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The Temporality of Project Success: Vindeby, the World's First Offshore Wind Farm

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Abstract

This article advances a temporal understanding of project success through a process study of "Vindeby," an exploratory project developing the world's first offshore wind farm. Pursuing a situated temporal view, our findings reveal how actors constructed Vindeby's success differently when seeing the project as future, present, and past and how these constructions mutually shaped each other. Adding to prior literature adopting an *over-time* or *in-time* perspective, we develop a *through-time* perspective of project success and a model explaining the interplay of the three perspectives. We discuss how projects may serve as *temporal stepping stones* toward sustainable futures in the green transition and propose ways for project managers and policymakers to nurture this potential.

Keywords

project success, temporality, timing, timeliness, sustainability, green transition, wind energy, scaling

Introduction

The foremost ambition of a project practitioner is to shepherd the project toward its success. However, project success is an evolving construct that is never settled and often renegotiated. Examples abound of successfully managed projects that, ultimately, were perceived as project failures, and vice versa (for an overview, see Ika, 2009, p. 8). Such cases challenge the notion of success as a fixed and conclusive outcome, instead revealing it as an ongoing pursuit that unfolds in different forms at different points in time (Kreiner, 2020). Recent literature reviews (Ika & Pinto, 2022; Meredith & Zwikael, 2019) emphasize the significance of grasping the temporal dynamics of project success. Specifically, our study responds to Ika and Pinto's (2022) call to investigate how actors construct project success differently across different time horizons and to shed light on the role of timing for project success.

Despite the relevance of 'time' for project success, prior research has only considered the temporal dimension as a backdrop, focusing on how project success changes *over time* or how actors socially construct project success *in time*. The over-time perspective highlights that project success can be evaluated differently at various stages of the project life cycle (e.g., de Wit, 1988; Meredith & Zwikael, 2019; Sabini et al., 2019). This perspective is most salient in the distinction between project management success; which focuses on meeting time, cost, and scope commitments; and project success, concerned with delivering long-term benefits (de Wit, 1988). The Sydney Opera House is a well-fitting example, initially seen as a project management failure but ultimately becoming a national icon (Gaim et al., 2022; Murray, 2003). On the other hand, studies have adopted what we term an in-time perspective, following actors in their enactment of projects and showing how they construct and negotiate project success during specific periods of time (e.g., Chang et al., 2013; Kreiner, 2014; McLeod et al., 2012; Pitsis et al., 2003; van Marrewijk, 2017).

Merely treating time as a backdrop against which project success is constructed in time and changes over time, we argue, overlooks recent advances toward a 'situated temporal view' (Dille et al., 2023; Hernes, 2022; Hernes & Schultz, 2020; Sergi et al., 2020; Vaagaasar et al., 2020). These studies call to explore how social phenomena are temporally constituted, emerging from the ways in which actors, situated in the ongoing flow of time, reinterpret the past, reimagine the future, and draw connections between past, present, and future. Inspired by these recent advances, we view project success as an inherently temporal phenomenon.

This temporal view drew our attention to how actors connect past, present, and future success. Again, the Sydney Opera House case offers an interesting example of connections between the past, present, and future. For instance, Danish architect Utzon was first interpreted as the villain behind the cost overruns and later as the genius behind the award-winning architecture, to the point that some commentators discuss the Sydney Opera House as a failure because it prevented humanity from experiencing more of Utzon's work. The same past events gave rise to diverging interpretations connected to present and future understandings of the project and its worth. Therefore, in this study, we investigate how actors, with the passing of time, differently connect, reinterpret, and reimagine the past, present, and future of a project in their ongoing constructions of project success.

Combining archival data and interviews, we conducted a process study of the world's first offshore wind farm in Vindeby, Denmark. Vindeby checked all the boxes for being considered an extraordinarily successful project. It marked the first realization of a long-entertained idea (e.g., Heronemus, 1973), was delivered on time and budget (Olsen & Dyre, 1993), and exceeded both its projected electricity production and lifespan (Skopljak, 2017). However, despite Vindeby's technical and commercial success, the wind farm's commissioning in 1991 received little public attention, and it would take more than 10 years before the inauguration of larger-scale projects. Once the industry started scaling rapidly in

the early 2010s, Vindeby became emblematic as the cradle of offshore wind energy, which has since become a key technology in decarbonizing the energy sector. In 2018, the Project Management Institute (PMI) named Vindeby one of the most influential projects of the past 50 years:

> Three decades ago, there wasn't a single offshore wind farm in the world. These days, there are over 100 ... What set off the winds of change? Vindeby, a €7.16 million project anchored off the southeastern coast of Denmark. (*PM Network*®, 2019, p. 66)

Our analysis followed how core actors, e.g., senior managers, project team members, stakeholders, policymakers, experts, and the media, constructed and reconstructed the success of Vindeby with the passing of time. From an *in-time* perspective, our findings show how actors engaged in the construction of success when seeing the project as a future, present, and past, respectively, which, from an *over-time* perspective, resulted in the temporary stabilization of different forms and evaluations of project success. Adding to these extant temporal perspectives, our findings reveal how actors drew connections between Vindeby's past, present, and future success *through time*.

Our study makes three main contributions. First, we advance a temporal understanding of project success (Ika & Pinto, 2022; Meredith & Zwikael, 2019) by developing a *temporal view of project success* that conceives of project success as inherently temporally constituted, that is, emerging from ongoing connections between past, present, and future. Second, we develop the *through-time perspective of project success*, adding to the extant in-time and over-time perspectives, and explain the interplay between these perspectives through a *temporal model of project success*. Third, our study advances an understanding of the *role of (exploratory) projects in the green transition*. We discuss how moving from exploratory projects to scaling may require practitioners to not only *infer* the right timing but also *enact* a

project's timeliness. We argue that projects may function as *temporal stepping stones* toward more sustainable futures, helping organizations in making distant futures actionable (Schultz, 2022).

Theoretical Background

In this section, we first clarify the in-time and over-time perspectives, providing examples of project studies that illustrate either perspective. Subsequently, we explain how a situated temporal view may help elaborate the temporal conceptualization of the two perspectives and their relationship.

The In-Time Perspective of Project Success

Prior studies adopting an in-time perspective show how actors socially construct project success during specific periods of time or at specific points in time (e.g., Chang et al., 2013; Ligthart et al., 2016; McLeod et al., 2012; Stjerne & Svejenova, 2016; van Marrewijk, 2017; Zerjav, 2021). As the project progresses, the involved set of internal and external stakeholders and their respective evaluations may change (Chang et al., 2013; McLeod et al., 2012), suggesting the need to consider 'project success as an ongoing and long term (emergent) process' (Zerjav, 2021, p. 292). Thus, from the in-time perspective, project success is an emergent, only temporarily stabilized outcome.

For example, Pitsis et al.'s (2003) study of a project seeking to clean up the waters of Sydney Harbor ahead of the Sydney Olympics illustrates the in-time perspective. The authors uncover how project stakeholders developed and matured their views of success by prospecting the project at different moments in time during its execution. Kreiner's (2014) study of an unusual project attempting to develop the best R&D facility in the world provides

another illustration, showing how stakeholders engaged and cocreated the new facility and evolved their view at each moment in time, adapting their projections and constructions of success. The study theorizes success as a collective feeling.

Even if studies adopting an in-time perspective do not highlight the temporal construction of project success, they implicitly adopt a view of actors as embedded in the flow of time and adapting their project aspirations and, thereby, their notions of project success at different moments in time, as the project evolves from fuzzy front-end to implementation and even beyond.

The Over-Time Perspective of Project Success

The over-time perspective of project success conceptualizes project success as varying over time (e.g., de Wit, 1988; Meredith & Zwikael, 2019; Sabini et al., 2019). For instance, studies distinguishing between project management success and project success (de Wit, 1988) or between short-term, medium-term, and long-term project success (Ika, 2009; Sabini et al., 2019) are illustrative of this perspective. Rather than project success being one concept, these studies suggest that project success may be better thought of as a variety of concepts, each associated with different time horizons (Ika & Pinto, 2022), as the Sydney Opera House poignantly exemplifies (Murray, 2003). Studies adopting an over time perspective conceptualize project success as differing qualitatively or quantitatively at different points in time, implying a discrete understanding of project success with past, present, and future success separated by intervals of time or belonging to different periods.

A Situated Temporal View: The Relationship Between In Time and Over Time

Recent studies advancing a situated temporal view (Hernes, 2022; Hernes & Schultz, 2020; Vaagaasar et al., 2020) may help elaborate the temporal conceptualization of the in-time and over-time perspectives and their relationship. Extending from studies following the social construction of project success, a situated temporal view emphasizes how such social construction occurs in the ongoing flow of time and entails reinterpreting the past, imagining the future, and drawing connections between them. This view gives primacy to the present, directing attention to how actors situated in the ongoing present imagine the future and reinterpret the past. With the passing of time, each present becomes a past for successive presents. These pasts remain open to reinterpretation, just as previously anticipated futures remain open to reimagination.

Applied to projects, this view invites us to follow how actors construct project success differently with the passing of time when seeing *projects as future*, *as present,* or *as past*. These different temporal standpoints are not foreign to project studies. Studies on 'future perfect strategy' (Pitsis et al., 2003) or the role of narratives in performing and changing the future (Sergeeva & Winch, 2021) are examples of seeing projects as future. Studies of projects as present show, for instance, how actors caught between an ever-shortening future and a lingering past deal with temporal boundaries (Stjerne et al., 2019) or tensions (Geraldi et al., 2020). Studies of projects as past have focused, for example, on the reevaluation of past projects (Söderlund & Lenfle, 2013) and how meanings that stakeholders attach to a past project may shape its symbolic meaning as a success or failure (van Marrewijk, 2017).

A situated temporal view helps clarify the relationship between the in-time and over-time perspectives of project success. At first glance, the two perspectives may seem congruent with the distinction between a subjective and an objective perspective of project success (Ika, 2009). However, whereas the subjective/objective distinction signifies ontologically incompatible perspectives, a situated temporal view suggests the in-time and

over-time perspectives be inherently related, representing different ways of abstracting from actors' ongoing course of action in the flow of time (Hernes, 2022; Koll & Jensen, 2023). These perspectives correspond to seeing a social process 'from within' or 'from without' (Shotter, 2006). This distinction is not only analytical, but actors themselves shift between these perspectives to orient themselves in the flow of time and redirect their course of action (Feddersen, 2020; Hernes & Schultz, 2020).

In our analysis of the Vindeby case, we followed actors in their situated temporal construction of the project as future, present, and past *in time* to reveal the resultant conceptions of project success *over time*. Whereas the in-time perspective highlights how actors construct certain conceptions of project success during a given period or at a specific point in time, the over-time perspective focuses on the resultant, temporarily stabilized conceptions of project success.

Research Process

Our interest in Vindeby can be traced to our first onsite meeting with company representatives, when we encountered a large banner on the side of the company's headquarters: "Vindeby—Celebrating 30 years of offshore wind." As we started our desk research after the meeting, the changes in attributed meaning and success outlined in the introduction were intriguing yet puzzling. Our research proceeded abductively (Timmermans & Tavory, 2012), honing in on our theoretical framework and analytical approach by moving back and forth between data collection, data analysis, and the literature on project success. We operationalized our theoretical framework using an event-based approach (Feddersen, 2020; Feddersen et al., 2023; Hernes, 2014; Hussenot & Missonier, 2016), conceptualizing actors' references *in time* to the past and future as connections between past, present, and future events, and plotting the resulting temporal constructions *over time* as event graphs.

Data Collection

Our analysis is based on archival data and interviews (see Table 1 for an overview). We collected archival data by performing an extensive Internet search for documents and information and systematically searching relevant platforms for Danish and international newspaper articles on Vindeby. We also consulted several historical studies of the development of the Danish and international offshore wind industry. Based on this corpus of archival data, we established a chronology of events for the Vindeby project. We uncovered how actors in the past had viewed the past and future through statements they had made and actions they had taken, seeking to treat each moment in time as if it were the present (Jarzabkowski et al., 2016). To validate the understanding of past contingencies that we had developed based on our archival materials, we conducted 16 primary interviews. We drew on an additional five secondary interviews drawn from archival sources.

We interviewed an energy historian and an industry expert, who helped us reinterpret the archival material in light of our research interest in the temporality of project success. We conducted 11 interviews with current and former managers at Ørsted, a Danish renewable energy company, to investigate the importance of Vindeby in attaining a leading position within the offshore wind industry and in Ørsted's green transformation more generally. These interviews were particularly relevant in analyzing Vindeby's role as a past event. Additionally, three primary and five secondary interviews with individuals directly involved in the Vindeby project enabled us to analyze Vindeby's role as a future and present event as the individuals relived the emergence, planning, and execution of the wind farm. The secondary interviews were obtained from a publicly available documentary on Vindeby (Ørsted, 2021) produced by Ørsted on the occasion of Vindeby's 30th anniversary. We obtained access to the full interview transcripts, including material left out of the documentary series.

Table 1. Overview of Collected Data

Data Source	Details
Interviews with current and former Ørsted employees	Eleven primary interviews with senior managers across the organization • Senior Vice President – Group Stakeholder Relations • Vice President – Sustainability, Public Affairs, and Branding • Vice President – Group Regulatory Affairs • Senior Director – Head of Global PA & Sustainability Solutions • Director – Global Sustainability • Head of Strategy & Global Alliances – Commercial Division • Head of Strategic Environment Programmes – Global Sustainability • Head of Social Sustainability – Global Sustainability • Head of Sustainability Reporting – Global Sustainability • Team Lead Sustainability Integration – Global Sustainability • Team Lead Biodiversity – Global Sustainability
Interviews with informants directly involved in the Vindeby project	Three primary interviews (titles at the time of construction) • Project manager, Bonus • Researcher, Risø Laboratory, Technical University of Denmark • Head of Secretariat, Ministry of Energy Five secondary interviews • Project manager, Elkraft • Foundation designer, Elkraft • Service engineer, Elkraft • Construction designer, Bonus • Chief Technology Officer (CTO), Bonus
Interviews with informants on the history of the Danish and international wind energy industry	Two primary interviews • Historian of the wind energy industry • Offshore wind energy expert, former executive of environmental non-governmental organization (NGO)
Archival documents	Internet and library search • PDFs of blog entries and news articles on Vindeby • Publicly available documents related to Vindeby, e.g., historical policies and agreements Newspapers • Newspaper articles from major Danish newspapers, 1991–2022 • Newspaper articles from international newspapers, 1991–2022 Books and journal articles on the history of the Danish wind power industry

In order to uncover how Vindeby embodied different pasts and futures at different points in time, we adopted elements of the biographical interview method to bring actors back in time and enable them to narrate past moments as if they were present (Rosenthal, 2004). Informants were asked to unfold their accounts of core events and situate them within their personal trajectory (Rouleau, 2015). More specifically, informants were asked to recall how, at different

points in time, they perceived what had transpired leading up to specific events and how they had imagined what was possible in the future.

To ensure the plausibility of our findings, in other words, the "validity of events" (Hussenot & Missonier, 2016, p. 533), we sought to mitigate retrospective bias, first, on the question whether or not actors, in fact, perceived particular events as core events, and second, on the question of whether or not these events had a shared meaning among actors (Hussenot & Missonier, 2016). We used triangulation as a cross-check (Bryman, 2008) of findings between archival and historical sources to arrive at a chronology of events. Triangulation was also used between interviews to look for similarities, patterns, and shared meaning between narratives. Also, we only included events in our event database if multiple actors referenced those events. Our process of analysis is explained in more detail in the next section.

Data Analysis

We analyzed our data in three phases. First, we built an event database. After coding temporal relationships between events, we used the temporally relational event database to create event graphs. Aided by these event graphs, we analyzed how the situated enactment of events in time gave rise to a pattern of events over time and, finally, how these patterns connected through time.

During the first data analysis phase, we transformed the collected raw data into an event database through two rounds of coding. In the first round, we coded all events in the raw data related to the Vindeby wind farm. In the second round, we grouped all coded passages referring to the same incident. We only included an incident in the event database if at least two different individual actors in our data set mentioned it, indicating that these incidents were socially meaningful. However, we stored the different sources' accounts along with our abstracted event descriptions so we could revisit this multiplicity. For instance, both primary and

secondary interviews (raw data) with former employees of wind turbine manufacturers revealed how they thought of Vindeby as pointing toward offshore wind as a future business unit for the company (incident). Consequently, we included "Offshore wind as a future business unit for Bonus" as a future event.

The second data analysis phase involved coding events in the event database for relations to other events. We revisited the accounts portrayed in our database's underlying sources for each event. We analyzed references to past or future events and coded each as either a "relation to past event" or a "relation to future event." This coding round yielded a temporally relational event database. For instance, returning to the prior example, we coded for a "relation to future event" between the "Vindeby" and "Offshore wind as a future business unit for Bonus" events. The temporally relational event database enabled us to plot relations between events in event graphs, which played a central role in the third analysis phase.

Finally, we returned to the three temporal perspectives of projects emerging from a situated temporal view: projects as future, present, and past. From our event database, we operationalized these perspectives by identifying events during which actors had primarily referred to Vindeby as a future, present, or past event. Each set of events represented a situated event configuration, which we plotted as an event graph to analyze the position and role of Vindeby as an event within the respective event configuration. Our analysis revealed a fourth configuration of events that simultaneously framed Vindeby as both present *and* future, which we termed "Vindeby as present-future," inspired by Koselleck (2004). Moving back and forth between event graphs and underlying accounts of specific events in our sources, we developed analytical narratives for each temporal perspective. An in-depth analysis of the event configurations revealed how situated actors constructed project success in time and connected future, present, and past through time across event configurations.

Findings

We structure the presentation of our findings around the four event configurations that resulted from our analysis: Vindeby as a future project, Vindeby as a present project, Vindeby as a present-future project, and Vindeby as a past project. In each section, we provide an analytical narrative of the relationships between events from an in-time perspective, through which Vindeby attained a specific role and meaning from an over-time perspective, and summarize our findings with reference to an event graph. Finally, we adopt a through-time perspective and analyze the trajectory of Vindeby that emerged from the connections between event configurations.

Vindeby as Future

The idea of placing wind turbines in the ocean began to attract serious attention in the wake of the first oil crisis in the early 1970s. This period saw intensified exploration of renewable energy sources more generally. Concurrently, engineers engaged in conceptual work in the United States (Heronemus, 1973), the United Kingdom (Lindley et al., 1980), and Sweden (Hardell & Ljungstrom, 1979); however, initially, none of these concepts were pursued further given high levels of technological uncertainty, and thus, expected costs.

Around the same time, during the 1970s and early 1980s, Danish companies became technology and market leaders in the onshore wind energy industry. For many years, Denmark had the largest installed wind energy capacity globally (Petersen, 2018). At that time, individual citizens (primarily farmers) and wind energy cooperatives erected most wind turbines in Denmark. In 1985, an agreement between the Ministry of Energy and the two major state-owned energy companies changed this situation by committing to building a cumulative wind energy capacity of 100 megawatts (MW) over the next five years (Energiministeriet, 1985).

The agreement responded to three parallel developments (see Petersen, 2018). First, it was an attempt to compensate for the excess production capacities of Danish wind energy turbine manufacturers. In addition to the Danish market, exports to the US, particularly California, had fueled the growth of Danish wind energy manufacturing. However, this export demand was starting to dwindle in the mid-1980s. Second, the sitting government had a strong environmental agenda and an interest in increasing the share of renewable electricity production. Third, the agreement sought to incentivize "a broad industrial and technological development in the [wind energy] area" (Energiministeriet, 1985, own translation from Danish) to secure Denmark's leading position in the wind energy sector. Preliminary studies for potential offshore wind locations had been ongoing since 1983, following the rationale that "there are fewer conflicts with other interests than on land, and … better wind conditions outweigh the additional costs for the construction of offshore wind turbines" (Planstyrelsen, Miljøministeriet, 1986, p. 24, own translation from Danish). Building on these efforts, the parties agreed in subsequent negotiations to pursue two pilot projects for offshore wind energy, of which Vindeby was the first.

This section showed how Vindeby emerged as a future envisioned as a timely solution to problems associated with past events (e.g., the oil crisis) and multiple present concerns (i.e., decreasing sales of wind turbines to international markets, increasing recognition of the need to transition to renewable energy, and increasing resistance to *onshore* wind turbines). As they imagined Vindeby as a future, actors further specified the idea of placing wind turbines *offshore*, which had been lingering as an imaginary at least since the early 1970s, thereby reconnecting to and reinterpreting these past events. As a pilot project, Vindeby became a stepping stone toward the more distant future, testing the viability of a pathway toward offshore wind as a scalable, cost-competitive source of renewable energy. This shows how actors not only imagined Vindeby as a future but also reflected upon what Vindeby could enable them to

do once it would have become a past project in the future, indicative of what we theorize as the through-time perspective of project success. Figure 1 visualizes this configuration of events.

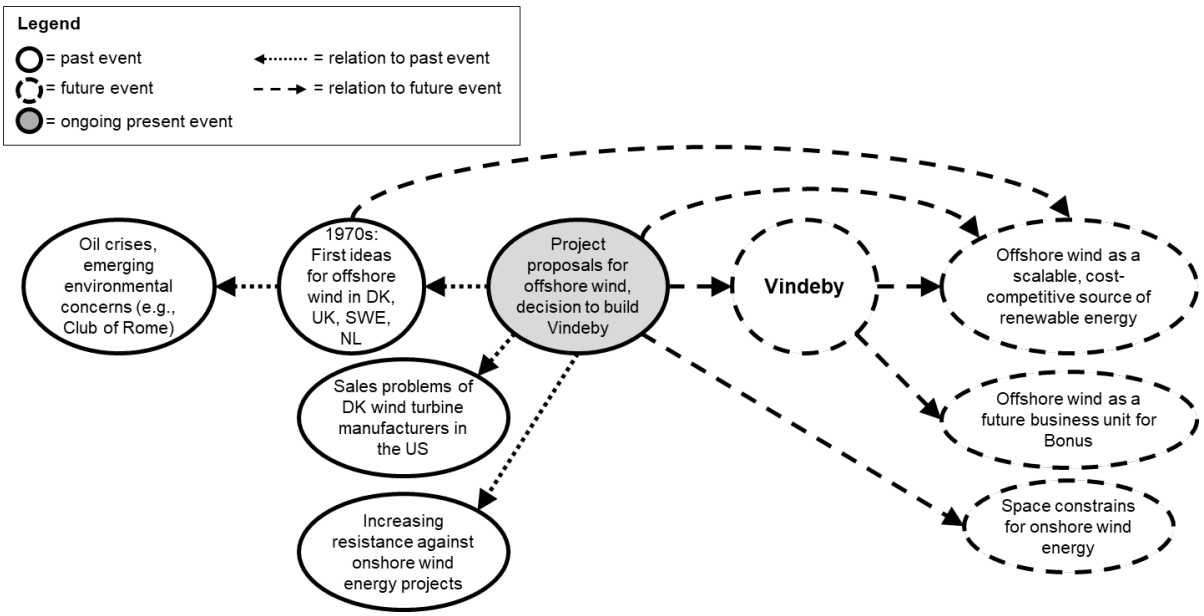

Figure 1. Event configuration of Vindeby as future.

Vindeby as Present

Elkraft, the electric utility of Eastern Denmark, assumed responsibility for the Vindeby project, with Elkraft's board of directors eventually approving the Vindeby project on 20 June 1988 (Ingeniøren, 1989). Danish wind turbine manufacturer Bonus (now Siemens Gamesa) was selected as the main contractor for Vindeby, primarily due to the company's experience with onshore wind farms in extreme environments (Interview, project manager, Bonus). In addition, several informants highlighted the role of CTO Henrik Stiesdal, who himself recounted recognizing the potential for offshore wind to become a new business unit. He said it would be an "unbeatable reference" (Vinther, 2021) to be the first turbine manufacturer in the world to build offshore. Thus, Bonus's future-oriented ambitions to become a leader in the emerging offshore wind energy market seem to have been an additional driver behind the project.

On the other hand, many involved actors did not believe that offshore wind energy would have a future, as illustrated by the following quote from a foundation engineer:

> It was far too expensive and difficult for a variety of reasons, mainly because you can't walk on water, making it hard to access the turbines and the foundations. I fully agreed with everyone else: I didn't believe it had much of a future. (Interview, Foundation designer, Elkraft)

Likewise, Bonus's project manager recounted how "many employees in the company didn't believe in the idea of an offshore wind farm … I told them that there had been other projects that no one could have anticipated 30 years earlier" (cited in *PM Network*®, 2019). To convince his colleagues, the project manager reported how he drew parallels to other breakthrough projects, like the first moon landing (*PM Network*®, 2019). Elkraft's project manager echoed this awareness of the project's importance for the future of offshore wind energy technology, indicating how practitioners subconsciously were attentive to the project's movement through time:

> We knew that if the project failed—if turbines only worked half the time and it turned out to be a scandal—offshore wind power would suffer a setback. So, we wanted to make it work. It had to be reliable… My biggest fear was having wind turbines out there breaking down one by one, and we couldn't get out to them. And then everyone could say: "Told you so! Wind turbines don't work [offshore]!" (Interview, project manager, Elkraft)

From an engineering perspective, onshore turbines had to be modified to ensure robustness in an offshore environment. During an interview, Bonus's project manager explained how the main modifications related to corrosion protection (closed nacelles, air dehumidifiers, and special paint), the cooling system (through a heat exchanger rather than using outside air), and the addition of two cranes to facilitate maintenance work (one to lift

components up the tower, one to handle components inside the nacelle). Unlike contemporary projects constructed using jack-up vessels, Bonus used barges with cranes to construct the Vindeby turbines. Concrete foundations were cast, and turbines were assembled onshore before being transported to their designated locations offshore. The barge's crane erected the wind turbines on their foundations, including towers and nacelles, with installed turbine blades.

The Vindeby project manager highlighted Bonus's organizational processes and culture as central factors that contributed to the project's successful completion:

> We were a very dedicated team … and the company was just a dream scenario back in the late 80s and the early 90s. You know, there was a very flat organization at that time. So we had a kind of fantastic winning spirit … we had a fantastic knowledge in a really small group of people (Interview, project manager, Bonus)

Uncommon for an exploratory project, which should be expected to entail imperfections and failures, Vindeby was delivered on time and within budget (Olsen & Dyre, 1993). On 12 October 1991, Minister of Energy Anne Birgitte Lundholt inaugurated the wind farm, stating that "the Vindeby project shall … demonstrate whether it at all makes sense to produce energy in the ocean. ... The hope is that the project in the longer term pushes the boundaries for what is possible" (Petersen, 2018, p. 157, own translation from Danish). Despite the potential historical significance of being the first offshore wind farm in the world, the project's inauguration received limited public attention. In Denmark, only one major national newspaper published a small article (Petersen, 2018), while internationally, only specialized press covered the event (e.g., Flood, 1990).

Overall, as a present, Vindeby transformed the potential future of an offshore wind farm into an actuality. Mostly, this enactment unfolded as a sequence of events from planning, design, and construction to commissioning. However, our findings reveal how the materialization of Vindeby involved several mundane design decisions, which, in retrospect,

would provide important learnings for subsequent offshore wind projects. Figure 2 visualizes the event configuration underlying this section.

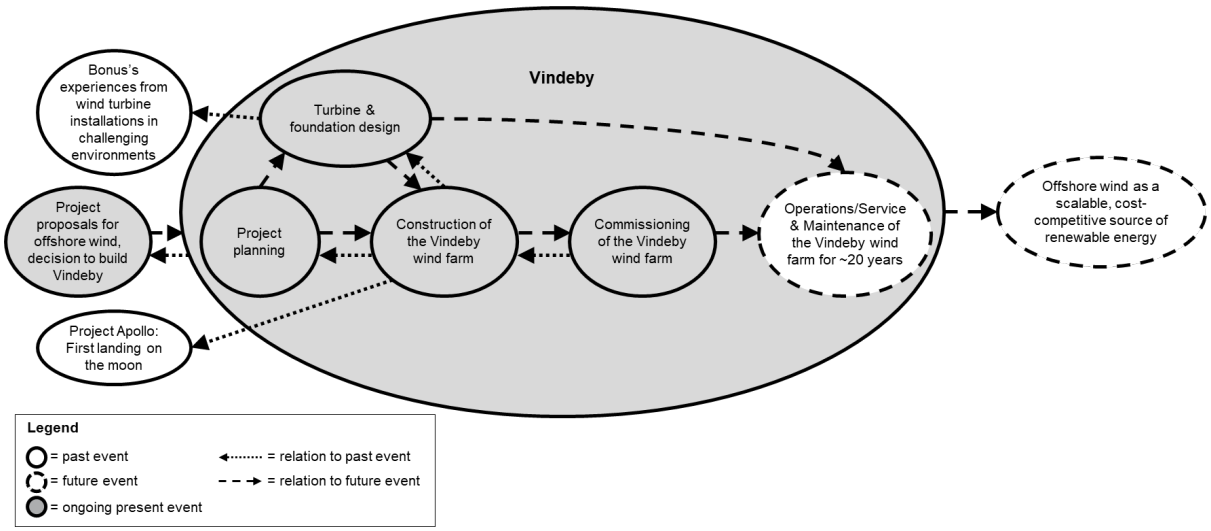

Figure 2. Event configuration of Vindeby as present.

Vindeby as Present-Future

For its operational lifetime, Vindeby represented what we term a present-future. The idea of an offshore wind farm as a potential future project had become a reality: 11 wind turbines were turning and producing electricity in the Baltic Sea. In this way, Vindeby was present. On the other hand, the designated role of Vindeby as a present was to provide a pathway toward a potential, more distant future: the installation of other offshore wind farms. Hence, we conceive of Vindeby as a present-future.

Vindeby proved to be a technical and economic success, producing more energy than expected (Barthelmie, 1998; Olsen & Dyre, 1993). Although the wind farm's inauguration had received limited attention, in subsequent years, numerous delegations representing companies and governments from around the world visited Vindeby to witness and learn more about this technological advancement, many sailing out by boat to see the wind farm up close. However, this general interest in Vindeby did not transform into specific new projects. Throughout the

1990s, only four other small-scale demonstration projects were realized in Denmark, the Netherlands, and Sweden (Barthelmie, 1998).

The slow uptake of offshore wind energy, despite Vindeby's successful demonstration of the technology's potential, puzzled and disappointed the individuals involved. For instance, the Bonus project manager for Vindeby recounted his frustration at that time:

> In '92, we could already see that the turbines were operating really fine, and it could have been a possibility to make a much bigger project … It's so disappointing to see how we've [—as Danish society—] been slow in expanding. (Interview, project manager, Bonus)

Indeed, the offshore wind power industry's development did not begin to accelerate until the early 2000s (see Figure 3), driven by larger scale projects, first in Denmark and then in the United Kingdom.

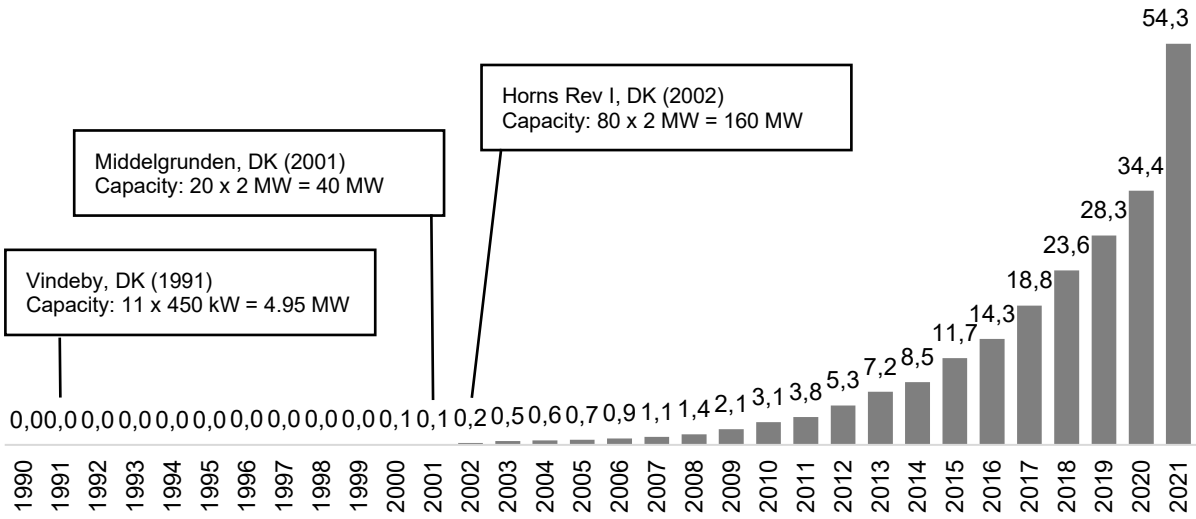

Figure 3. Cumulative installed offshore wind energy capacity worldwide (end-of-year capacity in GW, 1990–2021) (International Renewable Energy Agency, 2022).

Even after committing to building 100 MW of wind energy capacity, state-owned utilities in Denmark remained skeptical about the future of wind power both onshore and offshore and

repeatedly expressed their opposition publicly (Petersen, 2018). Elkraft's project manager for Vindeby recounted: "There were two kinds of people driving wind power—those who wanted to show that it didn't work, and those who wanted to show that it worked" (Interview, project manager, Elkraft, own translation from Danish). Additionally, whereas private individuals and cooperatives had driven the initial building of onshore wind energy in Denmark, this was no longer possible to the same extent due to unclear yet extensive regulatory requirements and high investment costs (Interview, project manager, Bonus).

Internationally, other countries had not progressed with their onshore wind buildouts to the same extent as Denmark. Thus, the siting problems and local opposition to onshore projects that had driven Danish politicians to support offshore ventures were not so acute. As a result, offshore wind was in direct competition with onshore wind:

> I think Vindeby is a very, very good example of having a great idea too early. ... In '91, onshore wind was still sort of on the rise. That means there were two innovative new forms of electricity generation competing… Then you add another layer of problems to put it in the water (Interview, offshore wind energy expert, former executive of environmental NGO)

A related factor was the pilot project's timing relative to the energy system's overall transition. While the oil crisis had incited early developments in onshore wind energy, public awareness about climate change was low in the 1990s, so there was little sense of urgency to scale up renewable energy sources.

In addition, our findings suggest how the passing of time was necessary for Vindeby to prove its worth: "Interest was growing and growing, and the success story just became … better and better every year" (Interview, project manager, Bonus). As a pilot project demonstrating a novel technology, Vindeby's credibility seemed to have increased the longer it had been in operation. In 2017, Ørsted decommissioned Vindeby after 26 years, having exceeded its

expected lifespan by 6 years (PM Network, 2019) and producing 243 gigawatt hours of power (Skopljak, 2017). The longer Vindeby had been in operation, the more valid it became as a proof-of-concept, and the more it attained the potential to be viewed as the industry's symbolic origin, as shown in the next section.

In short, as a present-future, some questioned whether the Vindeby project would be able to realize the future stakeholders had envisioned. Views of the project differed across two time horizons, leading to limited adoption after commissioning in the present while preserving the potential for diffusion and scaling of the technology in the future. However, even as the project withstood the test of time, future events and activities would need to connect to Vindeby for it to fulfill its envisioned role as a stepping stone toward the future imaginary of offshore wind. Figure 4 depicts the underlying event configuration.

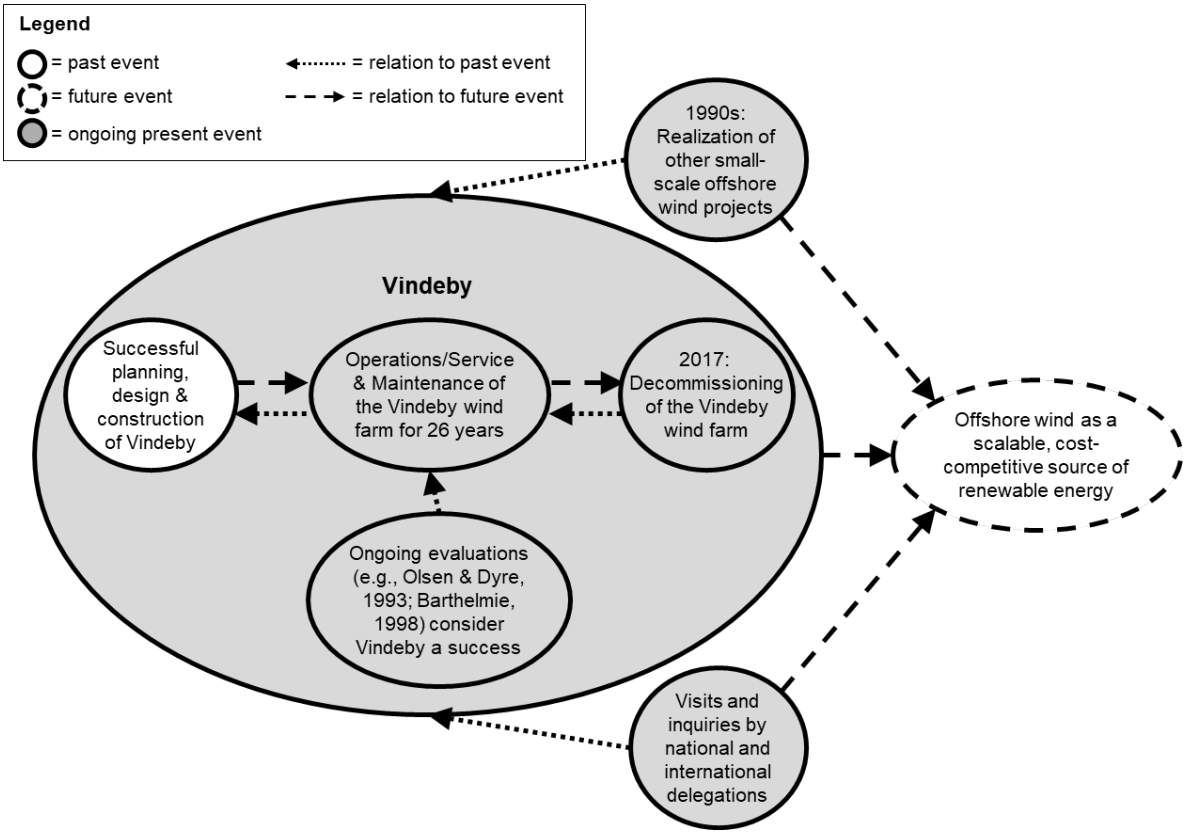

Figure 4. Event configuration of Vindeby as present-future.

Vindeby as Past

Construction on larger-scale offshore wind projects did not begin until the early 2000s, and industry growth first accelerated significantly around 2010. Our findings indicate that lagged adoption may be explained by the timing of the Vindeby project relative to the diffusion of rival technologies (e.g., onshore wind, as shown in the previous section) and the problematization of greenhouse gas emissions as a driving force of climate change. In 1997, the Kyoto Protocol, an international treaty, was the first collective commitment by governments worldwide to reduce greenhouse gas emissions. Around the same time, the Danish government launched concrete plans for two large-scale offshore wind energy plants, and the United Kingdom government developed an ambitious offshore wind energy plan shortly after that (Petersen, 2018). These two initiatives played critical roles in accelerating the development of an industry that had not gotten off the ground since the Vindeby project's realization. As a past, Vindeby became both a source of learning and a symbolic event, attaining a pathbreaking role for the offshore wind energy industry's nascent trajectory.

First, Vindeby became a source of learning for subsequent large-scale projects. Even though more than 10 years had passed by the time construction began on new projects, some of Vindeby's design decisions remained relevant: "The project's core design elements, such as the corrosion-protection system, are fundamentally the same as those used in the much bigger wind turbines produced today" (*PM Network*®, 2019). Even construction decisions made for the Vindeby project that have not been used in subsequent projects may regain relevance in the future. For instance, as the offshore wind industry pursues floating turbines, jack-up vessels are reaching their operational limits due to increasing water depths, and trials are underway with floating cranes similar to the cranes on barges used for the Vindeby project (Interview, project manager, Bonus).

Second, apart from serving as a technological and organizational learning source, Vindeby became a symbolic event. According to Ørsted's chief market developer, "Vindeby has an almost iconic status in our industry. When I am at conferences all around the world, people often say 'It all started in Vindeby'" (Honoré, 2017, own translation from Danish). Our findings reveal how Vindeby attained a symbolic meaning once the industry started to grow, providing a way to demonstrate innovation, progress, and scale, for instance, by comparing current turbine sizes to those of Vindeby. The symbolic significance of Vindeby as a past increased with its decommissioning in 2017 and peaked, at least preliminarily, with the 30th anniversary of Vindeby's inauguration in 2021.

Apart from providing a reference point for the industry, Vindeby played an important role for the trajectories of several companies, most prominently Ørsted (successor of Elkraft) and Siemens Gamesa (successor of Bonus). In the case of Ørsted, Vindeby attained a new meaning when the energy company embarked on its green transformation in 2009, refocusing its entire energy generation portfolio on offshore wind. Ørsted drew on Vindeby in legitimating this bold change in direction, attempting to convince stakeholders of their competence in the field of offshore wind energy by pointing to their longstanding expertise with the technology, even though the company had not pursued offshore wind activities in any meaningful way since the Vindeby project. In subsequent years, Ørsted referenced Vindeby when venturing into new technologies (e.g., hydrogen) and markets (e.g., Ørsted U.S., 2021). Similarly, for Siemens Gamesa, Vindeby underpinned the company's self-understanding as an offshore wind frontrunner (Braendstrup, 2021).

The symbolic role of Vindeby as a past event is not limited to the private sector. Vindeby is publicized as an industrial policy success that kick-started a novel green industry. The first paragraph of the European Commission's offshore wind strategy illustrates this point:

> "The world's first offshore wind farm was installed in Vindeby, off the southern coast of Denmark, in 1991. At the time, few believed this could be more than a demonstration project. Thirty years later, offshore wind energy is a mature, large-scale technology providing energy for millions of people across the globe. … It is a story of undisputed European technological and industrial leadership." (European Commission, 2020, p. 1)

The Danish government similarly constructs its temporal trajectory when explaining and justifying the country's leading position in offshore wind energy (Buch & Kjær, 2015). Recently, Danish government agencies have increasingly referred to Vindeby, connecting the past project to projections of a planned energy island, as exemplified by the following tweet: 'Could Danish #energyislands go global? DK has been a frontrunner on offshore energy since "Vindeby" … Now, with the North Sea Energy Island the world is once again looking to DK for tomorrow's solutions' (Denmark in UK, 2021).

Moving forward in time, it will be interesting to see whether and how Vindeby will remain a benchmark for the industry or whether it will fade into the history books, as one informant suggested: 'In 10 years' time, very few people will probably remember Vindeby as the starting point… For example, the first commercial floating offshore wind project, which is successful and large, will then probably replace Vindeby' (Interview, offshore wind energy expert, former executive of environmental NGO).

On the other hand, rather than only being a demonstration project for offshore wind energy, actors have begun to draw on the symbolic meaning of Vindeby as a past when projecting the future promise of other novel technologies, such as green hydrogen in the case of Ørsted or energy islands in the case of the Danish government. This stretching of the project's meaning may be due to its unique status as an instantly successful pilot project,

thereby counteracting the usual tendency for the relevance and importance of events to fade over time.

In short, this section showed how various actors reinterpreted Vindeby as a past in the light of present events and activities to construct and legitimize their current and future course of action (for an overview, see Figure 5). Actors seized the potentiality inherent in the project's past. Importantly, Vindeby did not cause these events or exert a forward-looking influence that shaped the growth trajectory of the offshore wind industry. Vindeby could not acquire this role until other events and activities took place, nor could it demonstrate the growth of an industry that did not yet exist; conversely, the industry's growth would have been more challenging and perhaps slower if Vindeby had never been conceived and actualized. These temporal interdependencies illustrate what we in the following theorize as the through-time perspective of project success.

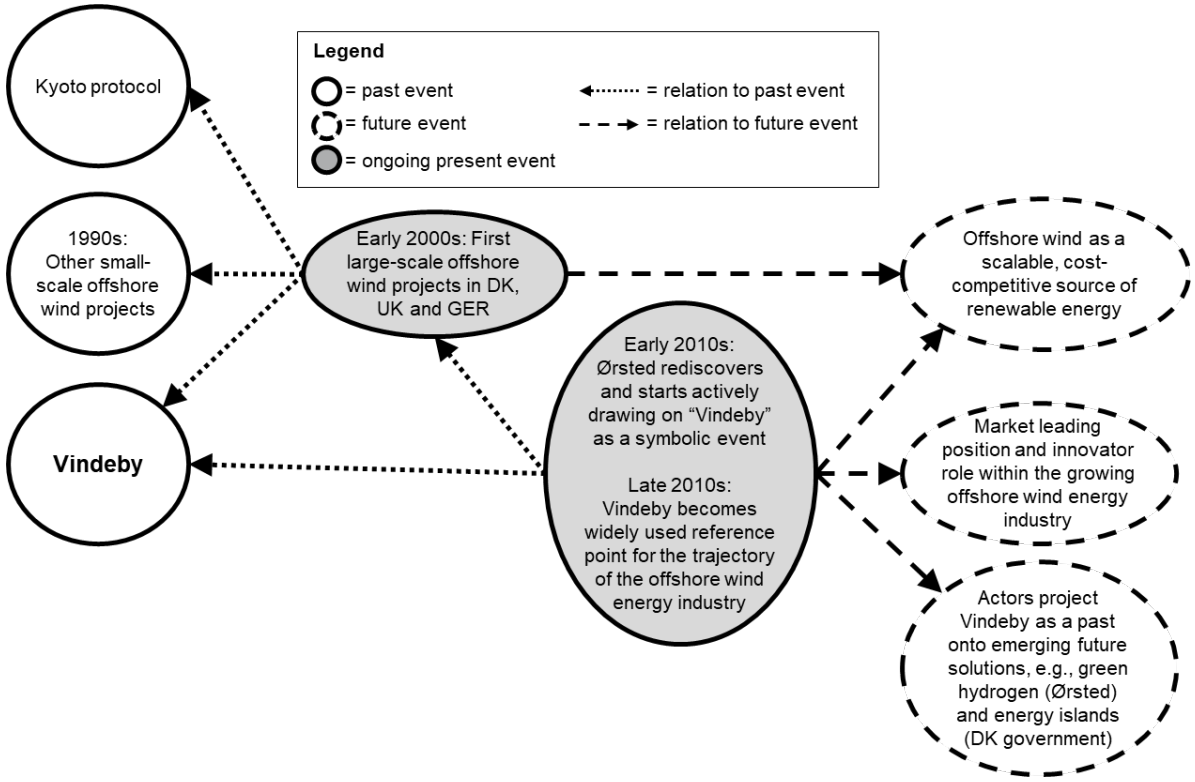

Figure 5. Event configuration of Vindeby as past.

Connecting Future, Present, and Past

In addition to revealing how actors constructed Vindeby's role as a future, present, present-future, and past project, our findings also show how actors connected these temporal constructions of the project's role and the associated conceptions of project success. As a *future,* Vindeby emerged as a timely solution connecting multiple present concerns and past events to the future imaginary of offshore wind energy. Actors envisioned the future project as a stepping stone toward the more distant future, testing the viability of offshore wind as a scalable, cost-competitive source of renewable energy. Throughout all four situated event configurations, actors continued to refer to this distant future imaginary, providing Vindeby's movement through time with direction. Even though actors involved in enacting Vindeby would not be able to influence the attainment of this objective, this distant goal was crucial to mobilizing the resources to pursue the construction of the world's first offshore wind farm.

As a *present*, Vindeby transformed the potential of an offshore wind farm into a reality. For the most part, this enactment unfolded as a sequence of events, from planning, design, and construction to commissioning. As a *present-future*, some questioned whether the present project was actualizing the future stakeholders had envisioned. Views of the project differed across two time horizons, leading to slow adoption of the technology after commissioning in the present but preserving the potential for diffusion and scaling of the technology in the future. However, our findings reveal that, even as Vindeby withstood the test of time, future events would need to connect to Vindeby for it to fulfill its envisioned role as a stepping stone toward the future imaginary of offshore wind. Finally, once the offshore wind energy industry started to grow, Vindeby, as a *past,* served as a source of technological learning and

proof of technological viability, thereby becoming the symbolic origin of the offshore wind industry and several organizational trajectories.

Our findings suggest how these situated event configurations and Vindeby's role in them were not temporally bounded or independent but mutually shaped each other. For instance, when actors envisioned the world's first offshore wind project, Vindeby as an imagined future already embodied the potentiality of becoming a symbolic past, just as actors involved in Vindeby's design and construction in the present were aware of its pathbreaking potential. Arguably, awareness of their involvement in "making history" may have contributed to the project's technological and economic success. In our discussion, we theorize Vindeby's temporal movement enacted through the connections actors drew between past, present, and future as a *through-time* perspective of project success.

Discussion

In this section, we discuss the three main contributions of our study. First, our study develops a temporal view of project success, conceiving project success as temporally constituted, emerging from the connections actors draw between past, present, and future. Second, pursuing such a temporal view, our findings revealed the importance of accounting for the temporal movement of a project, what we term the through-time perspective of project success, adding to the in-time and over-time perspectives adopted by extant studies. We develop a temporal model of project success that shows the interplay between these three perspectives. As a third main contribution, our study advances an understanding of the role of (exploratory) projects in the green transition by suggesting that moving from exploratory projects to scaling requires practitioners not only to infer but also enact the 'timing' of projects. We argue that projects may function as *temporal stepping stones* toward more

sustainable futures, helping organizations in making distant futures actionable (Schultz, 2022).

A Temporal View of Project Success

The first main contribution of our study is to advance a temporal view of project success, responding to recent calls to understand better the temporal dynamics of project success (Ika & Pinto, 2022; Meredith & Zwikael, 2019). As a first step in developing this temporal view, we clarified how extant studies of project success mostly considered 'time' a background against which project success is constructed *in time* or changes *over time*. These extant temporal perspectives of project success guided our analysis of the Vindeby case.

In a second step, inspired by recent advances toward a situated temporal view (Dille et al., 2023; Hernes, 2022; Hernes & Schultz, 2020; Sergi et al., 2020; Vaagaasar et al., 2020), we argued that prior studies did not consider project success as a temporal phenomenon in itself. From this view, project success is temporally constituted, emerging from the connections actors draw between a project's past, present, and future. Whereas extant studies pointed to the temporal dimension of project success as one dimension among others (Ika & Pinto, 2022), we draw attention to the inherent temporality of project success. Using the notion of 'temporality,' we grant the passing of time ontological status (Hernes, 2022; Vaagaasar et al., 2023) in how project success evolves.

Pursuing this view in our analysis allowed us to appreciate how constructions of success at one point in time mattered for how actors constructed success at other points in time. This insight led to our development of the through-time perspective of project success.

The Through-Time Perspective of Project Success

As our second main contribution, we propose the *through-time* perspective of project success, adding to the *in-time* (e.g., Chang et al., 2013; Ligthart et al., 2016; McLeod et al., 2012; Stjerne & Svejenova, 2016; van Marrewijk, 2017; Zerjav, 2021) and *over-time* (e.g., de Wit, 1988; Meredith & Zwikael, 2019; Sabini et al., 2019) perspectives adopted by extant literature on project success. The through-time perspective captures the connections through time between the temporal construction of project success of the project as future, the project as present, and the project as past, as revealed by our findings. It highlights the event pattern that emerges from a project's movement through time, focusing on how different meanings and roles of a project at different points or during different periods mutually shape one another. Our development of the through-time perspective takes inspiration from Hernes (2022), who unfolds a view of social actors as 'tangles of intersecting temporalities' (p.v):

> Actors move with the flow of time while making their own representations of time, of the present, past, and future. As they move through time, they develop traces of the past and emerging representations of the future, which … may be seen as tangles of intersecting temporalities. ... Seeing actors through the lens of movement allows us to analyze both their actuality and potentiality. (Hernes, 2022, p. v)

Instead of emphasizing differences between a project's past, present, and future, as the over-time view does, treating these as separate moments or periods in time, a through-time perspective focuses on the temporal wholeness of a project. It captures the distinguishable temporal pattern that a project attains as it moves through time, what we, adopting a situated temporal view, may call a project's 'temporality' (Hernes, 2022; Vaagaasar et al., 2023). This pattern is never settled but remains subject to ongoing remaking in light of the potentialities presented by each new present (Hernes, 2022).

Rather than seeing success and failure as two sides of the same coin (Ika, 2009), a through-time perspective suggests a need to overcome the success/failure dichotomy

altogether. Instead, consistent with a performative view of projects (Sergi et al., 2020), a through-time perspective is sensitive to what a project *does*. Our findings show how Vindeby took on different roles and functions over time, yet which roles it could take on at a specific point in time depended on the movement the project had taken and was taking through time, creating novel potentialities and actualities along the way. Thus, what a project does and can do is temporally constituted and not just changing over time.

Prior project studies pointed toward a through-time perspective of project success without explicating or conceptualizing it. Kreiner (1995) argued that although projects are typically designed to achieve meaningful outcomes, it should not be assumed that the initially intended outcomes will remain relevant over time in the face of environmental drift. Engwall (2003) clarified the temporal embeddedness of projects, observing how past events and future projections directly influenced the present inner dynamics of the project yet did not attend to the project's temporal movement through time. Van Marrewijk's (2017) study of a Dutch high-speed train project comes close to what we term the through-time perspective by showing how meanings that stakeholders attach to a past project not only shape its evaluation as a success or failure in the present but also affect future possibilities. Likewise, recent studies advancing a narrative perspective of projects also hint in this direction (Carlsen & Pitsis, 2020; Sergeeva & Winch, 2021).

A Temporal Model of Project Success: Combining *Over Time*, *In Time*, and *Through Time*

To conceptually represent our temporal view of project success, we develop a temporal model that combines and explains the relationship between the in-time, over-time, and through-time perspectives of project success (see Figure 6). To allow the representation of all three perspectives in one model, the model plots 'time' twice. Vertically, the rows (T_1 to T_3)

show the (chronological) flow of time from top to bottom. Horizontally, the columns (past, present, future) show socially constructed time. Keeping both temporal dimensions in sight simultaneously is pivotal to our main argument, even if perhaps counterintuitive at first glance.

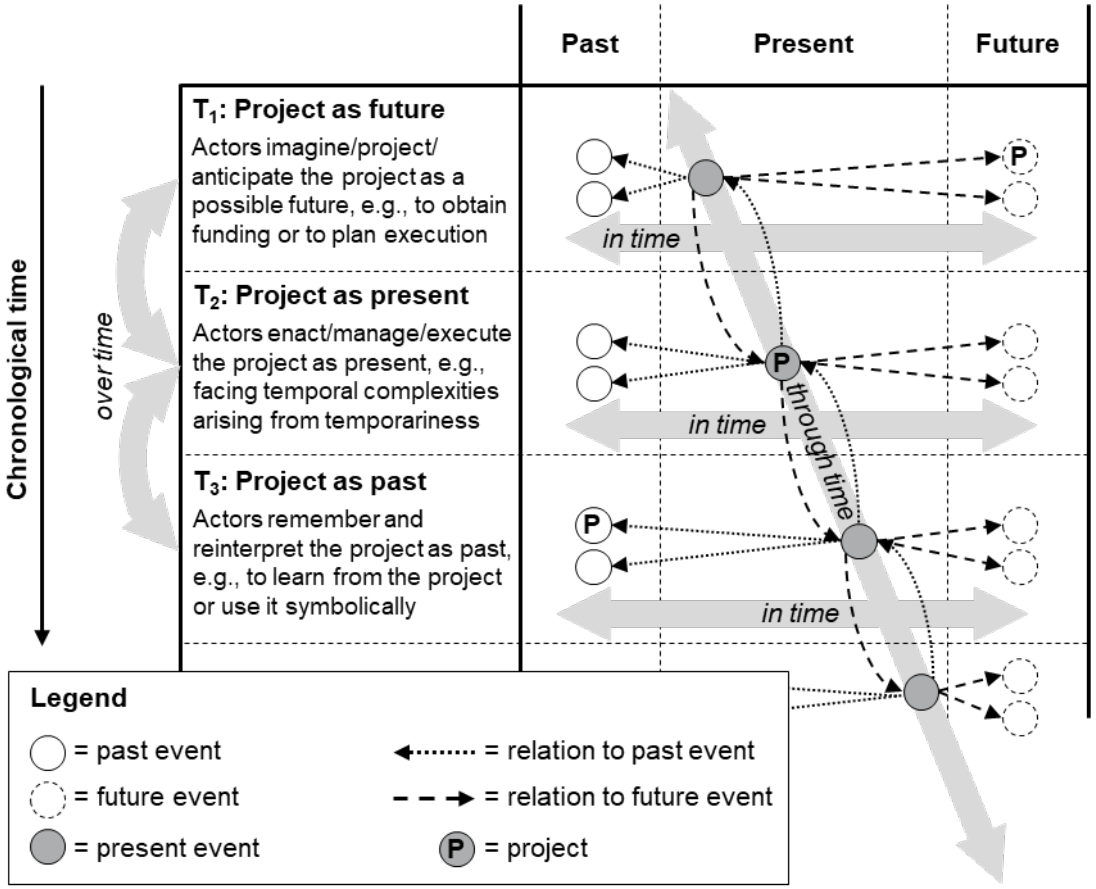

Figure 6. A temporal model of project success.

First, the model captures the over-time perspective through the periods T_1 to T_3, plotted from top to bottom. With the passing of time, the project is first a future, becomes a present, and eventually a past, as indicated by the event marked with a capital P. At T_1, actors imagine/project/anticipate the project as a possible future, for example, to obtain funding or to plan execution. At T_2, actors enact/manage/execute the project as present, for instance, facing temporal complexities arising from temporariness. At T_3, actors remember and

reinterpret the project as past, for example, to learn from it or use it symbolically. The over-time perspective focuses on the differences in project success between these different periods in time, tracing changes in project success over time.

Second, corresponding to the in-time perspective, each point or period T_1 to T_3 has its own situated past, present, and future, represented horizontally across the respective columns. Project success is constructed and negotiated at each point or period through the connections actors situated in the temporal flow of the ongoing present draw between past, present, and future events. The model indicates these connections through the arrows toward remembered and reinterpreted past and imagined or anticipated future events.

Third, the model represents the through-time perspective as the connections actors draw across these in-time constructions of project success. While constructing the project as future (T_1), the project as present (T_2), and the project as past (T_3) are anticipated futures. Likewise, during the construction of the success of the project as past (T_3), the project as future (T_1) and the project as present (T_2) have become pasts. The through-time perspective captures how actors enact the project's temporal movement through time by drawing connections between past, present, and future in-time constructions of project success. In contrast, an over-time perspective of project success highlights the differences between the outcomes of these in-time constructions of project success. In short, the over-time and the through-time perspectives represent different ways of abstracting from the ongoing construction of project success in time.

Our model invites analysis of how project success takes shape through how actors, situated in the flow of time, draw connections between a project's past, present, and future. The model keeps the three perspectives analytically separate and invites future studies to investigate their interplay, thereby advancing an understanding of projects' movement through time. Our study highlights how adopting only an in-time or over-time perspective

inhibits a through-time understanding of projects, which accounts for the temporal movement of actors and the projects in which they are engaged. In addition, it provides distinctions and concepts for future studies to clarify which temporal perspective of project success they adopt, even if they are not focally concerned with time and temporality.

The Role of Projects in the Green Transition

As a third main contribution, our study advances an understanding of the role of (exploratory) projects in the green transition. Previous research shows how the pursuit of distant sustainable futures poses a significant challenge for organizations in general and corporations in particular (Augustine et al., 2019; Gümüsay & Reinecke, 2022; Slawinski et al., 2017; Slawinski & Bansal, 2015; Wright & Nyberg, 2017). As an increasing number of organizations are making binding sustainability commitments with a 15–30-year future horizon, it becomes important to understand how actors may translate distant sustainable futures into short-term strategies (Schultz, 2022).

We put forward two ways in which projects may aid organizations in making distant futures actionable. First, our study suggests a need for practitioners to *make projects timely*, which requires not only inferring the right timing but also enacting a project's timeliness. We distinguish between two kinds of timeliness: (1) the timeliness of the project itself and (2) the timeliness of the project's outcomes. Practitioners can ignite the move from exploring to scaling sustainable solutions by carefully crafting connections between these two kinds of timeliness. Second, we argue that projects may function as *temporal stepping stones* toward more sustainable futures. We propose five ways for project managers and policymakers to nurture this potential.

Making Projects Timely: From Inferring Timing to Enacting Timeliness

Research increasingly investigates how to develop and deploy sustainable solutions through projects (Huemann & Silvius, 2017; Marcelino-Sádaba et al., 2015; Sabini et al., 2019). Instead of only considering the immediate outcomes of projects, recent studies examine the role of projects in the green transition more broadly (Gasparro et al., 2022; Geels et al., 2023; Ika & Munro, 2022; Lenfle & Söderlund, 2022; Nylén, 2021; Sovacool & Geels, 2021), for instance as vehicles for moving from exploration to scaling. These studies are united by an assumption of 'forward causality' (Allport, 1954), implying that past events lead to present events, subsequently leading to future events (see also Hernes, 2022). This assumption comes to the fore, for example, in arguing that it is possible to design 'vanguard projects' to achieve sustainability goals through rapid technology development (Gasparro et al., 2022) or purposively employ 'project-oriented agency' to target critical transition problems (Lenfle & Söderlund, 2022).

However, by only viewing the future as open and malleable, the assumption of forward causality overlooks how the past may remain open to reinterpretation. Indeed, our study demonstrates how the Vindeby project initially did not exhibit agency nor spark successive future projects. Our analysis of the Vindeby case suggests how *projects may not become a success in and of themselves* solely through their activities and immediate outcomes. Instead, temporally situated actors amplified successful aspects and reinterpreted failures to turn the project into a success.

The concept of 'timeliness,' we argue, helps explain how project managers and policymakers may influence the connection between exploration and scaling. In contrast to prior research using the concept of 'timing' (Dille & Söderlund, 2011; Ika & Pinto, 2022), implying an ability to infer the 'right time' vis-à-vis the environment of a project, the notion of 'timeliness' emphasizes how actors may not only *infer* but also *enact* timing (see also

Garud et al., 2011; Geraldi et al., 2020; Jarvenpaa & Välikangas, 2022; Lantz & Just, 2021). Whereas the concept of timing suggests that project success may depend on whether a project and its outcomes *are* or *are not* timely, the concept of timeliness, as we use it here, denotes that actors may *make a project timely* through how they draw connections to other past and future events or activities. In this way, timeliness emerges from the interplay between the temporality of the project and the temporalities of other actors, events, and activities.

Our study revealed how Vindeby's movement through time involved enacting two kinds of timeliness. On the one hand, actors enacted the *timeliness of the project itself* to ensure its realization. Actors connected past, present, and future events so the project as a future emerged as timely and worth pursuing. On the other hand, actors enacted the *timeliness of the project's outcomes* during and after project completion by reinterpreting and connecting them to emergent present and future concerns and events. Actors associated Vindeby with other present, past, and future events and activities related to the overall project (symbolically, as a singular event) or specific aspects of the project (for instance, by learning from specific technological design decisions) to support the scaling of offshore wind technology.

A through-time perspective draws attention to the *temporal connection between these two kinds of timeliness*. It highlights that the reinterpretation of the past project and its outcomes are not arbitrarily malleable. For example, members of Vindeby's project team were acutely aware that failure in realizing the projects would hinder or at least postpone further development of offshore wind energy. In contrast to Kreiner (1995), who observed project relevance to erode due to environmental drift, Vindeby became timelier and thus gained significance over time. In other cases, technological and societal developments may shift in a different direction so even successful (exploratory) projects run in danger of fading

from collective memory, like the Concorde—the first supersonic passenger-carrying commercial airplane—project (Morris & Hough, 1987).

In short, our study suggests a temporally open and malleable conception of project success, in which a project's success or failure depends not only on the project itself but also on how actors at other times refer to the project and its outcomes. Arguably, this conception alleviates some of the pressures for projects to be successful because success is not (only) in the hands of the project members. At the same time, it underlines how managing for success, nonetheless, may be more intricate than perspectives based on forward causality indicate. The agency of a project (Lenfle & Söderlund, 2022) may not only harbor in the project itself but in how actors imagine and anticipate as well as remember and reinterpret the project and its outcomes. Prior research shows that temporal misalignments may inhibit green transitions (Geels et al., 2023), underlining the importance of making projects timely instead of biding for their time to come.

Projects as Temporal Stepping Stones Toward Sustainable Futures

Our study suggests how projects may provide a way for organizations to make distant futures actionable (Schultz, 2022) by functioning as *temporal stepping stones* toward sustainable futures. As futures, projects allow us to articulate, negotiate, and combine the respective, potentially diverging distant futures imagined by heterogeneous actors across societal sectors into a shared sustainable future. As presents, projects secure organizational resources and sustain actors' focus to ensure the materialization of this shared future. As present-futures, projects demonstrate the viability of sustainable solutions and technologies, thereby sustaining belief in pursuing the sustainable futures they point toward. As pasts, projects provide learning and legitimacy for successive projects and thereby facilitate scaling but may also inspire novel sustainable futures. Projects become temporal stepping stones if and when

actors create and sustain a connection between these different temporal functions across time. In that case,projects contribute to the gradual actualization of the potential distant sustainable future actors pursue. Inspired by the Vindeby case, we propose five ways for project managers and policymakers to nurture the potential of projects to serve as temporal stepping stones toward sustainable futures. We illustrate our points with examples from Ørsted's ongoing efforts to mature Power-to-X technologies.

First, the Vindeby case underlines the importance of *physical prototypes and demonstration projects*, enacting the timeliness of sustainable solutions by making them relatable and graspable as 'present futures' and thereby increasing chances for their scaling. The material temporality (Hernes et al., 2021) of the physical wind turbines seems to have played an essential role in keeping 'offshore wind' alive between the time horizons of initial project realization and the technology's scaling. The durable materiality was 'patient,' remaining open for new ascriptions of meaning, similar to what Feddersen et al. (2023) observed for a landmark building. Ørsted's involvement in several Power-to-X pilot projects indicates an awareness of the potentiality inherent in demonstrating sustainable solutions' viability at a small scale, providing a way of exploring multiple 'present-futures' simultaneously.

Second, for project managers, the Vindeby case suggests a need to *shape the project's 'afterlife' or 'legacy'* already during project execution, being alert to and seeking to shape how the project will be conceived of in the future, for instance, through strategic use of narratives (Sergeeva & Winch, 2021). One strategic goal could be to focus efforts on securing a follow-up project to sustain the momentum of the new technology through time, even if this project will not receive the same amount of government funding. Ørsted's investment into Europe's largest e-methanol plant in Sweden provides a case in point, with Ørsted's CEO of Power-to-X commenting that this project

> … proves our intention to take proactive investment decisions in order to drive the rapid maturation of the Power-to-X market beyond ambitions and announcements and into the delivery of molecules. ... Our first offshore wind projects came with significant risk, but we saw a route to … deliver that technology as a cornerstone in the green transformation. Today, Power-to-X is at a similar inflection point, and at Ørsted, we're once again ready to assume risk and lead the maturation of this crucial technology (cited in Lee, 2022).

This statement demonstrates an awareness of the need to sustain the momentum built up through a portfolio of smaller scale projects piloting Power-to-X technology, even if this means taking considerable investment risks.

Third, the fate of Vindeby suggests that the demonstration of technological and economic viability alone may not be sufficient conditions to create a future for green solutions but that they need to *connect with emerging current and future policy visions and objectives* to become temporal stepping stones toward distant future imaginaries (Augustine et al., 2019). For project managers, it is crucial to be aware of and potentially influence and shape policy visions and objectives, drawing temporal connections between past, present, and future projects and the (technological) futures envisioned by policymakers. They should attempt to connect 'their' project to the futures imagined by policymakers, foreshadowing their project's eventual legacy as a temporal stepping stone toward these futures. For instance, the 'Green Fuels for Denmark' Power-to-X project, developed by Ørsted in collaboration with key technology providers and industrial consumers from hard-to-abate transport sectors, provides an example of a project that connected to and eventually became central to the strategy of the Danish government and European Power-to-X, documented by its status as an 'Important Project of Common European Interest' (Habibic, 2022).

Fourth, given the uncertainty about which technologies will scale and when, our study suggests the need to pursue *multiple alternative technology trajectories* simultaneously. It underlines the dangers inherent to policymakers picking the winners too early. The concurrent development of different electrolyzer technologies for producing green fuels provides an example, with rivaling technologies currently being tested in exploratory and demonstration projects (Bermudez et al., 2022). The case of Vindeby suggests that policymakers should not settle prematurely on the 'Vindeby of green fuels.' In fact, given the many different use cases of Power-to-X technologies and types of green fuels, there will presumably be multiple.

Finally, considering the increasing urgency to act upon the multiple ensuing sustainability crises, policymakers and project managers will have to carefully consider the *scale of projects*—whether and when to pursue small-scale exploratory projects versus megaprojects. This choice will depend on the kind of sustainable solutions under development and the time available for scaling. While roughly 10 years went by between Vindeby's realization and the scaling of offshore wind technology, we will not have the same amount of time moving forward. Megaprojects may provide a way to accelerate scaling by decarbonizing whole industries, as exemplified by the 'Green Fuels for Denmark' project, or entire industrial clusters, as the Humber case illustrates (Geels et al., 2023). In contrast, acting on biodiversity loss, for instance, presumably demands a small-scale, explorative approach sensitive to complex social-ecological systems dynamics (Howard-Grenville & Lahneman, 2021; Williams et al., 2021), as documented by Ørsted's involvement in the *Wilder Humber* project (Ørsted, 2023), seeking to restore seagrass, salt marshes, and oysters in the Humber estuary.

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