by a guide after a visitor had commented that completely building an NPP, not turning it on, and then being proud of it is something “only Austria can do”. To this, another visitor responded that “the real achievement is making such a mistake look good”. Then, the guide said that the plant being put into operation “was no mistake but rather a lucky choice”. Clearly, the decision against the plant is performed here as something that is characteristically Austrian. The tenor is, however, very different from the connections usually made between the rejection of nuclear power and Austria’s national identity (see section 2.2.2; Felt, 2015). There was no sense of Austrians opposing nuclear power due to their special relation to nature or having demonstrated their capacity for making smart and value-driven decisions when voting against the plant. Rather, the first visitor emphasized the bizarre and bewildering qualities of the choice to refrain from turning the plant on when he reminded the group that the plant had been completely finished when this decision was made. Then, he made the case that such an absurd thing can only happen in Austria and thus articulated a national identity based on self-deprecating humor.

This resonates more generally with how “Austrianness” emerged at the tours, namely through humorous references the guides made to Austrian clichés. One example of this, which we have already seen in my summary of the tours, is when they call the wall made from bullet-proof glass an “Austrian solution” (see section 6.1.10), which is commonly understood as a compromise no one is satisfied with and allegedly “typically Austrian” (see, e.g., Schuh, 2013). Such jokes as well as the conversation about the “lucky choice” suggest that an Austrian identity is constructed at the tours which is different from how the nation is usually imagined in relation to the decision against NPP Zwentendorf. At the same time, however, several of my informal conversation partners did emphasize the significance of NPP Zwentendorf for Austria. When I asked them why they had wanted to visit, one visitor, for instance told me that “everyone in Austria has heard of” NPP Zwentendorf while another one said that “coming to the plant once is a must if you are from here”. Such statements generally reproduce the idea that what happened in relation to the plant is central to what it means to be Austrian. Visitors did, however, not feel the need to explain this any further. This suggests that the dominant way of making sense of Austria’s rejection of nuclear power was present and indeed taken for granted at the tours while alternatives also emerged, for instance in the conversation about the “lucky choice”.

This is further highlighted by the fact that how the visitors I spoke to retrospectively assessed the decision to refrain from turning the plant on varied widely. Some of them did praise the decision against the plant based on what the guides had shared during the tours: In an informal conversation, one visitor mentioned, for instance, that it puts him “at ease that the plant was not turned on when

you hear that there are problems with de-commissioning and no final repository”, which referred to some of the points the guide had made on the respective tour. Similarly, one of my interview participants described how she thought the plant going online would have been “a crazy, yes, bit crazy thing”. This was because she had gained the impression that the plant was a particularly “risky” one due to what the guides had said about it being “in an earthquake zone” and only having one reactor, which means that “power supply is not guaranteed if there is somehow an incident” (I4). At the same time, several visitors I talked to also questioned or even outright rejected the idea that not turning on the plant had been the best option. In the remainder of this section, I take a closer look at the reasons these visitors provided for their assessments and how they relate to the knowledge shared at the tours.

One aspect that made visitors see the decision to refrain from turning the plant not as a purely good thing was the huge amount of money that had been spent on the NPP. How much the plant had cost was a question many visitors discussed among themselves or asked the guides about. In response to this, the guides typically explained that building and maintaining the plant until 1985 when the final decision was made to abandon the plant had cost about 14 billion schillings (former Austrian currency). Today this would, as some guides added, amount to 7 to 12 billion euro. On one tour, I further observed a visitor who was leafing through one of the information pamphlets available in the entrance hall of the administration building call one of his friends over to tell him how expensive the plant had been. How much money had been spent on the plant was an issue visitors cared about and, what is more, saw as a problem. This can, for instance, be seen in a conversation between two visitors I overheard on one of the tours, in which they were referring to the plant as an “unbelievable waste of taxpayer’s money”. That the large sum that had been “wasted” on the plant led some visitors to see the decision against turning the plant not in an exclusively positive light became clear in one of my interviews: One participant told me that while he appreciated the “wonderful experience of actually crawling through the non activated reactor” as well as the fact that the referendum results had been respected, he did think that “the concern about the spent money is (laughs), is still quite important” (I2). He believed that it was “not very good” that by the time the referendum was held, the plant “was completely built and quite a lot of money were spent on it” (I2). This led him to conclude that not turning the plant on is “not simply the advantage or disadvantage, uh, it’s a mixture of different considerations” (I2). Clearly, the large sum spent made this visitor see this decision in a more critical light.

On top of that, empathizing with what not putting the plant into operation had meant for the people who were or would have been involved in developing and operating it made some visitors question whether it had been a good choice. This was made very explicit by one of my interview participants who described what he had been thinking about during the tour as follows:

I always thought so a bit, so, hey, stupid actually that it was not done, how much effort was put into it and what ground-breaking technology that probably was because you don't put a power plant there that is somehow from yesterday, if you build it, then it is ground-breaking back then and the, also the first in Austria, so they would have surely made an example of it. You know, there were so many scientists involved, who then did not see it in action in the end, which, so, seems to me to be a bit of a life's work, which then was not (laughs a little) fulfilled. Well, I would be very frustrated, let's put it this way (13).

Reflecting on how frustrating the plant not going into operation must have been for the scientists involved led this interviewee to be very critical of the decision, which he called "stupid". In a similar although much less outrightly critical fashion, some of the guides brought up the perspective of those who would have operated the plant. One guide, for instance, pointed out that "there were 200 workers who had partly completed specialized trainings in other countries and then they said we can't go into operation". Another guide commented that he thought it was bad that "highly skilled workers wrapped and unwrapped cables" while the plant was being preserved when he was pointing out the wrapped-up cable ends in the control rod drive chamber. These two examples show that the idea that not turning the plant on might have been difficult for the people involved is brought up by some of the guides during the tours. As we have seen in the interview quoted above, these are among the kinds of considerations that make some visitors very critical of the decision to refrain from turning the plant on.

Lastly, some visitors wondered whether not putting the plant into operation was the best option for the environment. As we will see, this closely relates to one of the issues I described in section 6.3.3, namely the question how environmentally friendly nuclear power is. As I mentioned, one interview participant argued that if you care about the environment, nuclear power might be "still a good option" (12). Right before this, the interviewee had been describing that she finds it very interesting that the decision not to activate the plant was made "very much thinking of environment" when, at the same time, "now, in, uh, 30 or 40 years it's also, uhm, when you be environmentally aware, and you start to realize that, okay, but, uhm, maybe it would be still a good option to some extent" (12). The other participant of this interview added to this by bringing up the coal power plant in Dürnrohr which had been built as a replacement for the NPP:

I totally agree that, uhm, maybe, you know, uhm, if I understand this correctly, in order to actually, uh, so, I mean the decision was taken to not start up that specific power plant, but, uh, Austria still needed the energy, so, a coal plant quite a huge one was built to, uh, to kind of, uh, make up, uh, energy for, for itself. (12)

Afterwards, this interviewee went on to argue that when it comes to big decisions, everything should be backed up "with figures and, you know, investigations, calculations to actually see, uhm, what would

be better long term, because quite often it might be not just, uh, not visible immediately and sometimes maybe counterintuitive" (12). What is implicitly assumed in this exchange is the idea that relying on an additional coal power plant might have actually been worse for the environment than turning the NPP on despite, as these visitors argue, environmental concerns playing a central role in the decision against the NPP. While not turning the NPP on might have seemed like the environmentally friendly option at first glance, this might, according to these visitors, no longer hold true from today's perspective. These reflections again directly related to knowledge shared during the tour which can be seen from the fact that one of the visitors brought up the Dürnrrohr power plant as part of his argumentation: That this plant was built as a replacement for the NPP is routinely mentioned by the guides during their "historical introduction".

Just like with the money that was spent on the plant and the empathy for the people directly involved, we can thus see that not all visitors come away from the tours with the sense that not turning the plant on was purely a good decision. They get this impression in relation to things the guides talk about. This shows that the tours make some room for visitors to interpret the decision against the NPP in a more critical light even though the tours in many ways reproduce the dominant way in which the controversy around NPP Zwentendorf is remembered in Austria. At the same time, we can see how visitors' assessments of the decision to refrain from turning the plant on are also shaped by the issues and concerns that are perceived as being at stake right now (see section 6.4.1). As I described above, the idea that nuclear power is relatively eco-friendly made some visitors question whether not putting it into operation was the best decision in terms of the environment. Others were glad that the plant had not been turned on due to concerns about its safety. The question how safe and green nuclear power is does thus not only matter when present issues are addressed on the tours but also when visitors reflect on whether not turning on the plant was the best decision that could have been made.

### 6.4.3 Performing the 70s as Different From Today

As we have seen in the previous section, different retrospective interpretations of the decision not to turn the plant on emerge at the tours and these assessments are partly based on the concerns visitors have in the present. This raises the question how the relation between past and present is imagined in the context of the tours. In this section, I demonstrate that a sense that the 70s were fundamentally different from today permeates the tours. I use the notion of trajectorism (see section 4.4; Appadurai, 2012) to draw attention to the kinds of evolutions this performance implies have taken place between then and now. As we will see, there is a sense that we have by now become aware of the unsafety of NPPs and concerned about the environment which the 70s are portrayed as having not yet understood.

A central element of the performance of the 70s as different from today is the short film the guides show at the beginning of the tour. As I mentioned in my re-telling of a typical tour, the guides

oftentimes announce this film as a “bizarre” or “peculiar” advertisement for nuclear power from the 70s (see section 6.1.2). This corresponds to how many of the visitors experienced this film: When I asked them about how they liked the film, many visitors I spoke to grimaced in wry amusement and told me, “yes, god, that was weird” (I1), “very strange” (I4), or “rather special” (informal conversation). One aspect that made this film strange in visitors’ eyes were the many sexual allusions and (half-)naked women it features which I already hinted at in my summary of the film (see section 6.1.2). In one of my informal conversations, for instance, a visitor remarked that there had been “a lot of naked skin” in the film. Another visitor also part of this conversation agreed while a third one pointed out “and only women”. Similarly, other participants described the film as “extremely sexist” (e.g., I4 and I1). The visitors believed that the film was like this because it was from the 70s. One interviewee, for instance, speculated that this was “normal for that time probably anyway” (I1). In an informal conversation, a younger visitor remarked that she did “not expect” so much nakedness in a film “from the 70s” to which an older visitor replied that this was in fact typical for the 70s when “there were the Mutzenbacher movies” (a series of Austrian-German pornographic comedy films). Clearly, the film thus causes people to imagine and remember the 70s as a certain kind of time that was different from today. This became clear, for instance, when one of my participants remarked that the film “would probably not be broadcast anymore now” (I1) or a spontaneous interviewee commented that “the perspective does change” when I asked him about the film.

Another topic visitors brought up when I asked them about the film were the overly confident claims that nuclear power is absolutely safe (see section 6.1.2): One visitor I interviewed spontaneously said that he believed the film contributed to the decision against turning the NPP on because it was “so exaggerated” that it “creates fear”. Another one mentioned that “back then, there was simply no awareness of the danger” of NPPs (informal conversation). This last comment points to another way in which the film performs the 70s as being different from the present, namely as less knowledgeable about the dangers of nuclear power. This view of the 70s also emerges in the control room when the guides explain that the safety risk posed by the windows was initially overlooked until a journalist pointed it out (see section 6.1.10 of my re-telling of the tours). Some guides add that “this is different in present-day NPPs”, where the control room is located in the inner part of the building and is not indicated on any plans. What they suggest here is that today there is more awareness of the need to protect the control room from attacks and better precautions are taken compared to the 70s. This was also what the visitors I interviewed took away from this conversation: One participant, for instance, mentioned that the “window thing” made him wonder if “the terrorism threat already existed back then” (I3). He concluded that “if someone wanted to do evil, you could surely somehow do something strange over the window” (I3). Clearly, this visitor implied that terrorist attacks on NPPs are very much



an issue today and that this was not adequately prepared for at NPP Zwentendorf. Another interviewee described her thoughts on this as follows:

But I also, I guess people who made the project of the power plant in the 70s, they also haven't considered this, the world (maybe?) was not the same, so, it's, it was one of the points which made me like, wow, okay, yeah, [the guide], he's right in the today context, but this was not something that was considered back in the time, (so?) it was built. (I2).

Like the visitor I cited previously, the story about the window also inspired this participant to think about how much of an issue attacks on NPPs were in the 70s. She makes clear that today there is a consciousness of the possibility of an NPP being attacked which did not exist back in the 70s.

These debates about an increased awareness of what is dangerous about NPPs make visible that the 70s are not only performed as different from the present but that there is also a sense of having evolved since then: We have journeyed from understanding less to knowing more about the safety and (un)safety of NPPs. In other words, there is an element of trajectory-thinking (Appadurai, 2012; see section 4.4) embedded in the tours' performance of the 70s as a different kind of time. I would argue (also based on my own experience of watching the film) that it is precisely this sense of knowing better than we did in the 70s which makes visitors react to the safety claims made in the film (see section 6.1.2). Contrary to what the film promises, we now know that an NPP *can* "blow up" because Chernobyl did explode. This and other nuclear accidents that have occurred between the 70s and the present time are what make the claims of the film that NPPs are completely safe seem unreasonable and absurd. The idea of having learned about the inherent unsafety of NPPs from history, as I mentioned before, also explicitly emerges on the tours when the guides argue that NPPs "can never be 100% safe" based on past accidents (see section 6.1.5).

On top of this, trajectory thinking is also visible in the conversation that takes place in front of the bird's eye photo. As I described in my summary of a typical guided tour, after drawing attention to the absence of the cooling tower, the guides typically explain that the plant would have been cooled exclusively via the Danube because there was the permission to heat it up by 3 degrees (see section 6.1.3). The guides often call this a "utopianly" high value from today's perspective and share that you would get a maximum of 0.5 degrees today. Again, the 70s are thus performed as being unlike the present time: What was an acceptable temperature difference back then is considered unbelievably high based on today's standards. This already indicates that the relationship between past and present is once more imagined in terms of an evolution, namely in environmental standards. More broadly, the 70s are performed as a time in which no one cared about the environment in Austria: After commenting on the "utopianly high" temperature difference, the guides typically go on to say that environmental protection was "not so important back then" or even "virtually unheard of". This

interpretation was shared by one of the visitors I spoke to, who explained to me that the plant's water rights were one thing she had told her parents about. She then said that "those were simply the times back then when no one thought about climate protection or anything else. It didn't matter then. Yes, channel it through the Danube, that's no problem" (I1). Taken together with tours' performance of the present time as being chiefly concerned with how we can produce energy in eco-friendly ways, this suggests that the evolution in environmental standards discussed in front of the birds' eye photo is considered indicative of a broader change in values: A society that did not care about the environment in the 1970s has by now understood the importance of this issue. A similar argument was made by one of my interview participants (I2) when she pointed out that in hindsight, putting the plant into operation might have been better for the environment (see section 6.4.2). She said that this is "how society also learns more as we, uh, progress and continue" (I2) which makes explicit the idea that there is a trajectory of learning about environmental protection.

To sum up, I have pointed out several facets of how the 70s emerge as having been unlike the present time at the tours in this section. We have seen that this period is performed as sexist and sexually liberated, unaware of the dangers of nuclear power, and not protective of the environment. Underlying this is, as I have argued using Appadurai's (2012) notion of *trajectorism*, an imagination of having evolved and progressed since the 70s. Specifically, there is a sense of having understood the importance of protecting the environment and having learned about the unsafety of NPPs since then. In the next section, we will see how these trajectories are also extended into the future at the tours.

#### 6.4.4 Envisioning the Energy Future

As I just described, the tours co-produce the 70s as a time that did not care about the environment with a present that does. Here, I show how this self-understanding of having become full of concern for the environment and needing to decarbonize the energy sector connects to visions of a sustainably powered energy future constructed at and around the tours. I analyze how this trajectory is imagined continuing into the future by examining different kinds of problem-solution packages (see section 4.4) articulated. Furthermore, I examine the future roles envisioned for nuclear power and NPP Zwentendorf and how these visions are bolstered up by relating them to aspects of the past.

As I already discussed, a PV system is installed on the plant premise which typically also comes up on the tours (see section 6.1.3). In relation to this, renewables and especially solar photovoltaics are performed as the energy sources we will rely on in the future. This is because of their eco-friendliness which links this vision of the future to the trajectory of having become environmentally aware and the performance of the present moment in time as one concerned with the reduction of carbon emissions (see sections 6.4.1 and 6.4.3). While the solar-powered future was not explicitly addressed by guides and visitors during the tours I went on, we can clearly see it emerge on some of the

information boards in front of the plant and in some of the pamphlets available in the administration building. As I described before, some visitors interact with these materials in the context of the tours: I, for instance, observed visitors leaf through the pamphlets while waiting for the rest of the group to arrive. Another time, visitors who had arrived particularly early were looking at the information boards before entering the administration building.

On one of these boards, it says in big and bold letters, “The NPP produces 100 percent sustainable and environmentally friendly energy” (see Figure 41). The photos of PV modules arranged around this statement make clear that it is the plant’s PV system that is being referred to here. Within the text, such systems are explicitly framed as “power plants of the future”. This board thus imagines a future powered by eco-friendly solar photovoltaics and performs this as a continuation of the present in which the PV system on the premise already produces this kind of environmentally friendly energy, “supplying numerous households in the region with solar power”. A similar message emerges in one of the pamphlets available in the administration building which provides information about the plant’s PV system and features a large photo of the solar panels installed on the premise (see Figure 42; EVN, n.d.-g). Again in a big and bold font, it is pointed out that NPP Zwentendorf “has been producing electricity for Austria’s households since 2010” and that “opponents of nuclear power have not been protesting this” because it is “100% sustainable and environmental-friendly” solar energy. Here, the solar-powered future is not only connected with the present but also opposed to a past in which nuclear power, implicitly performed as non-eco-friendly, was to be produced at the plant. Overall, a future in which we cover our energy needs sustainably is constructed as the cumulation of the trajectory from a past uncaring of the environment to a present which has – starting with the anti-nuclear protests – become increasingly environmentally aware.



Figure 41: Information board outside of the plant

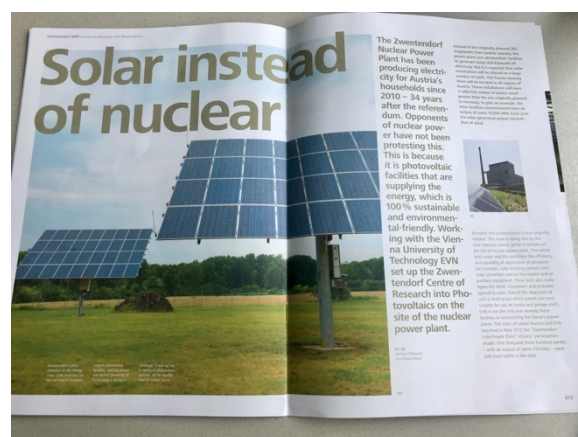


Figure 42: Pamphlet available in the administration building

To continue on this journey, i.e., to attain the renewable-powered future, certain kinds of actions were performed as needing to be taken in the present. More precisely, I have identified two kinds of problem-solution packages (see section 4.4) in my material, which each stage a certain obstacle to a solar-

or, more generally, renewable-powered future and present a corresponding solution. This version of the future was thus granted a certain authority over the present: Indeed, the necessity to do certain things in the present in order to achieve this future was tacitly assumed by the problem-solution packages while doing what was required was considered laudable. In what follows, I individually examine the two problem-solution packages and how they relate to the tours.

As I already described in section 6.3.3.2, the guides highlighting the difference in output between the PV system and the NPP made one of my participants think that solar photovoltaics are not very “efficient” compared to nuclear power and that this is a “challenge for humanity” (I2). This interviewee thus took away from the tour that how much (or rather how little) energy PV systems like the one installed on the premise can produce is an obstacle to relying more extensively on solar photovoltaics that has not yet been overcome. This idea was expressed even clearer by the second participant of the same interview who explained that for her the guide’s comparisons between the PV system and the NPP had highlighted that “at this point, we are unfortunately not advanced to, to the extent to switch to solar energy” (I2). The problem with the solar-powered future these visitors identified was that photovoltaics technology is not yet efficient enough for us to meet our energy needs with this power source. The logical outcome of this was, according to these visitors, that new and more “efficient” photovoltaic technology needs to be developed to bring this future about. This can be seen in one of these participants stating that it would be “good to develop” solar photovoltaics “and, uh, maybe to, to go for a better technology in that, uh, specific energy type” right after pointing out that we cannot yet “switch to solar” (I2).

Another one of my participants suggested that what is “insanely important” is that “we need to use energy differently” (I1). She explained to me that she had installed a “fat PV system” on her roof and that she “programs [her] dishwasher to run during the day” (I1) while she is generating her own energy. This illustrates that this participant considered changes made by individual people in how they produce and consume energy as paramount to achieving a renewable-powered future. The problem with this is, according to this interviewee, that while everyone agrees “great, yes, yes, we need to do that”, “people don’t actually live” it (I1). Overall, this visitor thus created a vastly different problem-solution package than the one I described above: Rather than needing to develop photovoltaics technology further before being able to switch, this participant argued for individually adapting the way in which we live, produce, and consume energy to the presently available technology. The idea that individual behavior changes are what matters also emerges at NPP Zwentendorf in the form of the two statues placed next to the entrance to the administration building (see Figure 1), which I observed some visitors look at and discuss. As I described in my summary of a typical guided tour (see section 6.1.1), the statues are celebrated as “climate protectors” and “everyday heroes” due to their energy

efficient behavior. They also provide visitors with advice for how they can adapt their daily lives to save energy (and money). Clearly, the statues thus transport the idea that changes in individual behaviors are required and laudable, even “heroic” acts.

Having described these two ways of looking at what needs to be done in the present to continue on the trajectory to a renewable-powered future, I now turn to the question what future roles are envisioned for nuclear power and NPP Zwentendorf in the context of the guided tours. On none of the tours I went to, the guides explicitly presented nuclear power as an option or non-option for the future. At the same time, as I already described in section 6.3.3, the guides usually do make the case that NPPs can never be completely safe and are not an eco-friendly energy source. Their arguments are more conflicted with regards to “efficiency” of nuclear power. Nevertheless, their big focus on the (un)safety of NPPs and the importance attributed to the question of how we can decarbonize the energy sector justifies claiming that the tours overall produce an anti-nuclear message. As I described above, the guides usually justify their argument about the inherent unsafety of nuclear power by referring to past accidents. Furthermore, they present NPP Zwentendorf as an outcome of a time in which, unlike today, no one cared for the environment. The trajectories of having learned about the inevitable risk of nuclear disasters and having become environmentally aware articulated here thus also extend into the future: They imply a need (to continue) to abstain from nuclear power in the eco-friendly powered future.

The vision of the nuclear-free future was, however, not shared by all the visitors I spoke to. This can be seen from how they described their own position towards nuclear power: While one visitor I spoke to mentioned that he was “not the biggest proponent”, another interviewee identified himself outrightly as “pro-nuclear” (I3). Although the guide’s argument that that NPPs are never 100% safe did make this participant “a little more critical of the nuclear”, he was certainly “still pro” (I3). Similarly, another participant, who also noted how much less space an NPP needs compared to solar photovoltaics, said that she does not believe that “nuclear power is something bad (laughs) as long as nothing happens” (I1). As I already mentioned, yet others explicitly framed nuclear power “a good option to some extent” (I2) due to its relative eco-friendliness and efficiency compared to other energy sources. Among my participants, there thus seemed to be a certain openness to at least consider the nuclear as a part of the trajectory to an environmentally friendly powered future. As we can see, this related to the issues thought to be at stake today (see section 6.4.1), namely the question how we can produce large enough amounts energy in eco-friendly ways while the unavoidable risk of potentially catastrophic accidents seemed to be the main caveat in visitors’ eyes.

While there was thus a certain willingness to consider nuclear power as an option among many of my participants, none of them, at least not openly, wondered whether NPP Zwentendorf could still

be turned on. Unlike what the EVN's head of communication, Stefan Zach, described back in October 2022 (Sica, 2022), this question was not asked once on the tours I went to. Nevertheless, the guides always made very clear that there is no version of the future in which NPP Zwentendorf would be turned on. This happened in the pressure suppression chamber, where, as I described in section 6.1.7, the guides pointed out the opening in the containment wall they call "the deathblow to Zwentendorf". They typically argued that even if the opening was closed again, this would never again receive the certifications necessary for putting the plant into operation. Clearly, turning the plant on was thus ruled out as an option for the future. This kind of future was sometimes further presented as being in accordance with Austria's past decisions: Some guides, as I pointed out in my re-telling of the tours, brought up the constitutional law banning nuclear power from the country in this context. While there was some general openness towards the nuclear at the tours I went to, no vision of the future was imagined in which NPP Zwentendorf would go into operation and this was performed as a continuation of the past.

At the same time, the NPP is typically still performed as a site with great potential for contributing to the energy future at the tours. We can see this mainly towards the end of the guide's "historical introduction" in the conference room when they address the question why the EVN bought the plant. As I mentioned in my re-telling of the guided tours (see section 6.1.2), in this context, the guides usually present the NPP as an "ace up EVN's sleeve" because the company could use the site to build a new power plant, namely a biomass plant, in the future. As the guides explain, about half of the plant premise is empty, which means that there is lots of space for a potential new plant, and more importantly, it remains authorized for the operation of a power plant. Based on this authorization, which was granted back when the NPP was built, the site is thus performed as having further potential to contribute to covering our energy demands in the future on top of the power the PV system on the premise is already producing. Again, a specific vision of the future of the plant is thus stabilized by making connections to the past.

## 6.5 Conclusion

To sum up, in this empirical analysis, I have demonstrated that the tours do lots of different things at the same time. The first section, in which I described what typically happened at the tours I went to in chronological order, might suggest that the tours are a strictly sequential affair. However, as we have seen in the ensuing more analytical sections, this is not at all the case. Rather, moments which seem inconspicuous at first glance, such as when the guides point at the opening in the pressure suppression chamber and call this "the deathblow to Zwentendorf" (see section 6.1.7), co-produce various effects: Firstly, as I described in section 6.2, a space is constituted in this instance both physically and in terms of meaning making. Guides and visitors arranging themselves in relation to the pre-existing spatial

features of the plant and the explanatory boards, that were added later on, causes a physical space to emerge. The guides pointing at and sharing an anecdote about the opening gives meaning to this physical arrangement. This story also causes amusement among the visitors which shows, secondly, how the knowledge shared at the tours shapes and is shaped by the kinds of emotional experiences deemed desirable in the context of the tours (see section 6.3.1). Thirdly, as I demonstrated in section 6.4.4, this brief interaction participates in the making of a particular vision of the energy future by ruling out the possibility of NPP Zwentendorf ever going into operation and presenting this version of the future as a continuation of Austria's past decisions against nuclear power.

Another little moment like this, which we have encountered over and over again in my analysis, is when the guides compare the output of the PV system installed on the premise to the output the NPP would have had in front of the bird's eye photo of the plant. As I showed in section 6.3.3.2, the knowledge shared here speaks to concerns about how much power we can get out of an NPP but also relates to the broader question how we can produce enough energy in environmentally friendly ways. This means that not only knowledge is produced here but also a particular version of the present in which the climate crisis and the question how we can decarbonize the energy sector are considered the pressing issues at stake (see section 6.4.1). While this is performed as a central concern of the present moment in time, the 70s are remembered as not caring much about the environment. We have seen this only a few moments later still in front of the bird's eye photo when the guides speak about how the plant would have been exclusively cooled via the Danube. As I argued in section 6.4.3, this way of remembering the time in which NPP Zwentendorf was built connects to a broader imagination of a trajectory of becoming more protective of the environment, which links the pasts, presents, and futures configured at the tours. The conversation that takes place in front of the bird's eye photograph is thus another example of how many different things emerge at once during the tours. As such, this interaction illustrates the wider point I have been making throughout my analysis: Spaces, issues, knowledge, and versions of the past, present, and future are produced throughout the tours and all of this happens in tight conjunction rather than separately.

## 7. Discussion and Conclusion

The overall aim of this thesis has been to examine what the guided tours through NPP Zwentendorf bring into being. In my empirical analysis, I have addressed this by investigating three main dimensions of the tours, namely how the space of the plant is constituted, how knowledge is made, and how versions of the past, present, and future are constructed and connected. Here, I provide a summary of what I have examined and how my approach has been shaped by theories and methods. I then go into further depth on some of my findings and discuss how they contribute to the literature I presented in the State of the Art. Throughout this, my focus lies in particular on what we can learn from my analysis about how the work done by the tours interacts with wider developments. I end by pulling out a few conclusive thoughts and providing general directions for future research.

After describing what typically happened at the six guided tours I went to, my empirical analysis examined the space of the plant that emerges at the guided tours. This was to do justice to the crucial role this space played during the tours and in visitors' experiences of them. Guided by Löw's (2016) concept of spacing, I was first attentive to the physical aspects of this space. I considered the bodies and objects present and the positions they occupied in relation to each other. Knoblauch and Steet's (2022) notion of the communicative construction of space further sensitized me to the role of bodily performed actions, such as pointing at objects, looking at them, and speaking about them. Second, I investigated how this space was given meaning to on the tours. Here, I was again influenced by Löw and her concept of synthesis as well as Knoblauch and Steets' work, which allowed me to see different yet complementary manners in which space was made sense of: Meaningful spaces emerged both in visitors' perception, imagination, and perception as well as in the conversations between guides and visitors and these two ways of constituting space were mutually constitutive. Third, I considered the atmosphere (Löw, 2016) of the plant, that is the diverse yet patterned ways in which the emerging spatial arrangement affected visitors emotionally.

I then turned to the processes of knowledge production that take place at the guided tours, examining what and how knowledge was made. After providing an overview of the kinds of knowledge shared in different parts of the tours, I studied the kind of knowing space (Law, 2017) the guided tours are. This led me to consider how various aspects of the tours shaped and were shaped by the knowledge that was produced. I looked at how this knowledge was mutually constituted with certain emotional experiences that were deemed desirable for visitors to have at the tours. Furthermore, I examined the assumptions about what kind of knowledge should flow from whom to whom at a good guided tour implicit in the kind of knowing that took place at the guided tours. Another central focus was on how the knowledge made at the tours related to and reinforced concerns about the safety,



efficiency, and environmentally friendliness of NPPs. Here, my work was guided by Latour's (2004) notion of matters of concern.

Finally, I examined how the past, present, and future were constructed and connected at the tours. I began by investigating how the present moment in time was performed. Here, I showed that the climate crisis and how we can decarbonize the energy sector to mitigate it were perceived to be the central issues at stake right now. Drawing on the concept of the collective memory (Assmann, 2019; Erll, 2008), I then examined the versions of the past produced at the guided tours. We saw that there were varied ways in which the decision against turning NPP Zwentendorf on was remembered and assessed at the tours. I also discussed how the time in which the plant was built was performed more broadly. Lastly, I looked at how the collective future was imagined as one powered by environmentally friendly energy sources at the tours. In this context, the idea of the problem-solution package (Bayer and Felt, 2019; Fujimura, 1987) helped me see the obstacles believed to stand between us and this future and the actions performed as needing to be taken in the present to attain it. Throughout my analysis of the pasts, presents, and futures produced at the tours, Appadurai's (2012) notion of trajectorism was further useful to understand the connections that were made between them. The concept drew my attention to the kinds of evolutions performed as having taken place between the 70s and the now and how they were imagined continuing into the future.

While I analyzed space, knowledge, and pasts, presents, and futures in separate sections, it became clear throughout my empirical chapter that they were in fact made together or co-produced (Jasanoff, 2004) at the tours. We saw that space was constituted, knowledge made, and versions of the past, present, and future constructed all in the same moves. The tours were thus multi-layered rather than, as my re-telling of what usually happened at the tours in order might have suggested, a primarily sequential affair. Furthermore, I already identified some ways in which the tours interacted with the meanings attributed to nuclear power and NPP Zwentendorf more broadly. Especially in section 6.4.2, we saw that how the decision against turning NPP Zwentendorf on was made sense of at the tours reflected but also diverged from how it is inscribed in Austria's collective memory. Here, my analysis was guided by an understanding of the guided tours as a cultural activity (Hall, 1997), producing and circulating shared interpretations of the world. This theoretical framework further highlighted the need to consider what visitors make of the tours to understand what they bring into being.

The various theoretical lenses I employed guided my attention and helped me make sense of my empirical material. On top of that, my analysis was enabled by my methodological approach. As I described in section 5.3, doing an ethnography of the tours allowed me to witness the interactions that took place between guides, visitors, and the emerging space of the plant. I could capture what they were saying and doing in which places and in relation to which objects. This was, as we saw in my

empirical analysis, crucial to understanding how space, knowledge, and pasts, presents, and futures were made together at the tours. My attention to my own experiences at the tours supplemented my participant observations especially with regards to the emotions that were present and helped me recognize my own tacit assumptions about the tours. Interviewing visitors was another main component of my ethnographic approach. It allowed me to see how they make sense of their visit, which was central to understanding what the tours brought into being and how they interacted with the wider meanings nuclear power and NPP Zwentendorf hold. Talking to visitors in particular gave me insights into the atmosphere of the plant, the knowledge made and concerns raised on the tours, and how visitors imagined the collective past and future in relation to the tours.

Having summarized what I examined about the tours and how I did so, I now discuss some of my findings in more detail and connect them to the literature I presented in the State of the Art. In the first two sections that follow, I look more closely at how the work done by the tours relates to broader developments. I draw on pre-existing literature on the history of NPP Zwentendorf and how it is inscribed in Austria's collective memory (see section 2.2) to go into further depth on how the tours interact with the national anti-nuclear imaginary (section 7.1). In section 7.2, I focus on the issues debated at the guided tours and, aided by an approach from deliberative theory, I read these discussions as moments of deliberation. This allows me to demonstrate how my work contributes to the pre-existing STS literature on PCST. Lastly, in section 7.3, I discuss on what we can learn from my study about the heterogeneity of PCST. I summarize the roles played by the spatial and the emotional at the tours and make connections to similar recent STS studies of PCST.

## 7.1 Interacting With Shared Meanings and Broader Discourses

In section 6.4.2 of my empirical analysis, I discussed in detail how the tours I went to simultaneously reproduced and departed from the dominant way in which the controversy over NPP Zwentendorf is made sense of in Austria. As we have seen, the "historical introduction" provided by the guides in many ways corresponded to how what happened around the plant is usually remembered in Austria (as opposed to how the events are interpreted in political history). The guides, for instance, reinforced the idea that the 1978 referendum on NPP Zwentendorf was the result of the anti-nuclear protests rather than primarily an outcome of party political strategizing (see Bayer, 2013, 2014; section 2.2). Furthermore, the "historical introduction" portrayed Kreisky's roundabout offer to resign if the referendum voted against turning the plant on in accordance with how this event is engrained in Austria's collective memory as *the* moment which turned the debate into a party political one (Bayer, 2014). The guides, moreover, did not mention that by 1985 a majority of the population was again in favor of putting the plant into operation which is, as Bayer (2013) points out, usually obliterated in the version of events floating around in Austria. As I described in section 6.4.2, several of the visitors I spoke to

further mentioned the significance of what happened with the plant for what it means to be Austrian. This indicates that how the rejection of nuclear power is dominantly made sense of in Austria, namely as being a demonstration of distinctly Austrian values, was also present at the tours I went to.

On top of that, the way in which this version of the past is usually connected to visions of Austria's collective (energy) future was reproduced at the tours. As I mentioned in the State of the Art, Felt (2015) argues that this way of remembering the rejection of nuclear power has been mutually constituted with a vision of the future in which Austria stands for renewable energy. This resonates with how the future was imagined at the tours I went to, namely as powered by environmentally friendly energy sources and, especially, solar photovoltaics. As I described in my empirical analysis, at least in the statements that the guides made, nuclear power was not presented as an option in this kind of future. This argument was reinforced by their performance of the decision to build an NPP in Austria as an outcome of a time in which, unlike today, no one cared about the environment. Furthermore, the guides made the case that there is no version of the future in which NPP Zwentendorf would go into operation. They presented this as a continuation of a past in which Austria once and for all decided against nuclear power by passing the anti-nuclear constitutional law. This clearly again corresponds to how the (energy) future is dominantly imagined within Austria in relation to its collective memories of the controversy over NPP Zwentendorf, namely as "nuclear-free" (Felt, 2015, p. 113).

At the same time, alternative ways of remembering Austria's nuclear history, tying it to an Austrian national identity, and imagining the future were also articulated at the tours. As I described in my empirical analysis, in their "historical introduction", the guides highlighted how tight the referendum was and that the plant was preserved for seven years in a state that would have allowed for it to be turned on. This can be seen as drawing attention to how polarized the situation was in 1978 and that the debate continued beyond the referendum which are aspects that are, according to Bayer (2013), mostly obliterated from the version of events floating around in Austria. Furthermore, the decision against NPP Zwentendorf was not, as is usually the case, unanimously celebrated as a testament to the Austrian population's ability to foresee the future and know what the right thing to do was. On the contrary, if it was framed in positive terms, the referendum was performed as something that turned out to be a good decision but could not have been predicted as such. On top of this, the bizarre and bewildering qualities of the decision not to turn on the completely built plant were highlighted at the tours I went to. In this context, these events were tied to Austria's national identity in a different and more humorous and self-deprecating way than they usually are: Here, Austria emerged as distinct from other nations because it is the only place where such an absurd thing can happen.

The plant not going into operation was, in contrast to the dominant way of interpreting it, also not judged as the right decision by all the visitors I spoke to. As I described in section 6.4.2, based on

the information that an additional coal power plant was needed to replace NPP Zwentendorf, some of my interview participants, for instance, argued that turning the plant on might have ultimately been better for the environment than refraining from doing so. Viewing nuclear power as being more eco-friendly than other sources of energy allowed not only for alternative interpretations of the past but also for different imaginations of the future to emerge: As I demonstrated in my empirical analysis, there was an openness among many of the visitors I interviewed to at least consider the nuclear as part of a future in which we need to cover our energy demands in eco-friendly ways. This clearly resonates with the discourse that is driving the ongoing global nuclear revival which, as I described in the State of the Art, portrays nuclear power as necessary and inevitable if we want to produce enough energy in environmentally friendly ways (Müller & Thurner, 2017; Kinsella, 2015). Apart from reproducing and challenging the dominant imaginations of Austria's nuclear-free future, the tours thus also interacted with these meanings of nuclear power that float around at the present moment in time.

That several visitors I spoke to expressed pro-nuclear sentiments should not be seen as an indication of any kind of broader shift in Austria's attitudes towards nuclear power. Making such a general statement is not possible based on the small-scale, qualitative study I conducted and was not the aim of my thesis. It would furthermore be at odds with a recent representative poll which showed that an overwhelming majority of Austrians continues to be opposed to nuclear power (Kleindl et al., 2023). What the present study does demonstrate, however, is that the debate on nuclear power is not over in Austria and that the guided tours through NPP Zwentendorf are one setting in which it continues to take place. On the tours I went to, the "advantages" and "disadvantages" of nuclear power were controversially discussed. The dominant interpretations of Austria's rejection of nuclear power and imaginations of a nuclear-free future were simultaneously reinforced and challenged.

These findings contrast with how Austria's relation to the nuclear is made sense of in both the nations' collective memory and (political) history. While these points of view, as I described in the State of the Art, differ in many ways, what they share is the idea that Austria has been consensually rejecting nuclear power at the latest since the Chernobyl disaster in 1985 (see e.g., Bayer, 2013; Kuchler, 2012a; Müller, 2017; Preglau, 1994). My research, on the other hand shows, that fueled by the global nuclear revival and concerns about how we can decarbonize the energy sector in the face of the climate crisis, there seems to be a need to talk about nuclear power again in Austria or at least at the guided tours. This underlines the argument made by Felt (2015) and Bayer and Felt (2019) that no matter how unshakable Austria's anti-nuclear imaginary might appear, it cannot be taken for granted (see section 2.2.2). From this perspective, the guided tours through NPP Zwentendorf I accompanied presented opportunities for both rehearsals and contestations of Austria's anti-nuclear imaginary. The

contribution of my work to this literature lies in identifying the tours as a space where this work takes place and demonstrating how it is done.

## 7.2 Deliberating Issues, Shaping Wider Science-Technology-Society Relations

How the tours interact with Austria's anti-nuclear imaginary also already illustrates the potential of the tours to shape the wider relations between science, society, and technology. A particular way in which Austria's relations to nuclear technologies are imagined is at once reinforced and challenged. Here, I examine this capacity of the tours further by focusing on the issues debated at the tours. As suggested by Davies (2015), I draw on Mansbridge et al.'s (2012) view of deliberation as distributed throughout society to read this kind of talk as deliberation. Based on this, I argue that my thesis underscores the need to study different forms PCST from a performative angle as opposed to focusing narrowly on activities with direct links to policymaking.

In my empirical analysis, I argued that the "technical" knowledge shared by the guide speaks to and reinforces certain concerns about nuclear power, namely how "efficient", eco-friendly, and safe NPPs are (see section 6.3.3). I showed that the guides explicitly raised these issues when they talked about advantages and disadvantages of nuclear power in the refueling space. They praised NPPs as "efficient" due to their ability to generate a lot of energy from a small amount of fuel. On the other hand, they argued that nuclear power is not environmentally friendly and can never be completely safe. Moreover, these issues shined through in the "technical" information the guides shared about NPP Zwentendorf. The concern about the safety of NPPs was, for instance, visible in the many safety measures of the plant the guides pointed out. The "efficiency" of nuclear power also came up when the guides compared the output the NPP would have had with the much smaller one of the PV system installed on the premise. The argument that nuclear power is not environmentally friendly was supported by what the guides shared about the composition of the uranium used to fuel NPPs and the need to enrich it.

These issues and positions were, however, not unquestioned at the tours I went to. One guide also contested the efficiency of NPPs by cautioning that the comparison between the PV system and the NPP needs to be taken with a grain of salt. Another one drew attention to the huge amount of energy decommissioning an NPP consumes. What the visitors I spoke to made of this also varied: Some saw the differences in output between the PV system and the NPP as an illustration of the great efficiency of NPPs vis-à-vis renewable energy sources. Others were struck by what the guide had said about the large amount of energy needed to dismantle an NPP. Some visitors also had a different view on the environmental friendliness of nuclear power than the guides. One of my interview participants,

for instance, made the case that NPPs are relatively eco-friendly because they emit less carbon than other energy sources. This involved slightly reframing the issue at stake: While the guides argued that that NPPs are not environmentally friendly because they are not carbon-neutral, what some of the visitors cared about was how much (or rather how little) carbon NPPs emit compared to other power sources. The question how (un)safe NPPs are was less controversial on the tours I went to. No guide or visitor I spoke to claimed that NPPs could be entirely safe. At the same time, there was disagreement as to what the inherent unsafety of NPPs means: Implicit in the guides' claims that a nuclear accident could happen again at any time was an anti-nuclear message. One of the visitors I spoke to, on the other hand, said that even though the guides' argument about NPPs never being completely safe had made him slightly more critical of nuclear power, he was certainly "still pro" (I3). To him, the inevitable risk of nuclear accidents did not mean that we should stop or refrain from using nuclear power.

These comments by my interview participants further show that the three issues I identified as being central to the tours mattered not only to the guides but also to at least some of the visitors. This could also be seen in some of the questions visitors asked during the tours. Many of them, for instance, wanted to know what had gone wrong in famous nuclear accidents, such as Chernobyl and Fukushima, which demonstrated their concern with the (un)safety of NPPs. On top of being shared by guides and visitors, these three central issues were also performed as being relevant more broadly at the present moment in time. As we saw in my empirical analysis, the debates that took place around all these issues were shaped by the broader question of how we can decarbonize the energy sector to mitigate the climate crisis at the tours. This wider question, in turn, emerged as the main issue at stake right now. There was thus a sense that concerns with the safety, efficiency, and environmental friendliness of nuclear power are (or should be) shared within wider society. This meets one aspect of how Mansbridge et al. (2012) define deliberation. While they, as I described in the State of the Art (see section 2.1.3), suggest that deliberation can take place in all kinds of settings, they nevertheless hold that some conditions need to be fulfilled for talk to qualify as deliberative. One part of this is that shared issues need to be discussed. Clearly, this was the case at the guided tours I went to.

On top of this, Mansbridge et al. (2012) define deliberation as containing "an element of the question 'what is to be done?'" (p. 9) and thus being oriented towards possible solutions. That this applies to the talk that I witnessed at the guided tours can already be seen from the fact that, as I just mentioned, connections were made between the three central issues raised at the tours and the larger question of how to cover our energy demands in eco-friendly ways. Underlying this is a concern with the kinds of actions that need to be taken. This was especially visible in the two problem-solution packages that I identified in my material and that provided different takes on what needs to be done in the present in order to attain the environmentally friendly powered future. The practical orientation

of the debates at the guided tours also becomes transparent if we look at how the three central issues relate to the future roles envisioned for nuclear power. As I described in my empirical chapter, implicit in the guides' arguments about NPPs being not environmentally friendly was a sense that they are no option for an eco-friendly powered future. That we should do without the nuclear was also insinuated when the guides spoke about the inherent possibility of future nuclear accidents while, as I have already mentioned in this section, one of the visitors I interviewed did not come to the same conclusion. Their view of nuclear power as capable of producing large amounts of energy and emitting less carbon than other available energy sources also led some of my interview participants to argue that nuclear power is "a good option to some extent" (12). This shows that underlying the debates about the safety, efficiency, and eco-friendliness of NPPs was the question whether we should use nuclear power in the future. Following Mansbridge et al.'s definition, these discussions therefore qualify as deliberation.

We can thus view the guided tours as a small element in a larger deliberative system in which both state and societal decisions are taken. From this perspective, the tours thus once more emerge as a site that has the potential to influence wider developments, this time by providing a space in which the pro and cons of NPPs can be discussed in relation to broader concerns, such as the climate crisis. This underlines, as Davies (2015) also notes, the need to examine not only the work done by instances of PCST that seek to directly impact policymaking, which is what has so far been mainly assumed and studied as the locus of deliberation within the STS literature on PCST (see sections 2.1.2 and 2.1.3). My thesis adds to this body of work by illustrating the potential of non-policy related forms of PCST to contribute to shaping wider decisions on science and technology, for instance, by providing an opportunity for shared issues to be discussed. I would further argue that the guided tours are a particularly interesting example in this context because they are, as I described in section 6.3.2 of my analysis, predominantly organized along the deficit model of PCST. Even instances of PCST which employ the kinds of logics STS scholars initially denounced when they were calling for more public participation in science and technology (see section 2.1.1) can thus allow for deliberation to take place. This invites us to study a wide variety of instances of PCST and what they bring into being including those which appear to be predominantly concerned with informing the public about science and technology.

### **7.3 Accentuating the Roles of the Spatial and Emotional**

In this discussion of my findings, I have so far primarily focused on how my study contributes to the existing literature by investigating talk: I first summarized how guides and visitors rhetorically constructed versions of the past, present, and future in the context of the guided tours and how this interacted with wider discourses. Second, I characterized the debates about issues that took place at the tours as deliberation. On top of that, as we will see in this section, my research adds to the literature

by highlighting the role played by the emerging space of the plant and to a lesser extent that of emotions in what the tours bring into being and how they interact with wider developments.

As I described in my empirical analysis, the emerging space of the plant was central to the tours and visitors' experiences of them. I demonstrated that throughout the tours, guides and visitors continually interacted with the objects that were previously positioned there: The guides' main activities included pointing at, naming, and talking about the pre-existing spatial features of the plant and the explanatory boards. Visitors oftentimes positioned themselves so that they could see what the guides were pointing at and allow others to see those things as well. I interpreted this as one of several ways in which the space of the plant was constituted physically at the tours. Furthermore, I analyzed how these bodily performed actions gave meaning to space while simultaneously making knowledge and issues. One example of this was the guides indicating the office of the radiation protection team, naming it, and explaining what workers would have needed to do when entering and leaving the plant in one and the same move. Similarly, pointing out the individual fuel pellets indicated on the model of the core cell led the guides to praise the "efficiency" of NPPs. Here, a statement about nuclear power more broadly was made in relation to a material object which gave meaning to this object. At the same time, the exhibit was used by the guides to raise one of the issues central to the tours.

On top of this, we have also seen versions of the past and future being co-produced with the emerging space of the plant in my empirical chapter. One case of this was the guide's question "What is missing?" in front of the bird's eye photo of the plant and the ensuing talk about no one caring about the environment in the 70s. As I mentioned, the time in which the plant was built is remembered here as a one in which – unlike today – protecting the environment did not matter. At the same time, the bird's eye photo is used to constitute the wider space of the plant. Specifically, the absence of the cooling tower is made sense of in this moment. Another example was the guides drawing visitors' attention the opening in the wall of the containment in the pressure suppression chamber and telling the story about this being "the deathblow to Zwentendorf". This anecdote made this inconspicuous opening meaningful while also articulating a particular kind of future, namely one in which NPP Zwentendorf will never go into operation. When the guides related this future to the past by remembering Austria's decision to pass a constitutional ban on nuclear power, a specific version of the past was furthermore constructed in the same move.

To a lesser extent, my empirical analysis demonstrated the role played by emotions in what the tours brought into being. The anecdote about the "deathblow" to Zwentendorf, for instance, usually caused laughters among visitors and was, as I described in section 6.3.1, part of a wider effort to amuse and entertain them. The versions of the past and future constructed in this moment were thus also co-produced with particular emotions visitors were intended to experience at the tours.



Moreover, as I argued in section 6.4.2, the feeling that what happened with the plant was bizarre was present at the tours. This connected to a performance of the decision against turning the plant on as being characteristically Austrian in which Austria emerged as the only place where such strange things can happen. Again, a particular way of making sense of the past was thus made together with a certain emotional experience. My empirical analysis further showed how the space of the plant was mutually constituted with particular emotions. When standing at the railing of the refueling platform and looking down into the reactor, for example, some visitors were struck with awe at the size of the plant. Here, a particular spatial arrangement allowed for certain emotions to become present. On the other hand, some visitors experienced a frightening sensation when they saw how deep the reactor well was, causing them to quickly step back from the railing. This illustrates how the emotions visitors experienced also shaped how the space was constituted physically.

In some cases, these kinds of interactions between the emotional and the spatial were further co-constituted with the knowledge the guides shared. We have, for instance, seen that the admiration the turbine installed within visitors was further heightened by the information the guides provided about the speed at which it would have rotated. Similarly, the slightly scary quality the emergency personnel air lock had in visitors' eyes was shaped by how "claustrophobic" that opening looked but also by the guides pointing out that workers would have had to crawl through it if there was a blackout. This was one of the many measures the guides pointed out that had been taken to prepare for different kinds of emergencies at the plant. Consequently, this moment further spoke to the tour's central concern with the (un)safety of NPPs. This was also echoed in some of my interviews in which it became clear that the emergency lock contributed to making visitors feel like something could always go wrong in an NPP and that they are potentially dangerous for the people who work there. In this example, we can thus observe how the emotions that were present and the emerging space of the plant together reinforced the tour's core argument that NPPs can never be completely safe.

What has overall become clear in this section is the central role the spatial and the emotional played in what was made at the tours. I summarized what we have learned from my empirical analysis about how the emerging space of the plant and certain emotions shaped the versions of the past, present, and future articulated at the tours and how they were tied to an Austrian national identity. In this way, the spatial and the emotional also influenced how the tours interacted with Austria's anti-nuclear imaginary. Similarly, I showed how knowledge was co-produced with the space of the plant and certain emotional experiences. As we saw, this meant that the spatial and the emotional also contributed to making the issues that were discussed at and around the tours and thereby shaped the deliberations that took place. Space and emotions did thus not only shape what the tours brought into being if we consider them in isolation but also mattered to how the tours interacted with the wider

meanings of and debates about nuclear power. In highlighting the roles of the spatial and the emotional, my thesis makes a meaningful contribution to the existing STS literature on PCST. As I described in the State of the Art (section 2.1.2), these aspects of PCST have for the most part been sidelined with previous studies tending to focus on how publics are constructed within instances of PCST. My research is attentive to the heterogeneity of PCST. I take into account very different components of the guided tours, how they were mutually constituted, and how they contributed to the tours' interactions with wider developments.

This connects my thesis to a set of recent case studies published in the volume edited by Felt and Davies (2020b). These contributions examine the work done by various instances of PCST and consider a diverse range of dimensions (see section 2.1.3). What is distinctive about my work is my close attention to how the space of the plant was actively produced during the guided tours through NPP Zwentendorf. By contrast, the case studies in the volume by Felt and Davies view spaces predominantly as pre-existing backdrops that invite certain behaviors and emotions while constricting others. This can, for instance, be seen in Tybjerg et al.'s (2020) study of the relations that emerged around specific objects, namely two hacked gene guns, when they travelled to different communication settings. They show that when the gene gun became part of a museum exhibition, for example, this setting allowed for visitors to handle the two gene guns. To the chagrin of the hackers, the guns could, however, not actually be used to conduct transgenic experiments in this setting because it was not a certified laboratory. Clearly, the space of the exhibition is imagined here as a pre-existing container (Löw, 2016) in which certain things can be done but not others. Along similar lines, Owens (2020) examines how the design of two public parks embedded assumptions about how people should feel and act. This approach allows him to analyze what kinds of publics emerged within these spaces. These works resonate with my finding that certain emotions were deemed suitable while others were to be avoided during the tours. My thesis, however, also extends these studies by being not only attentive to how the setting and the pre-existing spatial features of the plant impinged on the tours but also how the space of the plant was shaped by guides' and visitors' actions.

My focus on the space of the plant and my overall sensitivity to the emotions that were present further resonates with Davies's (2015) suggestions that studying non-policy related instances of PCST in addition to those with such ties can bring into view a greater variety of relevant dimensions. This is because participatory exercises are typically imagined pre-dominantly as incorporeal exchange of reasoned arguments. Other forms of PCST, on the other hand, are, according to Davies, oftentimes explicitly oriented towards pleasure and highlight the material character of science and technology. This was illustrated by the guided tours where the importance of the space of the plant was obvious. Interactions with the objects in the plant happened continuously throughout the tours. Furthermore, in all of

my longer interviews being able to see the inside of the plant emerged as one of the main aspects visitors enjoyed about their visit. Space and emotions, as I described in this section, also mattered to the kinds of deliberations that took place at the tours. This underlines Davies's point that examining forms of PCST without ties to policymaking can help us understand the non-discursive facets of deliberation. Again, my thesis thus contributes to highlighting the heterogeneity of PCST.

## 7.4 Concluding Thoughts and Directions for Future Research

The discussion in three preceding sections highlighted the work done by the guided tours through NPP Zwentendorf. Based on my analysis of the versions of the past, present, and future constructed at the tours, I showed how they simultaneously challenged and reproduced Austria's anti-nuclear imaginary. We further saw how the tours interacted with the narrative driving the ongoing nuclear revival (section 7.1). Afterwards, I interpreted the processes of knowledge and issue making at the tours as an occasion for deliberation. This makes the tours part of the wider deliberative system in which collective decisions on science and technology are taken (section 7.2). In section 7.3, I finally discussed how space and to a lesser extent emotions mattered to what the tours brought into being and how they interacted with wider developments.

At the same time, my thesis brings the situated character of the guided tours through NPP Zwentendorf to the fore. As we have seen above, what the tours produce is first shaped by the very specific, emergent space they take place in. Second, the work performed by the tours is inseparable from the cultural context they are situated in and the meanings this culture attributes to nuclear power and NPP Zwentendorf. Third, the temporal context of the guided tours has an influence. Current concerns about the climate crisis and the associated renewed interest in nuclear power do not leave the tours untouched.

Overall, my thesis thus demonstrates that the tours are at once highly situated and provide a window for studying much wider developments. What they bring into being is shaped by but also shapes the contexts in which they take place. This implies a need to continue examining the work done by instances of PCST in different environments. Various forms of PCST should be interrogated as well as diverse dimensions depending on the specificities of the respective case. As my thesis demonstrates, this can help us understand the performative character of instances of PCST, their heterogeneity, and locality as well as allowing for insights into wider science-technology-society relations.

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