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# in a stagnating acceleration phase

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# Facing transition phase two

## Analysing actor strategies in a stagnating acceleration phase

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### Abstract

Energy transition processes are currently entering into a new phase which is characterised by the maturation of renewable energy technologies and the challenges of system integration and regulatory changes, in particular the introduction of tender schemes for onshore wind energy. In the German wind energy sector, these policy changes are resulting in a drop in build-out during a phase in which acceleration instead of stagnation would be expected. Furthermore, insolvencies, dismissals and relocations are taking place among major wind actors and are increasing uncertainty within the sector.

This paper analyses how actors in the wind sector are reacting to the introduction of the tender scheme and how their strategic activities are affecting the transition process. To this end, we analyse four strategies: relocation, cooperation, business field diversification and exit. Specifically, we analyse the reactions of project developers, turbine manufacturers, energy utilities and banks. We show that the strategies chosen by crucial wind energy actors may actually be slowing down the transition process rather than accelerating it. We argue that adopting an actor strategy perspective enables new insights for sustainability transition research while at the same time highlighting implications for public policy and strategic management.

JEL classifications: O23, O33, Q01

Key words: energy transition, sustainability transitions, actor strategies, acceleration, onshore wind, transition phase

## 1. Introduction

Energy transition processes are entering into a new, still unexplored phase (Markard 2018). While the first phase of the energy transition was mainly characterised by developing and expanding renewable energy technologies, the second phase is characterised by the challenges of system integration and restructuring the energy system. Following Rotmans et al. (2001), this new phase can be defined as an acceleration phase during which the transition gains momentum. However, looking at the current transition dynamics in the German wind sector, the question arises whether acceleration has in fact been replaced by stagnation. In 2018, a tender scheme replaced the feed-in tariff for wind and PV. The newly installed capacity dropped by over 50 percent in 2018. This process has been accompanied by insolvencies, dismissals and relocations of major wind energy players. In order to understand the current phase within the transition process, focussing on actors and their (changing) activities appears to be a promising perspective. We thus ask: How are actors in the wind sector reacting to changing framework conditions and what do these reactions imply for the energy transition process?

This paper presents an inductive empirical analysis of actor strategies in the German wind energy sector with a particular focus on their consequences for the energy transition process. Based on 96 expert interviews, our findings reveal the enormous uncertainty and resulting reaction pressure on both incumbents and challengers. In this empirical analysis, we derive four types of actor strategies: First, actors look for new and more stable markets – either in other regions or abroad (relocation strategy). Second, they aim to overcome uncertainty via cooperation, mergers and acquisitions (cooperation strategy). Third, actors deepen and broaden their activities along the value chain (business field strategy). Fourth, actors shift their activities away from the wind sector, face insolvency or close sites (exit strategy). The strategies chosen by the actors in reaction to changed framework conditions directly affect the transition process as their focus is either shifted towards advancing the transition or – in instable markets – stabilising a company's business. We show how the observed activities call the progress of the transition process into question and contribute to sustainability transition research by elucidating the consequences of strategic activities in the transition process (Köhler et al. 2019).

The paper is structured as follows. Following the introduction, we outline the new challenges that are arising in the current transition phase and revisit existing theories of strategic actor behaviour. On this basis, we argue that there is a need for an inductive analysis of actor strategies in order to explain the concurring strategies in more depth (2). After introducing our methodological framework (3), we briefly outline the political context of the empirical case: Germany's wind energy policy and its current challenges (4). Chapter 5 presents empirical evidence that can be clustered into the four outlined strategies. We discuss these strategies and their implications for the energy transition (6) before setting out our conclusion (7).

## 2. State of the art: Challenges of transition phase two and strategies

Energy transitions have so far been characterised by a fairly linear phase model comprising the phases of predevelopment, take-off, acceleration and stabilisation (Rotmans, Kemp, and van Asselt 2001). The further we progress in real-life transitions, the more we realise that the acceleration phase is underspecified and that stabilisation will not become a new reality anytime soon. Consequently, there has been growing interest in understanding the challenges of later qualitatively different transition phases (Andersen and Markard 2020, Sinsel, Markard, and Hoffmann 2020, Köhler et al. 2019). This increasingly draws attention towards the decline (Rogge and Johnstone 2017) and destabilisation of incumbent regimes, focusing for example on the phasing out of nuclear or coal technology (Leipprand and Flachsland 2018). Several researchers highlight the importance of the acceleration of transitions (Hess 2020, Roberts and Geels 2019) and call for deeper insights into how to govern transitions and achieve acceleration in practice (Köhler et al. 2019, Sovacool 2016).

Compared to the early transition process, this second new transition phase is undergoing changes in five dimensions (Markard 2018). Technologies are maturing and their diffusion is accelerating. Renewable technologies are being complemented by so-called “phase two” technologies such as batteries and further storage options. At the same time, the decline in conventional power generation such as coal and nuclear is beginning (technology dimension), leading to shakeouts. The latter, however, also concern new renewable technologies that are advancing in their life cycle, maturing and manifesting themselves as industries (actor dimension) (Markard 2020, Klepper 1997). For the first time, established businesses are being threatened. This is resulting in struggles to defend the status quo by incumbents (actor dimension). While support for renewable energies is being downscaled and tenders that make it possible to control the build-out of renewable energies are being introduced at the political level, policies facilitating system integration are also being discussed and – slowly – implemented (policy dimension). What distinguishes phase two from phase one are developments in and integration with adjacent sectors such as transport and buildings (context and adjacent sectors) (sector coupling) as well as a new focus on the system integration of intermittent renewable energy (sector level performance) (Markard 2018).

It is evident that these dynamics change the scope for action for actors related to sectors involved in the transition process. However, we know very little about the social dynamics and, particularly, the characteristic actor behaviour in the second transition phase. This leads us to the following research question:

*How are actors reacting to the challenges of the current transition phase? Which strategies are they adopting and how are these impacting the further transition process?*

In order to understand changing actor behaviour, we focus on strategies, understood as the deliberate activities taken by actors to achieve a long-term goal (Hess 2019 with reference to Oxford English Dictionary). Actor strategies in the field of transition research – together with a focus on actors themselves – represent a still neglected area of research in the field (Hess 2019, Farla et al. 2012).

An exception is the analysis of strategic responses to fuel cell hype. Konrad et al. (2012) analyse how different organisations respond to changed conditions. They distinguish between discourse and innovation activities. The authors build on a strategic management perspective for their innovation strategies “enter, increase, continue, reduce, exit” (Konrad et al. 2012).

In strategic management literature, changing business models and business model innovations are seen as drivers of low-carbon transitions (Bolton and Hannon 2016, Wainstein and Bumpus 2016). Nevertheless, research on business models often focuses mainly on incumbents such as energy utilities (Bryant, Straker, and Wrigley 2018, Hall and Roelich 2016, Nillesen and Pollitt 2016). Among these, Müller, Steinert, and Teufel (2008) adopt the view of diversification strategies. Applied to German energy utilities after liberalisation, the authors find that utilities pursue three different types of strategies. Either they choose a 1) product diversification strategy (such as green electricity) or a 2) market diversification strategy which changes the geographical scope of the utilities’ activities. Both strategies focus on activities within the electricity sector. The authors also found that some utilities 3) diversified beyond the electricity sector. Thus, utilities also shift activities to other sectors than their core field of activity and, consequently, become less dependent on the electricity sector.

Evasive strategies are also considered in the strategic reactions of utility companies towards subsidy policies in the German, Spanish and UK electricity markets (Stenzel and Frenzel 2008). Applying a political management strategy approach, the authors investigate how firms coordinate their technological capabilities and political activities in the wind sector. According to Stenzel and Frenzel, firms pursue four different corporate political activities: Either they choose a proactive strategy which is outward oriented (e.g. definition of norms, redefinition of current legislation), a defensive strategy advocating the status quo, an anticipatory strategy having an internal focus (e.g. establish best practices), or a reactive strategy which focuses on internal developments (Stenzel and Frenzel 2008). In a similar vein, Engau and Hoffmann (2011) define strategic responses to situations of regulatory uncertainty. Their responses cover avoidance, reduction, adaptation and disregard strategies (Engau and Hoffmann 2011). Again, the typology includes evasive strategies (avoidance and reduction) while at the same time the strategies highlight companies’ endeavours for stability.

Ratinen and Lund (2014) analyse how the social context influences utilities’ growth strategies. Inspired by Whittington (2010), they distinguish between four strategies applied by incumbent energy firms: domestic orientation, internationalisation, diversification and adaptation. They find that the German utilities RWE and E.ON – having strong relations with the government – primarily focus on the internationalisation strategy in order to grow (Ratinen and Lund 2014). Again, this strategy typology also contains evasive strategies, best illustrated by the internationalisation strategy.

The different contributions to strategies provide valuable insights. They are, however, limited as they remain focused on management studies, on particular actor types and are not systematically connected to the specific challenges of the second transition phase as outlined above. We therefore suggest an inductive analysis of actor strategies in order to reach a more

comprehensive understanding of how actors are reacting to the current transition dynamics, which we will later link back to the outlined strategies.

## 3. Sampling and methods

This article focuses on actor strategies in reaction to the introduction of tenders in the current second transition phase. In order to conduct an in-depth analysis of these strategies, we concentrate on wind energy as this is a mature renewable technology and accounts for the second highest share of the German electricity mix after lignite (Agora Energiewende 2020). Germany is one of the leading wind energy markets and the biggest wind market in Europe. However, its lengthy development history has recently experienced setbacks and therefore makes for an interesting case study.

*Case study and case selection*

A heterogeneous set of economic actors are active in the wind energy sector. This paper focuses on four actor groups: manufacturers, project developers, banks and utilities. These actors are central for the wind energy sector as manufacturers produce the turbines and thus the main technology; project developers (once the challengers) enable the build-out by obtaining approvals and securing sites; banks finance these projects; and utilities (typically seen as incumbents) expand their activities in the wind sector acquiring and building wind parks. Other non-economic actors from politics, services, science and civil society also contribute decisively towards the advancement of the wind energy sector. While non-economic actors are not the focus of this paper, their assessments and evaluations of the changes in the wind sector and especially within the analysed actor groups have been taken into account.[1]

In order to cover a broad variety of strategies, we consider actors at both the centralised national level and the decentralised regional level. Numerous wind energy actors are located in Northern Germany where wind conditions are generally favourable. The main data for this case study stems from Berlin (national level), Hamburg, Oldenburg and the Uckermark. These regions are strong in wind energy, but they also illustrate different approaches towards wind energy and thus provide insights into a wide array of possible actor strategies. While Oldenburg represents a Western German region with a strong wind research focus and a high density of wind energy service companies, the Uckermark is a rural area in Eastern Germany with a comparably lower income structure but a much stronger density of wind parks. Hamburg is home to almost all turbine manufacturer headquarters and many utilities, has a strong finance sector and heavy industry. Berlin is the base of many interest associations representing wind energy stakeholders as well as ministries. The heterogeneity of the regional orientations chosen represents the maximum of different challenges that actors have to cope with. Any similarities identified thus enable us to draw more general conclusions about the activities and strategies of actors.

[1] This research is part of the project REENEA that investigates the social dynamics of regional energy transitions in Northern Germany. It is operated by the University of Oldenburg and financed by the German Research Foundation (grant no. 316848315).

*Data collection*

This paper follows an explorative qualitative approach primarily based on 96 semi-structured expert interviews and complemented by document research. In the complementary desk research, we analysed secondary data such as annual reports, press releases and media articles. Additionally, we documented strategic choices made by manufacturers, project developers and energy utilities, also covering actors we did not interview. This allowed us to gain an understanding of the field, each organisation's current situation and their strategic reactions taken. Moreover, we conducted participant observations at wind fairs, sector meetings and conferences. The results have been presented and discussed with actors from the sector in order to verify them.

We conducted 82 interviews in Oldenburg, Hamburg and the Uckermark and 14 at the national level. These 96 interviews lasted on average 1:09 hours. The interview partners selected for our in-person interviews were in charge of wind energy and its build-out or responsible for wind products, services or strategy; many of them were department heads or CEOs. After identifying the most relevant wind energy actors, our sample was adapted based on recommendations from interview partners regarding the most relevant actors. We assumed that these actors have a good overview of change processes in the wind energy sector and strategies chosen by the organisation they work for. In our standardised interview guideline, we explicitly asked for changes in their activities and roles. We centred our analysis around the question of their (strategic) reactions to the introduction of tenders, their resulting adaptations, strategies and room for manoeuvre. We asked about changes in activities, focus and area of activity in comparison to former strategies and double-checked developments in the sector by asking about observed changes among competitors, thus also learning about exits, for example. The interviews were recorded and transcribed. We developed a coding scheme, tested and refined it, and used co-coding procedures and group discussions as feedback loops in which we compared coded sections to avoid coding biases and to reach consensus about codes and increase reliability (Kuckartz 2016). Finally, we coded our interview data with QDA software and analysed it by means of qualitative content analysis.

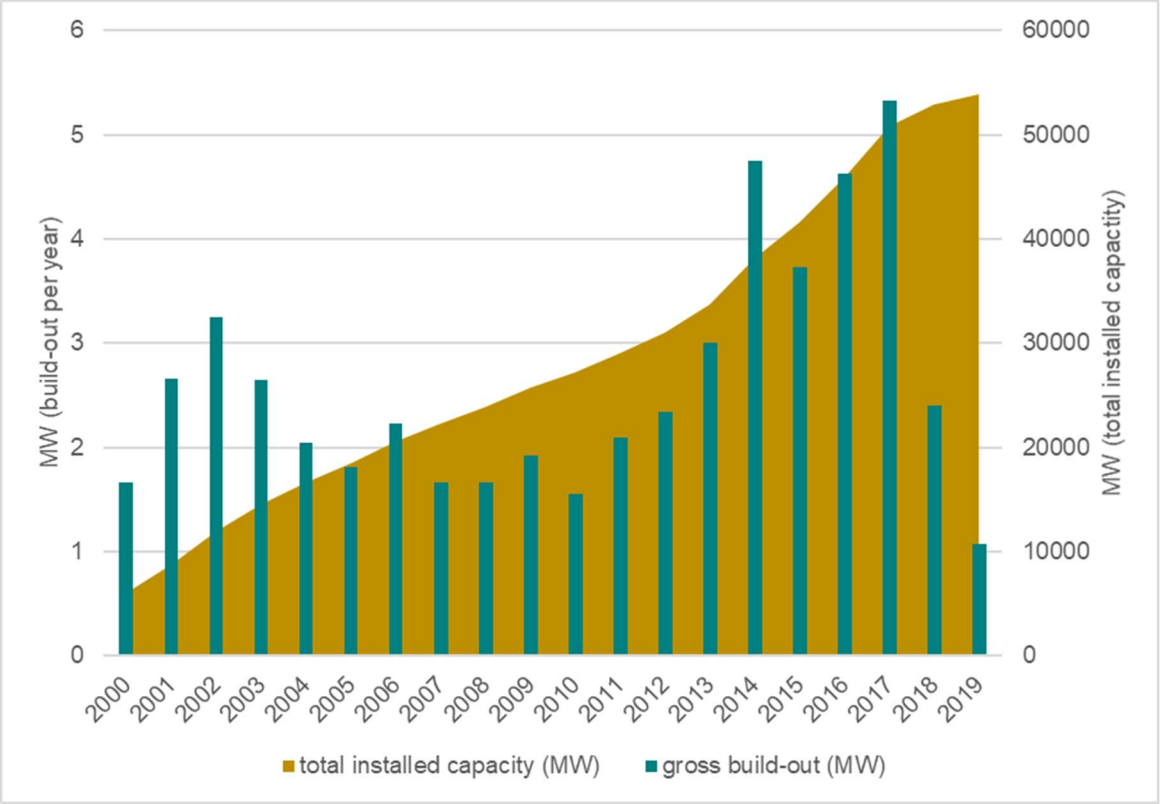
*Data analysis*

Data analysis was a three-phase iterative process between coding and theorising. In the first step, we coded the interview passages relating to strategic choices and changed business activities in reaction to the introduction of tenders. In the second step, we inductively developed subcodes for similar strategic choices and derived four different types of strategies: 1) a relocation strategy covers spatial diversification; 2) a cooperation strategy describes mergers and take-overs as well as strategic partnerships; 3) the business field strategy includes product innovations and a focus on new technologies, consequently reflecting a deepening or broadening of business activities. 4) The last strategy describes exits from the energy sector and thus differs qualitatively from the first strategies. In the third step, we further differentiated between our four strategies. In order to develop subcodes for the detected strategies, we summarised and paraphrased the relevant information contained in the quotes in reduction tables, thus further abstracting the data (Mayring 2010).

## 4. Wind energy policy in Germany: Changing framework conditions

The introduction of the German Renewable Energy Sources Act in 2000 (EEG 2000) was an important milestone in renewable energy policy and triggered the development of wind energy. It introduced fixed feed-in tariffs for electricity from renewable energy sources and guaranteed a fixed price for 20 years (Jacobsson and Lauber 2006).

*Figure 1: Installed onshore wind energy capacity in Germany (MW)*




*Source: Own depiction based on Deutsche WindGuard (2019)*

However, the policy and the favourable conditions associated with it changed following the latest amendments to the act. In 2014, large PV plants and onshore wind farms were granted approval through a tendering scheme for the first time.[2] The 2017 EEG amendment introduced compulsory tenders for onshore wind and PV while phasing out the feed-in tariff. The amendments were meant to introduce market principles and bring down the costs of the energy transition while also complying with EU rules on State aid (European Commission 2014). The latter demanded the full integration of wind energy into the electricity market and the introduction of competition. While the introduction of tenders is a general trend in the EU, the introduction process did not go smoothly in Germany: “Due to the changed legal situation and

[2] The amendment also introduced a direct marketing scheme obliging owners of large renewable installations to directly sell their produced electricity. Instead of a fixed tariff, these producers received a market premium on top of the market electricity price. The changing framework conditions for renewables, downscaling of support and introduction of more market-oriented instruments reflect the characteristics of the second transition phase (cf. chapter 2, Markard (2018)). They become even more apparent with the introduction of the following change in regulation.

tenders, we have relatively few awards. It is noticeable that we are running into a trough or are already in the trough" (OL25: 23). In 2019, the newly installed onshore capacity decreased to 981 MW net. This was the lowest in over 20 years (Deutsche WindGuard 2019).

Actors in the wind sector currently face several challenges which, taken together, have resulted in wind energy build-out dropping to only 2.4 GW in 2018 – 55% less than during the "boom" year 2017 (see figure 1). The following points constitute the framework for the strategic answers this paper focuses on.

- *Permits*: In the last years, permit procedures have taken longer – a valid building permit is still the prerequisite for participating in a tender. The number of permits in accordance with the Federal Immission Control Act decreased by two thirds between 2014 and 2019 (FA Wind 2020). In addition, almost every wind project ends up being taken to court. Reasons for this are citizen protests against wind farms and – often in combination with – stricter regulations regarding environmental protection and the protection of species. Outstanding permits and a decreasing number of suitable sites are reducing demand for turbines.
- *Tenders and volume:* While the feed-in tariff ensured fixed prices, tenders are an instrument that legally controls the volume and thus the capacity to be installed. Although many bidders took part in the first tender, several so-called citizen energy projects, set up by bigger project developers who claimed to "manage" them as partners, won the bid (Aykut et al. 2019). These citizen projects which do not need to present a permit before bidding are granted a longer realisation period and consequently delay wind energy build-out. Furthermore, due to the subsequent undersubscription to the tender, awards are being made to the highest bids. As a consequence, the instrument is not working.
- *Sites and acceptance*: While in the past sites were readily available, competition for sites has now increased. Designating wind sites – and facing likely resistance – has become unattractive for politicians with upcoming elections. Furthermore, distance regulations and moratoria on regional energy plans (designating sites) are aggravating the situation.

The change in the support system is in keeping with the outlined second transition phase in which transition processes are becoming more integrated and are meant to accelerate. At the same time, it is evident that the change in policy is causing disruptions in the German wind energy sector.

## 5. Results: Actors and their strategies – an empirical account

The preceding chapters outlined the increasing pressure in the wind energy sector and the highly dynamic situation in this second transition phase. In the following, we will discuss the inductively derived strategies that actors follow in order to cope with the current challenges. The findings are presented according to the following categories: relocation, cooperation,

business field diversification, exit (see table 1). We describe these strategies and their effect on the transition process below.

*Table 1: Strategy overview*

| Strategy | Substrategy |
|---|---|
| Relocation | Regionalisation |
| | Internationalisation as complementary strategy (int. + home market) |
| | Internationalisation (move abroad) |
| Cooperation | Merger, acquistion & takeover |
| | Real cooperation (with customers / suppliers; competitors) |
| Business field | Vertical (sales, operation, system operator) |
| diversification | Horizontal (new products, technologies, sector coupling) |
| | Price reduction |
| | Communication and lobbying |
| Exit | Job reduction |

### 5.1. Relocation strategy

In the data analysis, we found three subtypes of strategies relating to relocation. The first strategy is regionalisation, i.e. actors follow their activities into particular regions. The second strategy describes internationalisation which is when firms move abroad to complement their continuing home market focus. The third strategy covers actors moving abroad instead of continuing their home market focus.

**Regionalisation** and moving into particular regions are of surprisingly high importance for different actor groups. Generally, this strategy can be explained by the importance of proximity for collaboration and agglomeration effects, hence mirroring a vivid debate that has mainly been conducted in the economic geography community (Storper 1995, Malmberg and Maskell 2006, Bathelt, Malmberg, and Maskell 2004). Table 2 gives an overview of relevant empirical quotes exhibiting a regionalisation strategy.

We found three core arguments in favour of regionalisation: structural factors, soft factors and risk dispersal. *Structural factors* relate to beneficial framework conditions that are underlined by both project developers and producers. Project developers in the Uckermark, for example, stress the importance of low costs, cooperative agreements with communities, favourable framework conditions and socio-structural advantages for investments (UC04, UC08, UC09). *Soft factors* are related to establishing trust more easily by being present in a particular region. This seems to be essential for project developers (UE13), but also for banks that act as central intermediaries and door-openers. An interviewee from a big international bank explained this in the following way:

> We wanted regional proximity. (...) The idea now was to play the regional aspect more strongly, because you can't get to the people I spoke about at the beginning, you can't reach them from Berlin. (...) In other words, those who really do something regionally. You can't really reach them from Berlin, because they also want someone on location who speaks the language a little (…). (OL05)

*Risk dispersal*, finally, is particularly stressed by energy suppliers that operate in different locations in order to maximise subsidies and spread risks among different locations (OL23).

In this way, regionalisation is surprisingly similar to the internationalisation strategy that we will present in the following. Its effect on the transition process is not completely clear in the

empirical data. However, regionalisation is associated with a decentralisation of activities and strengthens activities rather than weakens them. We thus expect a stabilising or even a slightly accelerating effect on transition.

The second strategy is **internationalisation as a complementary strategy** (cf. table 3). Similarly, as outlined in the last facet of regionalisation, this is mainly a risk spreading strategy. This implies that activities remain in the original or home country, but additional subsidiaries are maintained abroad with the aim of keeping the company more stable in volatile times. This strategy results from push and pull factors, i.e. it is a combination of unattractive factors in the home country and attractive factors in the host country.

Among these *push factors*, the already outlined difficult framework conditions in Germany are key. The general lack of available sites for constructing new wind parks is a particularly important driver for expanding abroad operations abroad and most directly affects the investing actors, above all project developers, utilities and manufacturers. One interviewee describes this strategy of following markets abroad while maintaining original home bases as a question of efficiency:

> And I go to the places where the markets are. Germany was the market. Now it's not worth packing my boxes and moving somewhere else. But the other thing is that when I set up a new location, I do it where the market is. (UE09)

Besides these push factors, *pull factors* play a major role. These host country factors make it attractive to build international production and marketing sites (cf. also Kuemmerle 1997). While small actors tend to remain nationally rooted, bigger players regard internationalisation as a chance to grow, selecting the host countries carefully (OL09). International markets here contribute to balancing national volatility (OL06).

The effect of this strategy on the transition process is ambivalent. On the one hand, the reach of renewable energies increases to the countries in which activities are relocated. On the other hand, this may also weaken the activities and thus the drive of the transition process in the country of origin, as the following quote outlines.

> (...) There are a lot of prohibitions against building something. (...) This means that companies that have developed all the know-how now only have the option of looking to move into foreign markets. This know-how drain is now fully underway. (UE01)

While internationalisation as a complementary strategy is generally regarded favourably, its downsides become even more apparent as soon as internationalisation occurs at the cost of national activities, a strategy termed **internationalisation instead of home country strategy** (cf. table 4). Actors who follow this strategy do not maintain their home country roots as strongly. Particularly for the classical OEMs, the currently volatile situation in the German market is resulting in a “complete reorganisation” of their value chain with the aim of surviving as an equipment producer, a strategy closely connected to the prevalent cost pressure (UC01, UE04, UE09). While the EEG established favourable framework conditions for renewables and technology development, the latest changes increase the pressure on production prices – a development that makes countries with lower wages attractive.

> Well you just go where the markets are. Germany was practically an El Dorado. The operators had more money than sense and in case of doubt they would just buy a more expensive turbine. For example, this is what is totally backfiring for [turbine manufacturer] because they are relatively expensive. (UE09)

Moreover, withdrawn licences and other inefficiencies play an important role (HH05). This also means that these producers are not and cannot be loyal to their home regions (OL02). As these conditions deteriorate, especially the OEMs adapt accordingly and chose to relocate their production abroad without remaining locally loyal.

While this strategy is generally perceived to be normal and without any normative implications (UE09), it may be rather dangerous for the transition process. It implies a critical brain drain as well as a loss of jobs (UE01), as one manufacturer summarised:

> As they so nicely put it then: "We need to go international." Going international means: “Getting rid of jobs here and setting up again in low-wage countries." It boils down to this. That’s what’s happening now and on a relatively massive scale. (UE05)

Even more so than complementary internationalisation, this strategy slows down the progress of the energy transition in the home country.

Revisiting the relocation strategy in general, it is interesting that even though all the evidence shows how important this relocation strategy is for many actors, particularly those actors that regard it with scepticism stress how risky it is. This is even more true for small players who simply cannot afford to move abroad. But even for those who decide to move abroad, the chosen strategies are extremely heterogeneous. We also observe that relocation is not a voluntary strategy, but instead one that corporate actors in particular perceive as a bare necessity to secure their survival.

### 5.2. Cooperation

We identified two main subtypes of cooperation strategy: mergers and acquisitions, and real cooperations.

**Mergers, takeovers and acquisitions** (cf. table 5) is a strategy we primarily observe among energy utilities that take over project developers or other wind service companies. It is a strategy adopted for three reasons: to enter markets, to expand reach and to avoid market exit.

In order to *enter the market*, acquiring project developers is a strategy pursued by renewable energy “latecomers” – often bigger energy and public utilities (Frei et al. 2018, Kungl 2015) – which at the same time is a means to acquire skills and expertise.

> That’s a good example of how a municipal utility like [name] - wanted to get into the wind sector. You don't do that by employing people and starting out yourself, but by taking something over and assimilating it. Well-managed companies where things are basically running okay and who say: "We can’t cope with the changed market conditions anymore,” still have good people, the experience and the network. Those are the ones you take. (UE05)

When *already in the market*, companies enlarge their business volume, integrate new knowledge and markets and hence expand their reach via mergers and acquisitions (OL23, HH21). Energy utilities in particular are interested in merging with project developers and thus

securing access to sites. Takeovers are also a means to acquire knowledge and “generate pipeline”. (UE08)

> It doesn't matter whether it's [big energy utility] or something like that, but they absolutely have to generate pipeline. That increases the value of the company. If I don't have the pipeline, I have to generate pipeline artificially, i.e. I secure an existing repowering park or I buy companies that have pipeline (UE13)

Finally*, a merger or being taken over is a strategy of last resort for weakened actors.* Manufacturers take over others, as recently observed with the insolvent company Senvion. Nordex bought Acciona’s wind segment in 2015; in return, the Spanish company became a major shareholder of Nordex. In 2017, Siemens and Gamesa merged. A number of bigger project developers also merged, entered into joint ventures or took over smaller ones (UE01); some smaller actors accepted “safety net” cooperations with bigger partners (piggy-backing), often with utilities that tried to enter the market by buying know-how. In sum, mergers allow companies to persist: “Smaller players stop, merge or are taken over” (UE05).

In conclusion, this shows that mergers and acquisitions are a very common strategy, especially in the case of bigger project developers, producers and energy utilities. Whether this has an accelerating effect on the transition process remains questionable. The strategy implies the centralisation and concentration of activities. It is associated with the consolidation of the industry which has reached the era of incremental change where firms primarily compete on the basis of costs (Huenteler et al. 2016). While some actors may persist thanks to M&As, we cannot expect an accelerating effect on transitions, at least not in the short term; in the long run, however, some mergers may steer innovations and speed up the transition.

**Real cooperation**, in contrast, is a form of cooperation between actors that remain legally independent (cf. table 6). It can be subdivided into cooperation with customers or suppliers (along the value chain) and cooperation with competitors (across the value chain).

*Cooperation with customers or suppliers* leads to strategic partnerships and framework contracts between manufacturers and (local) energy utilities or bigger project developers (UE13). Cooperation is typically adopted by large actors and is equally decisive for project developers who carry out country-wide dispersed tasks (OL29) and strategically cooperate with local partners (HH11). However, smaller developers are now increasingly accepting risk minimising safety net cooperations with bigger partners:

> [Developer] is now planning projects themselves, but the traditional project business in Germany is still largely cooperation based. Local planners cooperate with [developer]. We supply the systems, we use the size of the company and they can be sure that milestones are financed, that the planning is also financed, because they now have to wait a very long time until a project comes. (...) The majority of [our] German projects actually came about together with our cooperation partner. (UE13)

Even less frequent is *cooperation with competitors*. Such open cooperation is difficult due to the high level of competition and distrust that exists especially among manufacturers.

> There is a very high level of distrust. Everything is plastered with non-disclosure agreements, every kind of activity. If you phrased the question this way: "Where do you think you can do something together?" Then certain areas are immediately discounted. Because they say: "We won't work together on this." Every company will be operating on its own for this. Maybe with a research partner. But it is

> inconceivable that manufacturer A and manufacturer B work together on a topic. At least that's been the situation so far. (OL02)

At the same time, cooperation in less sensitive topics of common interest is slowly growing. Manufacturers cooperate on safety standards but also develop e.g. ideas about sharing cranes for construction (HH21). This slowly growing cooperation can be interpreted as a necessity in a competitive market. Banks pursue a different strategy. While smaller, local banks may no longer be able to finance big wind farms, they enter into close cooperation partnerships with bigger finance institutes (OL15). Energy utilities also recognise the need to team up with former competitors in order to secure sites (OL23). For project developers, cooperation is even a common phenomenon – but only once the sites have been secured and contracts have been set up.

> Of course, there is a lot of fighting tooth and nail on the sites and over land ownership and contracts, but once the construction stage is reached, all the project planners always sit down together at one table and work on the construction together and coordinate with each other. (UE13)

Real cooperation therefore does take place, but not as a major strategy. Above all, it provides a safety net for small project developers to cooperate with bigger firms (OL23). Particularly among competitors, mistrust prevents cooperation on strategically important topics.

In general, mergers and takeovers as well as cooperations increase in a highly competitive market. While takeovers lead to further concentration in the wind sector and are mainly chosen by manufacturers (among themselves) or energy utilities (in order to acquire skills), cooperation can take many different forms. However, particularly those involving competitors are less likely among manufacturers. Instead, they tend to take place more frequently among project developers once the competitive part of their business is finished. Regarding the transition process, cooperation could well accelerate progress because it provides a means of pooling resources and knowledge in order to gain momentum. At the same time, however, it represents a fairly minor strategy and its effect should not be overestimated.

### 5.3. Business field diversification

Notably, actors diversify their business activities against the backdrop of changing framework conditions. The three sub-strategies we observed are (1) vertical integration (the integration of additional value chain steps), (2) horizontal integration (the integration of additional technologies) and (3) communication and lobbying. We address the particular traits of each strategy in the following.

**Vertical integration** covers a high diversity of strategies along the value chain (cf. table 7). It refers to the integration of additional value chain steps into a business that was previously limited to one (or several) value chain steps. This mainly entails internalising value added in order to become a system supplier and new marketing strategies.

The *internalisation of value added* is best illustrated by project developers and energy utilities that both try to take over each other's activities. Classical project developers are taking over more and more tasks in the electricity value chain, especially trading and sales, and thus the traditional energy utilities' business. Project developers handle more than just the project

planning of wind farms. Many project developers – and energy utilities (OL23) – keep the wind farms they have planned, thus earning an income as operational and technical managers (OL04, OL29, UC07, UE07, UE13). As a result of operating wind farms, project developers try to "position themselves as electricity suppliers" (OL29, MD10), which was typically the task of energy utilities. This indicates that project developers and energy utilities are operating wind farms themselves. The activities of project developers and utilities are melding and competing. This also represents a strategy of survival (UE05).

Parallel to this, turbine manufacturers are integrating service activities and offering full EPC (engineering, procurement, construction) instead of only turbines and are delivering turnkey projects (HH22, UE04, UE09). This is a strategy to make up ground for contracts lost to service providers in the past (HH18), but most of all it is a chance to increase profits: Service has become a "gigantic business" (HH18) with a high return on investment and a steady cash flow (UE09). In this way, large OEMs are also positioning themselves as system suppliers:

> For several years now, our vision has been to be the world's leading provider of sustainable system solutions for energy system transformation and not just a manufacturer of wind turbines. (HH18)

This system thinking is further reflected in their taking over of project developers and their know-how in implementing wind and solar hybrid projects. Offering a technology mix together with storage solutions is a (system) diversification strategy aimed at minimising the risk of manufacturing only.

> This mix of technologies is necessary to better meet system requirements. If we just place wind turbines everywhere, then of course we have bigger problems with grid integration than if we have a mix of wind and solar. They complement each other relatively well, especially if you can add a battery. (HH18)

New and more integrated *marketing strategies* also play a central role. Some developers set up power purchase agreements (PPA), a strategy that is already common for big wind farms in Finland and Sweden and is currently developing in Germany. Several smaller wind farms need to be clustered in order to reach the critical size for a PPA (UE13). Some project developers agree such a long-term power supply contracts, typically with industrial consumers that wish to buy green electricity (OL29). Nevertheless, energy utilities are often the direct marketing partners (UE13). Direct marketing of electricity is also becoming an interesting pilot project for securing the further operation of wind turbines for small project developers – although obtaining the status of an energy supplier in accordance with the German Energy Act requires several permits (HH01).

All these vertical diversification activities reflect evasion movements from core business activities and – at the same time – diversification. Companies are trying to position themselves more broadly and in a more integrated way (OL23). In terms of their effect on the energy transition, the vertical diversification strategy corresponds exactly to what Markard (2018) claims to be at the core of transition phase two: struggles between actors and consolidation processes, the maturation and integration of technologies as well as an increasing focus on adjacent sectors. Vertical diversification entails a more integrated and diversified actor

landscape and gives the involved activities more reach. It thus has an accelerating effect on the transition process.

**Horizontal integration** is a strategy chosen by a broad variety of actors aspiring to expand their activities at the same value chain step. It mostly covers activities addressing renewable technologies other than wind or new technologies such as storage options or hydrogen. This shift is reflected among practically all actor groups and for big and small players (cf. table 8). This relates to sector coupling and the integration of new and old technologies, but also to diversifying the product itself.

*Sector coupling* and the integration of activities in neighbouring sectors (Andersen and Markard 2020, Markard 2018) establish a close connection between wind energy activities and other sectors, thereby diversifying and equally stabilising activities in the original sector. For example, in order to increase and secure the demand for wind electricity, project developers are starting to work with hydrogen (HH03, HH11, UE13). Service sector actors such as banks are also focussing on topics such as sector coupling, grid extension and storage (OL05, OL15). However, wind still remains the core business, since entering new sectors and technologies requires a lot of personal engagement.

> Perhaps I will not only offer wind turbines, but also electricity storage units and batteries. We also want to make hydrogen now, that is also to come (HH03).

Interestingly, project developers focusing on new technologies such as storage and hydrogen did not characterise the introduction of tenders as an obstacle or a state of crisis (HH03, HH11).

Referring to the *integration of technologies*, several wind project developers moved back into or discovered photovoltaics (HH11, UE04, UE08). As photovoltaics underwent significant cost decreases, they provide a “second foothold” (UE08) that can help to balance uncertainties in the wind energy market. Similarly, some project developers discovered the potential of the heat sector (HH11), which represents not only a new technology but connects with activities in neighbouring sectors (Markard 2018). More classical energy utilities regard renewables as part of their product diversification strategy anyway in order to underline their green image (OL23, UE07).

Finally, regarding the *product itself*, one of the interviewed manufacturers is aiming to diversify in particular to low-wind sites. This adaptation to specific conditions and budgets (e.g. a low-cost version of an established turbine) reflect the high relevance of innovation (HH21). It is also a clear decision to improve existing technologies instead of investing in new technologies.

In summary, this diversification strategy is one that connects and couples not only between actors but also between sectors. It is adopted by all four actor groups but is particularly observable among large project developers. It is directly related to phase two of the energy transition (Markard 2018) and is hence a strategy that is accelerating the energy transition process.

Lastly, business field diversification also includes different forms of **communication and lobbying** which became crucial for wind energy actors. This is also a response to the introduction of tenders and the consequence of growing resistance against wind energy. Part of the *communication strategy* typically adopted by developers is to inform locals as early as

possible (OL29). Developers hold open house days (UC01), renewable energy nights (UC03), offer holiday games for kids (UC03) or a discount on the electricity bill (UE08). Many offer opportunities for citizens to participate, highlighting the importance of regional value creation and jobs (HH07, OL23, UE08). The main reason for this complementary strategy is to increase acceptance of wind energy projects and to secure sites. Even mediators, as e.g. appointed by a ministry, help reduce conflicts locally:

> The other side which will be doing again from the end of this year and then in the next few years: helping with conflict mediation locally. (...) they are then trained as mediators. They do not take the position that they are obliged to get wind energy projects up and running locally, but they are trained in all relevant topics and are meant to mediate between the conflicting parties (OL27).

However, the communication and lobbying strategy goes beyond communication with local citizens. Political *lobbying* plays an important role. This typically includes direct contact with politicians, writing position papers or organising parliamentary evenings (UE01). It also means highlighting the importance of the home market and its export potential (UE08). Both lobbyists and wind energy actors address politicians at the national, regional and local level (UE08). Clusters and associations have been founded in order to “channel one’s influence and bring it to Berlin” (OL06).

These findings highlight the growing importance and increased efforts actors are putting into political lobbying and communication strategies (cf. table 9). The effect on the transition process is less nuanced than in the other diversification strategies, but nonetheless notable. Based on this increased focus on interaction, coordination and communication, the transition process can be rooted more firmly into societal structures and hence accelerate.

### 5.4. Exit

Although the strategies introduced so far represent a wide array of reactions, some actors go far beyond these. The exit strategy describes when actors leave the wind sector, reduce or shift their activities. It covers job reductions, closure of sites and insolvencies and is hence the strategy that most clearly illustrates the difficult situation of transition phase two (see table 10).

In 2018 and 2019, many manufacturers *dismissed* employees and reduced margins (HH05). The Industrial Union of Metalworkers estimates that about 34,000 jobs in the German wind sector have been lost since 2017 (Handelsblatt 2019). Large project developers have also had to dismiss employees (HH03). While “mass dismissals” are publicly visible, other companies simply shrink due to normal fluctuation (UE05).

Job reductions are – especially for manufacturers – connected to *site closures*. As a general trend, manufacturers have closed their production sites in Germany and reopened them in lower wage countries (see 5.1).

Finally, *insolvencies* in the wind sector are affecting both small and big players. While some smaller planners acknowledge that they are unable to continue under the tender regime and state “I have to give up” (UE05), middle-sized project developers and manufacturers such as Senvion are also facing insolvency. Consolidation and centralisation are the consequence.

> (…) (...) adjustments are made. (...) There will be a couple of large medium-sized companies, in Bremen [project developer 1, project developer 2] in the 500 - 1000 employee category, large medium-sized companies, the manufacturers will keep going somehow anyway, but there's also quite a fight going on, whether all of them survive - we'll see. But this landscape with lots of smaller companies with ten or a couple of dozen employees, I think that if they are lucky, they will find themselves in the portfolio of an electricity supplier and if they are unlucky, they won't find themselves there because they won't survive two years. (HH05)

In summary, the exit strategy highlights the consolidation process in the wind sector, which is to some degree a natural process in advanced transition phases (Markard 2018). While exits are part of the normal industry life cycle (Markard 2020, Klepper 1997), exits of project developers are structurally changing the diverse actor landscape in the German wind sector to the detriment of smaller and locally based actors that are crucial for acceptance. The exit strategy also reflects avoidance in a much more prominent way than the preceding strategies. Actors look for alternatives, they diversify geographically and deepen or broaden value chain steps, but some also (un)intentionally leave the wind sector. In contrast to the diversification strategy, the exit strategy thus tends to slow down the transition process. It entails – partly natural – consolidation, but also the loss of work power and knowledge.

## 6. Discussion: Actor strategies and their impact on the energy transition

The empirical analysis has shown how manifold and heterogeneous the strategies adopted by various actor groups are. We will now summarise these empirical findings and derive propositions on the types of strategies and their impact on the transition process (cf. table 11).

*Table 11: Strategies and their impact on the transition*

| Strategy | Substrategy | Effect on transition process | |
|---|---|---|---|
| Relocation | Regionalisation | decentralisation, tendency towards acceleration | xx |
| | Internationalisation (complementary) | centralisation, loss of knowledge, evasion | x |
| | Internationalisation (move abroad) | centralisation, slow down in home market, possibly acceleration elsewhere | |
| Cooperation | Merger, acquistion & takeover | centralisation, concentration, consolidation, no short-term acceleration | x |
| | Real cooperation (with customers / suppliers; competitors) | tendency towards acceleration | xx |
| Business field | Vertical (sales, operation, system operator) | acceleration | xxx |
| diversification | Horizontal (new technologies, sector coupling) | acceleration | xxx |
| | Communication and lobbying | tendency towards acceleration | xx |
| Exit | Exit | slow down, consolidation | |

The intensity of a strategy may affect the transition process hardly at all (x), moderately (xx) or significantly (xxx). The effect may be negative or slowing down (red), neutral or ambivalent with positive and negative consequences (yellow) or positive or accelerating the transition (green).

The relocation strategy has three basic sub-types, 1) regionalisation, 2) internationalisation of activities while remaining in the original market, and 2) removal of activities to foreign markets. Regionalisation is chosen when proximity and trust are important factors for conducting a business. Not surprisingly, it is particularly project developers and banks that highlight this strategy and build local offices in order to implement projects locally. Internationalisation as a complementary strategy mainly spreads risks and balances unsteady market conditions or economic volatility in the home market. Push and pull factors – such as the lack of sites in the former case and market potentials abroad in the latter – are at play. This strategy is chosen by OEMs, bigger project developers and energy utilities. Internationalisation at the expense of the home market draws company activities, and often production sites, away from the country of origin. It is mainly OEMs who are not locally loyal that apply this strategy. Both internationalisation strategies are a response to uncertain and volatile framework conditions in the home market. While establishing regional dependencies strengthens home market activities, internationalisation shifts attention away from the home market, is associated with a loss of knowledge and is eventually an evasive strategy. While internationalisation does not accelerate the transition in the home country, it can, however, foster transition processes elsewhere.

Although internationalisation is a frequently discussed strategy (Ratinen and Lund 2014, Whittington 2010, Müller, Steinert, and Teufel 2008), research hardly differentiates at all between complementary internationalisation and leaving the home market, as we suggest doing. It is, however, precisely this nuance which reveals a decisive difference between project developers and utilities who mainly keep their activities in the home market and OEMs who relocate. Furthermore, regionalisation as a strategic choice is hardly ever discussed or is subsumed as “domestic orientation” (Ratinen and Lund 2014). It is less relevant for utilities and manufacturers, yet it underlines the decentralised character of the transition, which is also represented by smaller project developers and local banks.

*Proposition 1: Relocation strategies are a means to diversify risks between various regions and countries and thereby stabilise actors’ activities. Relocation at the expense of activities in the home market (i.e. removal to foreign markets), however, may slow down the transition process in the home country, lead to a loss of knowledge and increase centralisation.*

The second identified strategy, cooperation, likewise consists of two major sub-types: 1) mergers and acquisitions, and 2) real cooperation with customers, suppliers and competitors. While in the latter case the involved actors remain separate entities, mergers and acquisitions reinforce concentration and consolidation. Smaller actors seem to be in a less favourable position to “survive” than bigger ones; an observation that questions the decentralised character of the German energy transition. Actors that choose the cooperation strategy – regardless of the sub-type – try to gain impact, grow and stabilise their business through this strategy. Not surprisingly, manufacturers and most prominently energy and municipal utilities

opt for takeovers in order to sustain and change fossil-based business models (Kungl 2015). These established companies make use of traditional market mechanisms if they need a skill by acquiring, partnering or merging with another company (van der Loos, Negro, and Hekkert 2020). Large energy utilities still encounter difficulties in securing sites – taking over competitors creates the project pipeline they need. This bears consequences for ownership of renewable technologies and eventually the energy transition, as incumbents gain ground to the detriment of decentral actors. The volatile market situation – together with price pressure – enables incumbents to enter a market which has been characterised for a long time by decentralised, regionally embedded actors (Schmid, Knopf, and Pechan 2016). It also shows how incumbent firms, who tend to slow down sustainability transitions (Hess 2014), try to become part of the development, increase their renewable portfolio (Frei et al. 2018), diversify (Steen and Weaver 2017) and keep their position in the electricity market. Some tend to avoid changing the system architecture in order to maintain a comfortable status quo. However, those who decarbonise their generation portfolio may even turn into transition accelerators, which questions the static, change-resistant incumbent picture (Löhr 2020, Turnheim and Sovacool 2020, Steen and Weaver 2017).

Interestingly, more and more project developers are opting for takeovers, growing in size and becoming at least medium-sized or even large international companies, in some cases changing from a regionally loyal and proximity-oriented business model to a more market-oriented one. To some degree these strategies simply reflect the professionalisation and life cycle of what is now a mature industry that has developed a dominant design (Markard 2020, Klepper 1997): it developed and grew through political support (O'Sullivan 2020) but at the same time still exhibits the typical phases of an industry life cycle. The development demonstrates how former challengers (project developers) become key players in the socio-technical regime and partly adapt to the rules of the established actors. At the same time, the high competition amongst all actor groups also increases the need for cooperation, strategic partnership agreements and risk-reducing safety net cooperations through which smaller players team up with bigger ones. In this way, this strategy is a means to survive in the consolidation phase. Safety net cooperations maintain – at least in the short run – actor diversity. Real eye-level cooperations have the potential to accelerate the transition process – but remain scarce. Despite the potential of cooperations for accelerating transitions (through coalitions "of the willing"), takeovers are the predominant strategy, and their effect is more a consolidation of the sector than an acceleration of transition dynamics.

*Proposition 2: The cooperation strategy mainly induces a consolidation of the involved actors. It increases interaction between actors and reduces their variety. For the transition process, this implies ownership reduction to the detriment of smaller decentral actors and possibly a decrease in innovativeness.*

The third strategy, business field diversification, consists of the three basic sub-strategies: 1) vertical diversification, 2) horizontal diversification, and 3) communication and lobbying. The first two sub-strategies play a major role in actors' diversification activities and are typically

analysed as diversification strategies of utilities (Bryant, Straker, and Wrigley 2018, Hall and Roelich 2016, Nillesen and Pollitt 2016). Regarding the other actor groups, we mainly observe project developers (managing wind parks, marketing of electricity) but also energy utilities and banks diversifying vertically and integrating activities that were previously conducted by their suppliers or customers. Interestingly, project developers are increasingly taking over the activities of energy utilities (managing generation capacities) and vice versa (entering project development). This illustrates a change in actor roles (Wittmayer et al. 2017), questioning the traditional competencies in the energy system. This bears potential for structural change in the system. Along with these developments, the two main strategies among manufacturers (entering the service sector or becoming system suppliers) also stress how wind actors are striving to build more integrated and stable companies and are focussing on phase two activities (Markard 2018) that are potentially accelerating the energy transition. While integration and stabilisation are effects of vertical diversification, this strategy also reflects changing actor roles, e.g. system suppliers, in a competitive and dynamic sector.

While manufacturers have continued to focus on wind technology by improving turbine models or diversifying into niches such as low-wind turbines, other actors are in a more likely position to diversify horizontally to new (hydrogen, storage) or established (PV) technologies. One of the main challenges for these actors is to translate their acquired capabilities in the old technology (or sector) to the challenges of the new one (Andersen and Gulbrandsen 2020; Heidenreich, Kädtler, and Mattes 2017). This horizontal business field diversification reflects the potential for sector coupling activities and thus activities in neighbouring sectors, a typical phase two activity (Markard 2018) which is crucial for accelerating the energy transition. Given the necessary acceleration of energy transitions (Roberts and Geels 2019, Roberts et al. 2018, WBGU 2011), we expected to see the majority of activities grouped under this form of diversification. Indeed, we observe business diversification activities among all actor groups – but mostly as one of several options. These activities hence seem to be less dominant than we expected, which indicates less acceleration in transition phase two than initially expected. Finally, communication and lobbying reflect the growing need to integrate different stakeholder groups and to ensure the backing of society. This may likewise have an accelerating effect on the transition.

*Proposition 3: Business field strategies have the potential to accelerate the energy transition, but their adoption carries important risks. Vertical diversification leads to integration and stabilisation of actors and the transition process. Horizontal diversification covers activities focussing on new and established technologies and sector coupling.*

Fourth, the exit strategy subsumes dismissals, site closures and insolvencies. These effects reflect the consolidation phase of the wind sector. Exits can be understood as evasive strategies that have been largely covered by research (Konrad et al. 2012, Engau and Hoffmann 2011, Stenzel and Frenzel 2008). Despite being a natural phenomenon, exits contribute to decelerating the transition and reducing the heterogeneous actor base which is important for (social) acceptance. With regard to the transition process, insolvencies and site

closures weaken the wind industry and thus a supportive industry coalition (Hess 2014) of which manufacturers form a crucial part. If they exit the sector due to insolvency, site closures and eventually internationalisation, this weakens a coalition that is aimed at accelerating the energy transition (Löhr 2020) and thus tends to slow down the transition process.

*Proposition 4: The exit strategy mirrors the fragility of the current transition phase. The exiting of actors seriously weakens the progress of the energy transition and may affect its (social) acceptance.*

Besides these strategy-specific conclusions, we can draw several transition- and actor-specific conclusions. One of them is that phase two activities such as sector coupling do not come about naturally but involve high uncertainties and risks for the operating actors. Closely related to this, the risks involved in adopting those strategies at the heart of phase two also explain why the transition process is not gaining momentum automatically. Instead, activities related to horizontal diversification, i.e. new technologies, are still mostly expressed in the form of plans and pilot projects rather than as fulfilled facts or established integrated solutions.

Quite a few of the observed strategies can be interpreted as evasion and consolidation strategies that are significantly changing the German wind sector – at the expense of small players, established workforces and knowledge in the original corporate sites. In this sense, the introduction of tenders and the resulting drop in wind capacity build-out (cf. figure 1) indicated a stagnation of the transition process while the in-depth analysis of the adoption of these strategies points to a slowdown (cf. table 11).

*Proposition 5: Acceleration in phase two is not taking place automatically. Instead, actors combine activities that spur on and slow down the transition process. While this provides strategic advantages, it hampers acceleration.*

Although some strategies might be more accessible to certain actor groups (such as internationalisation for OEMs), we found that developers, OEMs, banks and energy utilities pursue a combination of all four strategies (cf. Müller, Steinert, and Teufel (2008) for a similar result on utilities' diversification strategies). A remarkable finding of our approach is that we are able to reveal which actor groups tend to apply a certain type of strategy and how this affects the transition process (cf. table 12). First, we can show that project developers, utilities and manufacturers are actor groups that tend to adopt a broad variety of strategies. Second, we observe that project developers and manufacturers tend to choose evasive strategies such as internationalisation and exit. By following these strategies, they contribute – possibly unintentionally – to reducing the speed of the transition process. In order to accelerate the transition process, policy makers hence need to be aware of these particular strategic preferences in order to formulate measures incentivising acceleration instead of slowdown.

*Table 12: Strategies per actor group and their impact on the transition*

| Strategy | Substrategy | Effect on transition process | | project developer | energy utility | manu-facturer | finance |
|---|---|---|---|---|---|---|---|
| Relocation | Regionalisation | decentralisation, tendency towards acceleration | xx | xxx | x | | xxx |
| | Internationalisation (complementary) | centralisation, loss of knowledge, evasion | x | xxx | xx | xx | x |
| | Internationalisation (move abroad) | centralisation, slow down in home market, possibly acceleration elsewhere | | | | xxx | |
| Cooperation | Merger, acquistion & takeover | centralisation, concentration, consolidation, no short-term acceleration | x | xx | xxx | xxx | |
| | Real cooperation (with customers / suppliers; competitors) | tendency towards acceleration | xx | xxx | x | xx | x |
| Business field | Vertical (sales, operation, system operator) | acceleration | xxx | xxx | xx | xx | x |
| diversification | Horizontal (new technologies, sector coupling) | acceleration | xxx | xxx | xxx | x | xx |
| | Communication and lobbying | tendency towards acceleration | xx | xxx | x | x | |
| Exit | Exit | slow down, consolidation | | xxx | | xxx | |

Strategies chosen differ per actor group from hardly at all (x), to partly (xx) and strongly (xxx) chosen strategies.

*Proposition 6: While all actors apply a variety of strategies to diversify and balance changing framework conditions, two crucial wind system actors, project developers and manufacturers tend to apply strategies that slow down the transition process. Political measures hence need to be tailored to particular actor groups.*

We can conclude that actor strategies are a reaction to the current energy transition situation, but at the same time shape the further transition process. They are a reaction as actors are seeking to compensate for risks, volatilities and challenges that are arising in transition phase two. In this sense, actor strategies mirror the need to diversify, consolidate and seek alternative routes through an increasingly complex transition phase. This need to react strategically affects all actor groups as well as challengers and incumbents. At the same time, these strategic activities are also shaping the further transition process and its direction. If actors evade and decrease their activities in their original sites, the transition dynamics are weakened. This finding is particularly interesting in a transition phase that is theoretically characterised by acceleration (Roberts and Geels 2019, Roberts et al. 2018): Acceleration cannot and will not take place without the keen involvement of these actors and transition coalitions (Hess 2019). This suggests that withdrawing economic support while at the same time creating uncertainty is a rather risky political strategy in a consolidation phase, as acceleration will most likely not happen automatically.

## 7. Conclusion

This paper claims that we need to look closely at actor strategies and the resulting social dynamics if we want to better understand the current energy transition process. Our inductive analysis of actor strategies and assessment of their implications for the transition process contributes to the actor debate in transition research (Wittmayer et al. 2017, Farla et al. 2012) and broadens it by identifying types of strategic activities and investigating their impact on the

transition process. Following an in-depth case study analysis, we derive four generic strategies that actors apply, namely relocation, cooperation, business field diversification and exit. These strategies are heterogeneous in themselves, and each of the investigated actor groups – project developers, turbine manufacturers, energy utilities and banks – shows unique patterns regarding their respective key strategies.

While undertaking strategic actions such as mergers is part of actors' typical business, our paper specifically analyses those strategies applied in reaction to the introduction of tenders and highlights their effects on the further transition process. We summarise our findings in six propositions. In a much more fine-grained presentation than most existing studies on the topic, we are able to show that relocation strategies can both favour and decelerate transition. Cooperation tends to result in concentration, centralisation and decreasing actor variety more than in sharing knowledge, and this might affect the (social) acceptance of the transition process. At the same time, increased competition leads to (safety net) cooperations. Business field strategies are of extreme importance for acceleration, but these strategies are risky and tend to be adopted as one of several options and more likely only once incentivised. Finally, exit is natural in advanced transition phases but clearly increases concentration and supports deceleration.

Based on our findings, we are also able to highlight the fragility involved in the current transition phase (Chlebna and Mattes 2020). Even though theoretical contributions point towards acceleration (Markard 2018, Rotmans, Kemp, and van Asselt 2001), our results reveal that some actor strategies instead point towards a slowdown of the transition. Tellingly, it is mainly two crucial actor groups which follow this strategy: project developers and manufacturers. Much more than the primarily researched utilities (that are fairly new in the wind sector) and banks (with a broader portfolio), these actor groups strategically withdraw activities from their former core markets and products and diversify into areas that are much less apt to advance the German transition process, thereby contributing significantly to the observed deceleration.

Although our empirical data is based on profound insights from 96 interviews, a crucial limitation is that the empirical analysis is based on data from Germany only. Nonetheless, we would claim that the analysis also provides important insights for other countries. The general framework conditions are evolving in similar directions in other countries, price competition is intense and the shift towards tenders is a global trend: tenders now take place in over 100 countries (REN21 2020). Likewise, the outlined consolidation process, often accompanied by internationalisation, is a general trend in the wind industry. Aggregating these dynamics, the increasing competition and pressure that energy transitions have to cope with are fairly universal. Our case thus explores the challenges of more advanced transition phases that other countries equally have to face.

This is also why our findings have important implications for policy. Understanding the four identified strategies and which actor groups apply them may prove helpful in better understanding the current transition dynamics. Our analysis outlines the critical situation brought about by the introduction of tenders together with international price pressure, outstanding permits, organised resistance against wind energy and the scarcity of sites. It also

shows that not in all aspects are the results those which were politically wanted and expected. We observe that – despite dropouts – many of the diverse actors adjusted to the tender scheme and are coping rather well with it – even though quite a few describe tenders as challenging, and criticise their abrupt introduction, yet many now see them as necessary. Nevertheless, the result of this "coping" and the chosen strategies comes at the expense of the next steps of the energy transition, namely sector coupling: actors are focussing on foreign or more promising markets and products. At the same time, clear directions are needed for actors to invest in system integrating technologies which would be crucial for a rapidly advancing second transition phase, as energy transitions and their acceleration remain a deeply political challenge (Roberts and Geels 2019, Meadowcroft 2009). The current proposal of an EEG 2021 amendment recognises this need for stability by determining a higher wind onshore tender volume. It is aimed at advancing the integration of sectors and may exempt green hydrogen from EEG apportionment. The time lost in uncertainty, however, is hardly likely to be regained.

The limitations of this paper lead directly to the need for further research: In order to better understand the complex, also global dynamics, the derived propositions might be tested in an international comparison. Although our paper covers more actor groups than is typically the case, it would be insightful to analyse which other (wind) actors are concentrating on system integration and phase two activities and if so, why. Finally, it would be helpful to investigate the consequences of the outlined strategies for the further transition process over a longer period.

In the interim, the present analysis sheds serious doubts on the expectation that the transition is currently entering the expected acceleration phase. Instead, wind build-out has stagnated and the chosen strategies of crucial wind sector actors (unintentionally) have a tendency towards slowing down the transition process. Nevertheless, analysing actors and their strategies in a fine-grained, empirical comparative perspective may be a critical tool for identifying political and managerial starting points to enhance acceleration.

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## Tables

Table 2: Empirical evidence of regionalisation

| Actor | Quote |
|---|---|
| **Regionalisation (move into regions)** | |
| project developer | Yes, we've divided up the whole thing regionally – we're also currently looking, or are actually active nationwide, looking at anywhere we might be able to set up another branch office; these are currently strategic decisions and considerations as to whether to then do it. (OL30) |
| project developer | Let's take the example of France (...). We have local offices there and they are staffed with French people of course. In France there's no point trying to make a start there, to secure sites from Bremen. Of course it won't work. It's always local offices and they need to be distributed locally in such a way that they are relatively close to the projects. (...) so it's always local offices. (UE14) |
| energy utility | You can spread the risk to a certain extent if you operate trans-regionally, also with regard to the energy market. If you only have sites in north-west Germany and they are out of funding at some point, then eventually you are at the point of: "Well, if Enera doesn't work, for example, or the regional energy market isn't there or the entire North West gets shut down, then I have a whole lot of risk." For this reason alone a certain regional spread is desirable in the long term. One discussion that keeps emerging, or what we are observing with many competitors, is that they are doing project planning abroad, that they are specifically focussing abroad. (OL23) |
| manufacturer | But [manufacturer] now also have – and it's a bit offshore, but to be taken symbolically – a production facility in Cuxhaven. On the one hand, because the framework conditions were extremely well done by the municipality. On the other hand, because at the point where they are now, Bard Offshore has already sunk millions. They also say today that they wouldn't have built the plant if they had known that at the time. They would have put it somewhere else. (UE10) |

Table 3: Empirical evidence of internationalisation as a complementary strategy

| **Internationalisation as complementary strategy (international and home market)** | |
|---|---|
| project developer | After having had countless options and opportunities to also invest outside of Germany, two years ago we decided that we would go to Canada. We didn't bother with Bulgaria; not France, not Holland, not Denmark, none of that interested us; Sweden, Norway, all of that was uninteresting to us. Instead we took a look across the Atlantic at Canada. We thought to ourselves: Canada, a big country, a huge environmental polluter, 33 million people, rich in natural resources, a stable political environment, more influenced by the political landscape than Germany, an enormous polluter, with fantastic resources for wind energy. And that's where we're building wind farms now; that's what we're in the process of doing there. (OL09) |

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| project developer | Of course, the manufacturers take a very close look at the markets, but also medium-sized project developers. The VSB Group from Dresden is not only active in Poland. They are very active throughout Eastern Europe and North Africa. I already mentioned Notus – they are extremely active in South and Central America and have their own offices. ABO Wind from Southern Germany are active not only in France; they are also active in several other European countries, but also in South America. (UE08) |
| project developer | I: And has internationalisation gained even more importance as a result? IP: No, everything has already been established; it's no longer possible for us to just go into any old market and act as if there isn't one – I can't just rediscover Portugal and suddenly set up a branch in Portugal and build large wind farms there; the market has already been decided; Brazil, Argentina – it's all been divided up already. That means we have our existing markets where we are continuing to do that, and in the other markets which are now new - South-East Asia, Japan, Korea, the Philippines – sometimes also with cooperation partners. (UE13) |
| project developer, public utility | That differs regionally. (...) [Municipal utility] with 100 percent renewables – that's one of our largest partners with whom we work. [Municipal utility] also has shares in [project developer], i.e. in the international area. They said to themselves: "We can't afford to do this on the side as well. We're going to cooperate and get our assets together with [project developer] in the international area" or "We're going to buy additional wind farms." (UE13) |
| manufacturer | And I go to the places where the markets are. Germany was the market. Now it's not worth packing my boxes and moving somewhere else. But the other thing is that when I set up a new location, I do it where the market is. Nordex, for example, produces in Rostock, and they will continue to do so. But all the new things that they produce, they don't do it there but in Argentina or wherever it makes sense at the time. Vestas does exactly the same. As a Danish group, in case of doubt, they are always committed to Denmark. As a global corporation, Siemens has just set up a production facility in Taiwan. And that's the way it works. In other words, it's the same as it's always been. The chemical industry once threatened to emigrate, but they haven't done that either. It's more of a creeping process. If you don't do anything new, you shrink and expand more elsewhere. The wind business overall isn't going too badly at all, also not for Nordex. (UE09) |
| manufacturer | That's the issue again if a country somewhere doesn't really work, then as a manufacturer I have to look [at the situation] and bridge this with other countries. The more diversified I am and the broadly positioned I am, the more likely I'll be able to absorb a fluctuation. (HH12) |
| finance | Of course, we're not neglecting the German market, but we have a situation in France where we have a slightly different remuneration system, which – at least for the current projects – is still based on an old fixed feed-in tariff. (...) If the German market doesn't hold that much potential, you can always somehow compensate for this with your resources by increasing your activities in other countries where you are already active. (OL15) |

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| finance | From [city] it is strategic that we instead follow our customers from the domestic market abroad. We then have colleagues at other locations who have an international background and take care of customers from France, for example, also native speakers from France or England. (OL15) |
| finance | I buy abroad. That's what I said, I have to react relatively flexibly. (...) Denmark is still very attractive for us. Of course we are still looking at the UK, France. Basically the western regions of Europe. We'll probably go overseas at some point and so on. (HH09) |

Table 4: Empirical evidence of internationalisation instead of home market strategy

| **Move abroad (instead of home market strategy, closing down sites/offices in home market)** | |
|---|---|
| manufacturer, energy utilities | We are seeing that many competitors, but also manufacturers, are orienting themselves strongly abroad or are expanding strongly with other value-added stages and technologies. (...) The evasive action that we've seen in other industries and systemic changes are currently increasing in wind. (OL23) |
| manufacturer | But there aren't any manufacturers anymore who say: "I'm here and I'm only here". The last one there who is really independent, so to speak, is Enercon in Aurich. They have their plants and various production facilities there and are active all over the world, but it's still an owner-managed company. (...) But Siemens or GE, or let's say Areva, and all those, let's say large corporate groups, they're there wherever it's currently cheapest for them. If the framework conditions change, then they say "Okay, let's move this to that country." They don't even bat an eyelid. (...) If you just look at Siemens, with the majority of their development in Brande, Denmark, also their production. Then they opened up a large production facility in Cuxhaven, for specific… for very large nacelles. Then there's the headquarters of Siemens Wind in Hamburg. That's also where the innovation department is located, but the products are being built in France, with French local content conditions, then a production facility will suddenly be opened there as well. (...) they are not regionally loyal. (OL02) |
| manufacturer | It's actually more of a geographical diversification. I go to the markets and, in case of doubt, that means I'm no longer here. (UE09) |

Table 5: Empirical evidence for the merger & acquisition strategy

| **Merger & acquisition, takeover** | |
|---|---|
| energy utility, project developer | I think MVV bought Windwärts at the same time. (...) There were phases then where they started: EnBW looked, they wanted to buy Prokon, but it didn't work out in the end. PEN merged with WKN. Volkswind was bought by a major Austrian or Swiss company, Axpo. There were a couple of consolidation stories. However, at the same time, big players like Innogy also really started to develop their own project planning operations. (...) Many entered into joint ventures. Cooperation stories like that happened. (UE07) |

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| energy utility, project developer | And then what actually happened is that – I would say from 2011, 2012, without being entirely precise – larger companies really started to look at project developers, they would join them and then want to buy them. Examples of this are perhaps the acquisition of Juwi by MVV. (UE07) |
| energy utility, project developer | These are several overlapping things. Of course, as you always hear in the trade, there is now a debate about succession in our industry. The people have been working in wind power for 20 or 25 years. They started at the age of 40 and are now approaching retirement age and wondering whether they still need to keep going. As a result, there are mergers, takeovers and companies being sold because people simply decide to leave the industry because their children don't want to take over doing it. But this is now more of a demographic issue, which just happens to coincide with the tender system, because wind energy has been around for 20 to 25 years. Then there is a second level, that new market players are entering the market and are trying with all their strength to tap into potential and know-how somewhere. These are companies – like Statkraft, MVV, certainly also EnBW – that buy in additional know-how by taking over companies and planning consultancies. It's all about how to get into the market, which requires a great deal of expertise in order to have even any degree of success there. (UE09) |
| energy utility | We have also recently taken over or acquired other companies or other project developers, that's fair to say. This also allows you to develop your volume and improve the opportunities for being active in different regions. We have acquired a project developer in Hanover. (OL23) |
| manufacturer | (Manufacturer) who can't diversify have a problem, of course. Nordex is purely a wind company, so that's difficult. Siemens – and it actually says Siemens at the beginning of the name – is also actually a wind corporation: Siemens Gamesa. They are currently making acquisitions and are cutting out the juiciest steak left at Senvion for themselves and are also consolidating. (UE09) |
| manufacturer | So, and [OEM] was a good fit because we simply fitted together well in terms of markets because we complement each other wonderfully. Where [OEM] was weak, [other OEM] was strong and vice versa, so there wasn't much overlap and that was the motivation. (HH21) |

Table 6: Real cooperation with customers, suppliers or competitors

| **Real cooperation (eye-level)** | |
|---|---|
| **with customers/suppliers, competitors** | |
| project developer | The question is then always how do you actually get access to the [wind] farms? We usually always look for cooperation partners who are active in certain regions. We don't do greenfield investments ourselves, so we don't go there and look to see where the great regions are and then talk to the owners of the respective sites and so on. We look for local cooperation partners for this. We have this in Stuttgart for example, which is why we are relatively strong in Baden-Württemberg. We have two cooperation partners there. (HH11) |

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| project developer | Even smaller companies that are perhaps even active Germany-wide will always have local cooperation partners directly there who will take care of all this work, because otherwise it's impossible to manage. (OL29) |
| project developer | We're now trying to generate pipelines in the existing system; there's another strategy that we're pursuing in Germany, which is to continue operating and marketing our own wind farms, i.e. we're trying to buy wind farms that are over 20 years old, but we're not doing this to generate new pipelines for repowering-<br>I: That is [specific project], isn't it?<br>IP: Exactly, we're actually doing this from a management perspective because we see it as a market; then we'll actually get another marketer – that will then be [energy utility] or another direct marketer with whom we will then do it together; that's another model, but otherwise perfectly normal project development, no change. (UE13) |
| project developer, energy utility | We cooperated well with local energy suppliers, for example with [energy utility], because these companies – like [name] was 50% [energy utility], 50% [project developer] and [project developer] is then out [of the game] when the direct electricity marketing competition became so high; you couldn't make money with it anymore and the [energy utility] took it. I also have cooperation projects: [municipal utility] was bought by [energy utility] together with [energy utility], we work for them partly also offshore, deutsche Windtechnik does service, maintenance and repairs for onshore and for offshore wind farms, so there are a lot of very normal technical cooperations with them which are currently in operation. But that would be the same with any other company, whether it's an energy supplier or not, that's completely irrelevant; it could also be an insurance company, we would cooperate in exactly the same way with them. But afterwards always on the specific project. (UE13) |
| energy utility, project developer | When we go into projects with cooperations, you can see that the other side is motivated by the fact… that the small ones are looking for cooperations as a safety net or for a family feeling. (...) Nowadays they tend to be interested in obtaining long-term securities and whether there's a somewhat larger company who is willing to take on the risk as well and who, I don't know, can perhaps also act as a service provider on the projects for which they originally concluded the leases. You can also see that sort of thing in individual cases. (OL23) |
| energy utility | We also have a department called "Partnership and Cooperation". It's become immensely important recently. Simply for the reason that in the last few years the market has consolidated in such a way that various consultancies or companies have not survived and it's becoming increasingly important to look for ways to stand shoulder to shoulder with other companies so you are better positioned at the point when it comes to project development and when it comes to contact with the landowners. It's becoming increasingly rare to be operating alone at a site . (...) Today we come to a site: "Hello, you're already there too." The company is also already there. Then the squabbling starts. Either you argue and end up in court, or you try, for example as part of a cooperation or with a project, to give everyone a piece of the cake and to get things up and running together. (OL23) |

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| manufacturers | There's a very high level of distrust. Everything is plastered with non-disclosure agreements, every kind of activity. If you phrased the question this way: "Where do you think you can do something together?" Then certain areas are immediately discounted. Because they say: "We won't work together on this." Every company will be operating on its own for this. Maybe with a research partner. But it is inconceivable that manufacturer A and manufacturer B would work together on a topic. At least that's been the situation so far. [...] When the company representative who has been appointed to speak by everyone then says: "As a topic we could imagine the lighting on the turbines, i.e. the flashing lights, or the lifts". Then you think: "What kind of strange answer is that? It's nothing to do with the technology at all." But the question was where can you imagine working together? [Laughter] [OL02] |
| finance | You have to be much more strongly inside the networks in order to be part of it. Just take [smart city district] for example. There are dozens of partners from [cluster] involved in this. Of course, contacts are hugely important and helpful if you want to be part of something like this. (OL05) |
| finance | Now a credit institution like this, which I know has a modest number of employees and a modest balance sheet, cannot finance a 50-million-euro wind farm alone. This the reason why – and we do this very gladly – the local bank is working together with us to set up this wind farm. We bring in the know-how, the many years of experience and how such a wind farm pays off, and in exchange the local credit institution, which also has the local contacts, is involved and integrated accordingly. (...) This is a model that's very much on the increase. We often also invite other banks in order to be able to do something locally in the region. This is definitely a very important aspect and ensures local acceptance. Therefore, it's a very important question and also part of the strategy of banks so they can implement things locally. (OL15) |

Table 7: Empirical evidence for vertical integration

| **Vertical integration (sales, operation, system operator)** | |
|---|---|
| project developer | In recent years, there has also been a slight increase in the number of project developers who have kept their own stock, but as a rule they have sold it to investors. (UE07) |
| project developer | Whether we are in direct marketing?<br>I: Yes.<br>IP: It's actually a necessity in order to operate the turbines as economically as possible, and at the end of the day we also owe this to the investors who finance the turbines. To begin with, many thought about doing it themselves. We also thought about it, but we're too small for that. You [as a company] need to be of a certain size and that will play an increasingly bigger role in the future. The turbines that are over 20 or 21 years old are now being added, the turbines that are no longer covered by the EEG after 20, 21 years. (...) Exactly, they are of interest to us. The question is, how do you integrate them? With what risks are you integrating them? Do you do this through direct marketers? Do you do it yourself? Actually, this tends to be done via a direct marketer, because the know-how and risk diversification just isn't possible |

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| | in our company on this scale. For that we would need a bigger company and there are bigger players who do that. (HH11) |
| project developer | Yes, we try to keep the added value completely here in house. In other words, we also try to keep the turbines that we've constructed and the projects we've developed actually under our management here. I would say we manage that 90% of the time. (OL04) |
| project developer | So in Sweden we've always sold everything via PPA, Finland everything PPA, and we will see that in Germany too, but not with one wind farm, instead eight or nine will be clustered and done there. (UE13) |
| project developer | Yes, but the business model [project] should not be that we are now acting as an electricity marketer, but that we run things as an operator, that is the business model of [project developer]. We do maintenance, repairs, we run the turbines, we take care of decommissioning afterwards and do operational management light. (UE14) |
| project developer | Yes, as I said, setting up here as an energy supplier as well, that's something which always gets ignored. (OL29) |
| small project developer | We were approached relatively early on because we've been in the business for a long time and are always interested in any changes and innovations, especially when it comes to direct marketing. We are participating in this pilot project, this spin-off of [electricity supplier, direct marketing].<br>I: With [name] electricity.<br>IP: That's where we market our electricity from a turbine in [place]. This is a turbine that will no longer qualify for EEG remuneration from the end of 2020. If we want to continue operating it beyond 2020, we need other marketing options – at least at the prices that the company traded at as market values for onshore wind power until the middle of this year. We come in then at three cents. We can't continue to operate a turbine for that, or can only do so until it suffers a capital loss. In the last few months, it's picked up to a surprisingly respectable rate and is now over five cents per kilowatt hour. That's about the price we need. (HH01) |
| small planner / developer | Exactly, these are the new challenges currently and of course we are also expanding our spectrum. Then perhaps I will be offering not only wind turbines but also electricity storage and batteries as well. We also want to do hydrogen now, that's what's coming. (...) Exactly, and it's not only wind energy now, but in the future more and more customers will say that battery storage is plausible and they'd like to have that too. (HH03) |
| project developer | This is what we are aiming for, because we will be the energy supplier in the future, perhaps investing more in structures and infrastructures to get to the customer or to operate with partners who are already active in trading. (MD10) |
| project developer, energy utilities | If you only sell, then you are really only a planner; if you do the operating yourself, then you're a planner and operator. We're doing a hybrid model. Others are doing this too now. (...) The concept they have now is called BSO (build, sell, operate), i.e. they also sell their projects. (UE13) |

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| project developer, energy utilities | I: This means that electricity suppliers are increasingly becoming competitors as a result?<br>IP: No, not yet, because they simply don't have any sites except for [energy utility]. Otherwise they'll notice that their business model isn't flying that way. The business model is: "We are power plant operators and I am adding a wind farm as a power plant to my power plant [portfolio]." [...] So, they are now increasingly copying the approach taken by classical project developers.<br>I: But you say not as successfully because they don't have the sites.<br>IP: No, they're only just getting started. Apart from EnBW – they recognised the signs of the times relatively early on. RWE, E.ON and Vattenfall were only concerned with themselves. (UE13) |
| energy utility | In recent years, especially since Fukushima and since the final decision of the conservative federal government to phase out nuclear energy, these were the companies that were previously active in the conventional sector as corporate groups and now they know: "Either you change or you disappear." It's therefore very visible that companies such as [energy utility] are now massively pushing into the wind market and are trying to implement wind projects and acquire sites, and in their lobbying activities they're trying to move things forward that will help them as big companies. (UE05) |
| manufacturer | We're reacting to this by firstly making real efforts to become a system provider, to be active in the energy industry and to become cheaper. Cheap, cheap, cheaper wind turbines and also relocation. As they always put it so nicely: "We need to go international." Going international means: "Getting rid of jobs here and setting up again in low-wage countries." It boils down to this. That's what's happening now and on a relatively massive scale. (UE05) |
| manufacturer | In terms of our order intake, this already accounts for – these service contracts which are sometimes up to twenty years and longer – more than half of our order intake. (HH18) |
| manufacturer | Then we bought [name] more than a year – I think – ago; it's a data processing company, so we're now getting more involved in this area of digitisation. We're therefore trying to make even better use of the data we collect from our gigantic fleet of over 86 gigawatts of wind turbines which are located worldwide and maintained by [manufacturer]. (HH18) |
| manufacturer, supplier | Diversification in the wind industry means, in case of doubt, the way into the service business for manufacturers. Areva Wind, for example, is still around as a service. This is also a nice steady cash flow, but it's not that much at once. Manufacturers are good at this, but that's about as far as it goes. Diversification is something you see more in suppliers. (UE09) |
| bank / finance | So we are very clearly in a market right now where the banks are not in such a high and mighty position. There have been other times when we – in fact even I – simply said: "No, we've got so many projects at the moment, we're being flooded; it's just a problem capacity-wise," – it still is now because it's just all a lot more involved and much more complex, but it is the case that the project planners choose the banks and it's not that we say: "No, we don't like you." (...) Now through the tendering |

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| | system even more in fact; that also means the pressure on margins and so on has also increased. (OL05) |

Table 8: Empirical evidence of horizontal integration

| **Horizontal integration (new technologies, products, sector coupling)** | |
|---|---|
| project developer | We are very interested in the area of hydrogen [...]. We only do this – when we do something like this – no longer at the research level, but at the market level. (…) But we only do this if a corresponding business model is there. (UE13) |
| project developer | Lots of wind project developers are currently jumping on PV, that's not unusual. I believe that quite a lot are also trying to get into the heat sector. That's currently the biggest step. Particularly among turbine manufacturers there's a lot happening at the moment. (HH11) |
| project developer | And we look into the heat sector, which is not unusual at the moment. More and more people are doing that, but energy transition means also heat transitions at the end of the day (HH11). |
| energy utility | I've been in the wind business for over 20 years now, and we've always been in a very lofty position, when I look back from where I am now. Because wind was always the big bang, you could earn so much money and the statutory challenges were fantastic for a long time. You didn't need anything else apart from your wind turbine. Let me put it this way, just keep on going straight ahead – tunnel vision. That's not possible anymore. I have to open up my view. I have to turn to other options now, other technologies. (...) Perhaps you just have to stop [seeing] wind as only something for producing electricity; perhaps instead you have to start connecting things together. I'm just saying: power-to-gas, sector coupling, hydrogen processing. And that's really rocking the industry and is seriously shaking us all up. But I think this affects all of us. (...) I have at least one political project in which I am represented with wind. This is [name] project. Which at the moment is still running under variant [x]; where there's no wind in it at all, just fuel cells, CHP and batteries. But as an innovation factor, wind should also be included there. And this year we'll be doing a planning and feasibility study to see if and how we can get wind in there. (HH07) |
| energy utility | From what [IP] has said, it's clear that we're no longer a classical energy seller or energy supplier. In the last few years, [utility] wanted us to present ourselves in a more, let's say, modern way, that we are not just a classical energy supplier: "[Utility]: You are where we get electricity and gas from." That's what we don't want; instead we are positioning ourselves more broadly there and are currently active in the field of renewable energies for various reasons. On the one hand, it's certainly also the aspect of generating energy and improving our ecological footprint in the way we present ourselves to the outside world, i.e. that we say: "Look, we are also sustainable and ecological in our energy production." (OL23) |

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| energy utility, manufacturer | We’re seeing that many competitors, but also manufacturers, are orienting themselves strongly abroad or are expanding significantly with other value-added stages and technologies. These are the same developments that we saw a couple of years ago. The solar industry collapsed to such an extent that there wasn’t much left to save, but the biogas industry is also looking at the moment: "Can't we also do PV project planning, or can’t we go abroad with our turbines, or can’t we enter into neighbouring process technology such as waste management or get on board with something else?” The evasive action that we’ve seen in other industries and systemic changes is currently increasing in wind. (OL23) |
| bank / finance | Our portfolio – that's about 10 billion renewable energies and 60% of that is wind. I think about 2,500 wind turbines or something like that, then also a bit of biogas. However, PV is then the second largest block. So 60% wind, then 30% PV and then the rest - and that is diversifying very strongly at the moment. (...) So here you are seeing the topic of hydrogen much more right now; that this will be the big thing up here. (OL05) |

Table 9: Empirical evidence of communication and lobbying strategies

| **Communication and lobbying** | |
|---|---|
| project developer | We’ve been doing the pool model for a long time, which that means we try to lease such a region, an entire field and take everyone with us. They say that whether you get a wind turbine or not doesn’t matter to begin with. We take the whole site, put eight wind turbines on it, then you create a sort of pot and everyone is served according to a distribution formula. So that everyone can reasonably walk through the village and not get eggs thrown at them or something. (UC07) |
| project developer | This is not exactly easy, and of course we’ve created various possibilities for this in recent years, starting with the first steps in 1996 -97, for example by introducing an open day. We’ve always held an open day here in the Eberswalde region on the anniversary of Chernobyl, which is the 26th or 27th April. We opened Trampe and people were able to visit at least one turbine in the wind farm nearby, so acceptance starts happening among the population. (UC01) |
| project developer | We look at sites, try to lease them, we generally succeed too, and then we explain to people why and for what reasons a wind farm should be built there. [...] And for that you have to have a feel and know that the majorities within the community are stable. We research this and take a very close look at how things are. This is all public information in the meeting minutes of the building committees. You know exactly who behaves how and how this is actually seen. If that’s not stable in a community, if we don’t know that a stable majority can really last through such a planning process, which takes years, then we just don’t even go there. [Laughter] (OL09) |

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| project developer | The [nuts 3 region], to come back to Brandenburg again, is certainly one of the most structurally difficult regions, where there are very good examples of how people can benefit from it. There [big project developer] is very strong in the region, one of our major members, who have also created many jobs in the area of service and maintenance. But they also created an idea, they say: "If you live near our wind turbines, you can come to us with your electricity bill at the end of the year and we will refund 10 percent back to you. People say that they really feel like they're getting something there. (UE08) |

Table 10: Empirical evidence for exit

| **Exit** | |
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| project developer, small wind sector actors | IP: That's currently not the case so far. Withdraw, smaller companies give up, smaller players give up, merge or are taken over. (...)<br>I: It's interesting that it's especially planners that you are talking about who have to stop [IP: Yes.]. Does that mean that they are the ones most affected by this transition?<br>IP: The small planners are the ones who are no longer able to get into this tendering world. They say: "I have to give up." (UE05) |
| manufacturer, project developer | Firstly, I believe that the global players, who are also very active internationally – turbine manufacturers etc. – can absorb this to some extent, but the situation is such that it has to be said: In the last five years, the German wind market has always accounted for almost 50% of the European market in terms of volume, and if you want to serve a European market with European production sites and suddenly 50% are gone, then that is very difficult, but the global players have had to reduce their margins, have reduced their workforce, but I think they are managing to get through this and in one or two years we will get out of the valley again. But due to this this atypical wind scene in Germany, there are many small and medium-sized companies that are usually only really active in their own region, and if there's a two-year standstill and no projects follow, then it's very difficult for them. And in my opinion, most of these will fall by the wayside or be bought up. (HH05) |
| manufacturer | They say: "It's global", but actually you can't stop it, and with many planners it would be fair to say that in the recent boom years they grew very strongly again and now they are shrinking again. But it is indeed the case that consolidation – smaller companies disappear, larger ones grow or take over the smaller ones – is obvious. If the market halves, it's perfectly obvious that the number of employees will shrink, and not even necessarily because of mass redundancies – this was the case at [manufacturer] because they had to close down a production facility, which is pretty spectacular because those are then big numbers. What tends to happen is that fluctuation is not balanced out by new recruitment, but that you shrink through fluctuation. That's the way many do it. (HH06) |
| manufacturer | Senvion first closed Trampe and then Eberswalde; we only had service in Eberswalde and production was in Trampe. Senvion closed both locations. Closure means: everybody out. (UC01) |

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| manufacturer | GE doesn't work in such a way that wind isn’t going well at the moment and they then take the employees and put them somewhere else. GE is the largest corporate group in the world, but ultimately that doesn't help the people in Salzbergen one bit. When business is shitty, they sell off that line of business. (UE09) |
| manufacturer | At least that's how manufacturers react. Those who can't diversify have a problem course. Nordex is purely a wind company, so that’s difficult. Siemens – and it does say Siemens at the beginning of the name - is actually also a wind corporation: They are currently making acquisitions and are carving out the juiciest steak left at Senvion for themselves and are also consolidating. Most of their production is in Spain. It’s more of a Spanish corporate group than a German one. And the others are gone. And an eno [small turbine manufacturer] is so small that they don’t need so much business. (UE09) |
| manufacturer | The pressure is being passed downwards. And if the ones at the bottom can’t cope with the pressure any longer – and that’s the situation at the moment – it passes back up again. Manufacturers are also having to consolidate. Of course. That also has other reasons. (UE09) |
| manufacturer | It was of course a consequence of economic factors, the volume collapsed and the costs had to come down. You can see that very clearly (HH22). |

## Annex

Table 13: Expert interviews

| | Code | Field of activity |
|---|---|---|
| 1 | OL01 | interest organisation, politics & administration, trade associations & unions |
| 2 | OL02 | science & education |
| 3 | OL03 | service |
| 4 | OL04 | project developer, owners, operators |
| 5 | OL05 | finance |
| 6 | OL06 | service |
| 7 | OL07 | network |
| 8 | OL08 | science & education |
| 9 | OL09 | project developer, owners, operators |
| 10 | OL10 | politics & administration, network |
| 11 | OL11 | civil society, interest organisation |
| 12 | OL12 | service |
| 13 | OL13 | civil society |
| 14 | OL14 | energy utilities |
| 15 | OL15 | finance |
| 16 | OL16 | network, science & education |
| 17 | OL17 | service |
| 18 | OL18 | service |
| 19 | OL19 | trade associations & unions, interest organisation |
| 20 | OL23 | project developer, owners, operators, energy utilities |
| 21 | OL20 | science & education |
| 22 | OL21 | science & education |
| 23 | OL22 | politics & administration |
| 24 | OL24 | politics & administration |
| 25 | OL25 | network, service |
| 26 | OL26 | civil society, finance, owners, operators |
| 27 | OL27 | politics & administration |
| 28 | OL28 | civil society, interest organisation |
| 29 | OL29 | project developer, owners, operators |
| 30 | OL30 | politics & administration |

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|---|---|---|
| 31 | HH01 | project developer, owners, operators, service |
| 32 | HH02 | politics & administration |
| 33 | HH03 | project developer, owners, operators, service |
| 34 | HH04 | civil society, interest organisation |
| 35 | HH05 | network |
| 36 | HH06 | politics & administration |
| 37 | HH07 | energy utilities, project developer, owners, operators, service |
| 38 | HH08 | trade associations & unions, interest organisation |
| 39 | HH09 | finance, service |
| 40 | HH10 | industry |
| 41 | HH11 | project developer, owners, operators, energy utilities |
| 42 | HH12 | industry |
| 43 | HH13 | science & education |
| 44 | HH14 | politics & administration, owners, operators, energy utilities |
| 45 | HH15 | politics & administration |
| 46 | HH16 | finance, owners, operators, energy utilities |
| 47 | HH17 | politics & administration |
| 48 | HH18 | industry |
| 49 | HH19 | industry |
| 50 | HH20 | finance |
| 51 | HH21 | industry |
| 52 | HH22 | industry |
| 53 | HH23 | service |
| 54 | HH24 | service, industry |
| 55 | HH25 | politics & administration |
| 56 | HH26 | politics & administration |
| 57 | UC01 | service, industry |
| 58 | UC02 | politics & administration |
| 59 | UC03 | politics & administration |
| 60 | UC04 | energy utilities |
| 61 | UC05 | project developer, owners, operators, energy utilities |
| 62 | UC06 | civil society |
| 63 | UC07 | project developer, owners, operators |

| | | |
|---|---|---|
| 64 | UC08 | politics & administration |
| 65 | UC09 | civil society |
| 66 | UC10 | project developer |
| 67 | UC11 | politics & administration, interest organisation |
| 68 | UC12 | civil society, interest organisation |
| 69 | UC13 | politics & administration |
| 70 | UC14 | politics & administration |
| 71 | UC15 | service |
| 72 | UC16 | politics & administration |
| 73 | UC17 | politics & administration, civil society, interest organisation |
| 74 | UC18 | project developer, owners, operators, energy utilities, interest organisation |
| 75 | UC19 | trade associations & unions, interest organisation |
| 76 | UC20 | politics & administration |
| 77 | UC21 | trade associations & unions, interest organisation |
| 78 | UC22 | civil society, interest organisation |
| 79 | UC23 | politics & administration |
| 80 | UC24 | project developer |
| 81 | UC25 | politics & administration |
| 82 | UC26 | service |
| 83 | UE01 | network, interest organisation |
| 84 | UE02 | service, interest organisation |
| 85 | UE03 | owners, operators, energy utilities, interest organisation |
| 86 | UE04 | politics & administration |
| 87 | UE05 | industry |
| 88 | UE06 | owners, operators, energy utilities, interest organisation |
| 89 | UE07 | owners, operators, energy utilities, interest organisation |
| 90 | UE08 | project developer, owners, operators, industry, interest organisation |
| 91 | UE09 | industry, trade association & union, interest organisation |
| 92 | UE10 | owners, operators, interest organisation |
| 93 | UE11 | interest organisation |
| 94 | UE12 | service |
| 95 | UE13 | project developer |
| 96 | UE14 | politics & administration |