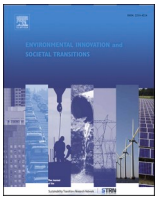
Interaction between Energy Incumbents and Solar Entrants: Relationship Status Complicated

Environmental Innovation and Societal Transitions 46 (2023) 100695

Contents lists available at ScienceDirect

Environmental Innovation and Societal Transitions

journal homepage: www.elsevier.com/locate/eist



Interaction between energy incumbents and solar entrants: Relationship status complicated

Maria Altunay, Anna Bergek *

Department of Technology Management and Economics, Chalmers University of Technology, SE-412 96 Gothenburg, Sweden

ARTICLE INFO

Keywords:
Transitions
Niche
Regime
Solar PV
Collaboration
Organizations

ABSTRACT

This paper contributes to the conceptualization of niche-regime interaction through a retrospective study of the evolution of business relationships between new entrant solar firms and incumbent municipal electric utilities in Sweden. We analyse how activity links, resource ties and actor bonds evolve over time and discuss the resulting interactions. We find that the relationships initially created mutual benefits, combining utilities' brands and sales channels with solar firms' technology competences. Most collaborations later turned into conflict due to the solar firms' strengthened network positions and the clash between their private sector logic and the utilities' public sector logic. Conceptually, we emphasize (1) changes in the relative importance of different resources (technology-related interactions), (2) decreased alignment of goals, strategies, and values (institution-related interactions), and (3) shifts in the relative power of new entrants vis-à-vis incumbents (network-related interactions). This leads us to question the common association of niches with new entrants and regimes with incumbents.

1. Introduction

> *"We have been working with solar for quite many years, I think already in 2011 we started a project which was, here in Sweden, really early. But we wanted to try solar. So we did sort of a pilot test and we had a partnership with a solar company who sells solar plants. The goal was to have 100 customers who wanted to produce solar electricity, and that was really popular …" (Municipal Electric Utility in Sweden)*

The quote above takes us right into the initial period of collaboration between Swedish municipal electric utilities and solar firms, running pilot projects for selling solar photovoltaic (PV) turnkey systems. The dynamics of this collaboration is the empirical focus of this paper. In the past two decades, the market price of solar modules and systems has decreased substantially worldwide (Goodstein and Lovins, 2019; Horváth and Szabó, 2018) and solar PV technology has been made available to new markets (Strupeit and Palm, 2016). This includes Sweden, where the residential market for turnkey systems has expanded rapidly in the last decade (Lindahl et al., 2021). This implies an increasing decentralization of the energy system as well as intensified competition in the electricity market (albeit still at a small scale), as consumers start to micro produce their own electricity and, consequently, start to compete with established energy companies. In Sweden and elsewhere, solar PV has also become an attractive market for new entrants into the energy system (Dewald and Truffer, 2012; Yang et al., 2021). Specialized solar installation firms provide turnkey systems and other types of solar-related goods and services to residential and business customers, thereby enabling solar PV diffusion and increased

* Corresponding author.
E-mail addresses: maria.altunay@chalmers.se (M. Altunay), anna.bergek@chalmers.se (A. Bergek).

https://doi.org/10.1016/j.eist.2023.100695
Received 16 June 2022; Received in revised form 12 January 2023; Accepted 16 January 2023
Available online 20 January 2023

prosumption (Aspeteg and Bergek, 2020; Aspeteg and Mignon, 2019; Fabrizio and Hawn, 2013; Palm, 2015; Palm, 2018).

At a first glance, this seems to be a rather traditional story of niche-regime interaction, as conceptualized in the multi-level perspective (MLP). An emerging niche innovation develops and – following processes of internal learning and accumulation as well as regime destabilization – starts to challenge the sociotechnical regime, which eventually leads to a reconfiguration of established sociotechnical systems, actor networks (in particular the relative position of energy incumbents vis-á-vis new entrants), and institutions (Geels et al., 2017).

However, at closer scrutiny the empirical case of solar PV in Sweden differs from the standard MLP story. Indeed, in the Swedish solar PV case, incumbent energy companies are very much involved in the downstream development and scaling up of the emerging niche innovation and have, in fact, been collaborating with new entrant solar firms to develop the turnkey solar business model for almost a decade (Lindahl et al., 2021; Wadin et al., 2017). Similar collaborative patterns have also been observed, for instance in Finland, both for solar PV and other energy-related technologies (Apajalahti et al., 2018; Heiskanen et al., 2018; Kangas et al., 2021; Ruggiero et al., 2021).

These and other examples support previous claims that our understanding of niche-regime interaction is limited (cf. Bui et al., 2016; Diaz et al., 2013; Elzen et al., 2012; Ingram, 2015). More specifically, they highlight two main shortcomings of the current conceptualizations of niche-regime interaction in the transitions literature. First, there is a *confrontation bias* in that the niche-regime interaction literature focuses on conflicts between niche innovations and regimes. Such conflicts are for the most part concretized as competitive tensions between new entrants (that build niches) and incumbent actors (that resist change) (e.g., Hess, 2016; Pekkarinen and Melkas, 2019; Smink et al., 2015a, 2015b). However, the balance between cooperation and competition can vary between cases (Kangas et al., 2021), and in cases such as ours – which is characterized by a high degree of collaboration – a one-sided focus on competition and conflict is clearly insufficient. Second, there is a *lack of attention to the business side* of niche-regime interaction. Indeed, even though both incumbents and new entrants tend to be "firms-in-industries" (cf. Geels, 2014), much of the literature on niche-regime interaction focuses primarily on their institutional or political strategies (Bui et al., 2016; Geels, 2006a; Hess, 2016; Smink et al., 2015a; Yang et al., 2021) or clashes between different institutional logics (Smink et al., 2015b). In our case, this becomes especially problematic, as the collaboration in focus concerns the development of a joint business model.

These shortcomings indicate that an approach that focuses on business-related collaboration between incumbents and new entrants would further our understanding of how niche-regime interaction unfolds. In our view, this requires a micro-level analysis, which can capture actor-level heterogeneity within both niches and regimes (cf. Laakso et al., 2021; Yang et al., 2021) as well as the "messy dynamics" that characterize collaboration in actor networks (Ingram, 2015; see also Diaz et al., 2013). *In line with this, the purpose of this paper is to study the evolution of business relationships between incumbents and new entrants, in order to contribute to the conceptualization of niche-regime interaction.*

To achieve this purpose, we use an analytical framework from the field of industrial marketing and purchasing, developed specifically to study business relationships between industrial firms at the actor network level: the Activities, Resources, and Actor bonds (ARA) framework (Håkansson and Johanson, 1992; Håkansson and Snehota, 1995). We apply this framework in a retrospective multiple case study of relationships between municipal energy incumbents and new entrant solar firms to answer the following research question: *How do activity links, resource ties and actor bonds evolve in business relationships between new entrants and incumbents, and what types of interactions result from the interplay between them?*

By answering this question, we contribute to the conceptualization of niche-regime interaction by showing that (1) the relative importance of different kind of resources may change over time, (2) interaction does not necessarily result in increased alignment of goals, strategies, and values, and (3) the relative power of new entrants vis-à-vis incumbents differs between cases and may also shift as relationships unfold. These findings also lead us to question the common association of niches with new entrants and regimes with incumbents.

2. Theoretical embedding

In this section, we review previous literature on niche-regime interaction before introducing our analytical framework.

2.1. Previous research on niche-regime interaction

As conceptualized in the MLP framework, sociotechnical transitions "involve interactions between the incumbent regime, radical 'niche innovations,' and the 'socio-technical' landscape" (Geels et al., 2017, p. 465). In order to understand such transitions, researchers should, therefore, analyse the "multi-dimensional struggles between niche-innovations and existing regimes", i.e. niche-regime interaction (Geels, 2018, p. 227).

In this context niches are defined as emerging radical innovations that develop in protected spaces that "shield" them from traditional selection mechanisms, "nurture" them to enable learning and growth, and "empower" them to become competitive with established technologies and systems (Geels et al., 2017; Smith and Raven, 2012). Regimes refer to highly institutionalized ways of fulfilling specific societal functions (Smith et al., 2010). Theoretically, they can be understood as "deeply entrenched rules and institutions" that guide and coordinate the behaviors of the (incumbent) actors that uphold established sociotechnical systems (Geels, 2019), but in empirical studies they are often understood as stable configurations that comprise technologies and actors as well as institutions (Markard and Truffer, 2008).

In the general MLP framework, niche-regime interaction tends to be described at a rather overarching level: emerging niches challenge regimes and put pressure on them to open up, whereas regimes, through their stability, oppose change and constrain niche

development. However, previous research specifically focusing niche-regime interaction provides more detailed insights.

Most of this literature analyses how either niches or regimes influence the other. Articles on *niche-to-regime* interaction provide conceptual ideas and empirical studies of how niche innovations build links to regimes (e.g. Bui et al., 2016; Diaz et al., 2013; Elzen et al., 2012; Ingram, 2015; Smith and Raven, 2012) or manage tensions with regime actors (Kangas et al., 2021). Articles on *regime-to-niche* interaction focus on conceptualising the different ways in which regime actors may respond to the threat of emerging niche innovations (Turnheim and Sovacool, 2020) and provide examples of cases where regime actors have either blocked or reframed niches to suit their own interests (Smink et al., 2015a; Späth et al., 2016) or engaged with a new niche innovation through their technology or business strategies (Mylan et al., 2019; Smink et al., 2015b).

However, some researchers argue that niche-regime interaction should instead be studied as a *bi-directional* process, in which niches and regimes influence each other simultaneously (Diaz et al., 2013; Mylan et al., 2019; Yang et al., 2021). This is in line with the idea that niche-regime interaction involves mutual struggles between new and old technologies, new entrants and incumbents, different policy actors and interest groups, and social groups with different views (Geels, 2019). This is also the approach we take in this paper. Bi-directional interaction could, for example, involve the continuous "making and breaking" of connections between niches and regimes (Elzen et al., 2012), mutual learning between niche actors and regime actors (Wadin et al., 2017), and gradual processes of translation and adaptation of technologies, practices, and rules between niches and regimes (Avelino et al., 2016; Diaz et al., 2013; Ingram, 2015).

As suggested by the abovementioned examples, niche-regime interaction may concern any of the three constituent parts of a sociotechnical configuration (sociotechnical systems, institutions/rules, and actor networks) (Elzen et al., 2012; Ingram, 2015). *Technology-related interaction* can concern competition or incompatibility between old and new technologies (Geels, 2018; Pekkarinen and Melkas, 2019), but may also involve less confrontational mechanisms, such as involvement of regime actors in the definition of key niche innovation characteristics (Elzen et al., 2012), mutual adaptations of technologies or organisational models to improve compatibility (Elzen et al., 2012; Pekkarinen and Melkas, 2019), or the integration of niche innovations into existing sociotechnical systems (Geels, 2018). The literature also describes how incumbent actors tend to have large and diverse sets of resources that can be applied to forming and accelerating niches, such as production capacity, customer bases, and legitimacy (Bui et al., 2016; Kangas et al., 2021; Turnheim and Sovacool, 2020; Wadin et al., 2017) which can complement the technical knowledge and innovation capabilities held by niche actors (Kangas et al., 2021; Wadin et al., 2017).

Institution-related interaction may, on the one hand, include struggles between niches and regimes in terms of conflicting problem framings or institutional logics (Geels, 2018; Ingram, 2015; Pekkarinen and Melkas, 2019; Smink et al., 2015a). On the other hand, the literature highlights that interaction may come in the form of alignment of visions and problem framings between niches and regimes, for example in the form of regime actors shaping transitions to suit their own purposes (Späth et al., 2016), niche and regime actors adapting or translating visions, problem framings and identities to fit better with the regime (Bui et al., 2016; Diaz et al., 2013; Elzen et al., 2012), or the development of shared visions (or other kind of new rules, including policy) across niche and regime actors (Bui et al., 2016; Elzen et al., 2012; Kangas et al., 2021; Yang et al., 2021).

Finally, from a traditional MLP perspective *network-related interaction* mainly involves market competition between niche and regime actors (Geels, 2018; Kangas et al., 2021). The literature on niche-regime interaction, however, shows that regime actors can become involved in niche networks, for example by establishing partnerships with niche actors for joint experimentation and technology or business development (Elzen et al., 2012; Kangas et al., 2021; Laakso et al., 2021; Wadin et al., 2017) or taking on intermediary roles in the system (Mylan et al., 2019). Interactions can also change over time within existing networks, for example in terms of intensity, forms of coordination, actor roles, and degree of interdependence (Bui et al., 2016; Elzen et al., 2012).

As these examples show, actors are at the heart of all types of niche-regime interaction. Consequently, we cannot stay at the meso-level of analysis described in the MLP if we want to fully understand niche-regime interaction, but instead need micro-level studies of actors and the interactions they engage in. In this regard, the literature review indicates that "niche actors" and "regime actors" are of particular interest. Most of the articles referred to above equal niche actors with new entrants and regime actors with incumbents, and we used this approach in our study as well to align our research with previous literature. As demonstrated in empirical studies, new entrants and incumbents may adapt technologies and combine their resources (technical interaction), establish different types of relationships (network interaction), and engage in institutional work (institutional interaction). To capture such interactions, we employ an analytical framework from the industrial marketing and purchasing literature, which has actor-level relationships in focus.

2.2. Analytical framework

As conceptualized in the industrial marketing and purchasing literature, business relationships result from continued "mutually orientated interaction between two reciprocally committed parties" (Håkansson and Snehota, 1995, p. 25). A core assumption is that the collaboration creates value which neither of the firms could achieve in isolation. While this definition focuses on "dyads" of two actors, the interactions in such relationships are also dependent on the microstructure surrounding the dyad (Madhavan et al., 2004) and the larger networks in which the two parties are embedded (Ford et al., 2010). In the example of service delivery, such as the sales of PV turnkey systems, the dyad is embedded in a "triadic" context with customers (Vedel et al., 2016), as well as a surrounding network consisting of equipment manufacturers and other partner firms. Changes in relationships with one business partner can, therefore, have a significant impact on other partner relationships (Håkansson and Snehota 2017).

In order to understand business relationships, their substance should be studied in three "layers": activity links, resource ties and actor bonds (in short: ARA) (Håkansson and Johanson, 1992; Håkansson and Snehota, 1995). In analysing how the three ARA layers

contribute to value, or mutual benefits, in business relationships, it is relevant to focus on the *connections*, i.e. the links, ties and bonds, rather than the activities, resources and actors in themselves. Table 1 summarizes examples of links, ties and bonds, which will be described in the following.

In the first layer, technical, administrative, commercial or other *activities* in both firms are linked and coordinated with each other (Ford et al., 2010; Håkansson and Snehota, 1995). Examples include quality control and product development (Baraldi et al., 2014), as well as the coordination of goods, location, pick-up and delivery times (Andersson et al., 2019). This layer is the most straight-forward to observe and illustrate as it usually describes the division of labour or the 'who does what' in a collaboration (Håkansson and Snehota, 2017). Potential conflicts can emerge from power asymmetries, control, and coordination (Li and Choi, 2009; Nätti et al., 2014; Vlachos and Dyra, 2020).

In the second layer, *resources* create ties as two parties adapt their resources to one another, and interdependencies emerge. As firms can hold a competitive advantage due to, for instance, rare or valuable resources (Barney, 1991), collaboration can facilitate access to other firms' resources (Sundquist and Melander, 2021) and, ultimately, lead to innovation (Adner and Kapoor, 2010; Laage-Hellman et al., 2021; Palo and Tähtinen, 2013). Resources can be tangible, such as production facilities and equipment, as well as intangible, such as knowledge (Ford et al., 2010; Håkansson and Snehota, 1995). Studies of resource ties investigate, for instance, material flows (Andersson et al., 2019; Finch et al., 2010), IT systems and interfaces (Andersson et al., 2019), and knowledge transfer and learning (Yang et al., 2011).

In the third layer, *actors* in both firms connect and form bonds and become committed to the relationship as they develop mutual goals and agendas (Ford et al., 2010; Håkansson and Snehota, 1995). Actor bonds are, thus, about the human aspect of the business relationship (Finch et al., 2010). For instance, the communication at a first meeting, sharing common values and 'getting along with each other' can determine the future of an entire business relationship (Escher and Brzustewicz, 2020). Actor bonds are, therefore, probably the most difficult layer to grasp. Conceptualizations often focus on trust, which includes both the individual and firm-level (Arvidsson and Melander, 2020). While interpersonal trust includes factors such as the competence, credibility, knowledge, willingness and honesty of the individual, (inter-)organizational trust involves the stability of the firm, their past experience and performance, the technology they use, contractual integrity, and the alignment of goals and values (Arvidsson and Melander, 2020). A failure of sustaining actor bonds can lead to information asymmetries, opportunism, and goal (in)congruence (Hartmann and Herb, 2014; van der Valk and Van Iwaarden, 2011).

Fig. 1 illustrates the interdependence between the three layers, with examples of how the layers relate to one another. Consequently, the three layers should not be interpreted in isolation. Any analysis of business relationships should, therefore, incorporate cross-cutting themes.

3. Methodology

The idea for this study was sparked by electric utilities taking over some of the activities and responsibilities that previously had been held by solar firms as the main coordinators in the solar PV turnkey systems business model. This model includes the value proposition of providing residential and business customers with hassle-free configuration, installation, and maintenance of a complete and operational solar PV system (Aspeteg and Bergek, 2020; Aspeteg and Mignon, 2019). It seemed counter-intuitive to share profit margins with an additional actor (the electric utilities) for an already well-functioning business model, and we therefore became interested in studying this relationship further.

3.1. Study design and case selection

Since the research was of an exploratory character, we chose a retrospective case study approach as our study design. Case studies involve examining a small number of instances of a particular phenomenon under investigation, about which rich empirical descriptions are formulated based on multiple data sources (Easton, 2010; Eisenhardt and Graebner, 2007). They are suitable for studies exploring broad research questions, when it is important to understand "the rich, real-world context in which the phenomena occur" (Eisenhardt and Graebner, 2007). They are also the main method of choice in previous research of industrial networks, as they "resonate well with interactions and relationships as basic units of analysis" (Dubois and Araujo, 2005, p. 210). In order to be able to understand our focal phenomenon better, we decided to do a comparative study of several cases, highlighting both similarities and differences between them.

When studying industrial networks, case definition and delineation is most often not straightforward, as such networks do not have

Table 1
ARA layers with associated categories and examples.

ARA	Categories	Examples (non-exhaustive list)
Activity links	Technical, administrative, commercial, and other	• Coordination and control of activities • Division of labour between partners
Resource ties	Tangible and intangible resources	• Material flows • Interfaces enabling resource sharing • Learning and knowledge exchange
Actor bonds	Trust at interpersonal and (inter)-organizational level	• Competence, knowledge, honesty, and commitment between individuals • Stability, performance, contractual integrity and alignment of goals and agendas

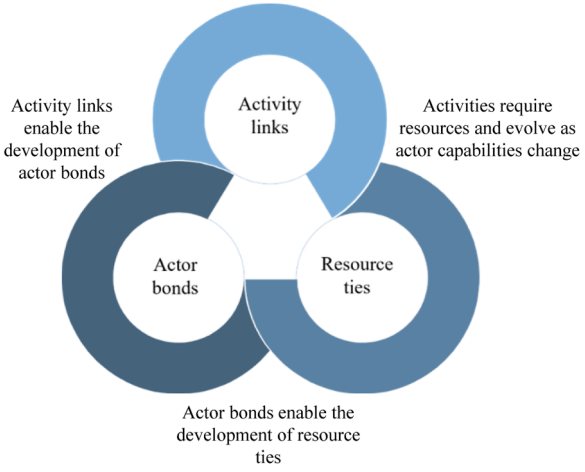


Fig. 1. Interdependencies between layers of ARA framework (based on Håkansson and Snehota (1995, p. 35)).

any "natural" or clear boundaries that can be defined beforehand (Dubois and Araujo, 2005). Case boundaries are therefore often redefined during the research process in an interplay between theory and insights from empirical studies. In our case, we defined the cases in terms of dyadic relationships between one electric utility and one solar installation firm.

Our case selection was made in two steps. As a basis for identifying the cases, we first started by mapping all electric utilities selling PV turnkey systems in Sweden (42 companies in total). This list was compiled for this study based on pre-interviews and information from company websites. amongst these, we chose to focus on municipal electric utilities, since they epitomize the concept of 'incumbent firms', which are established firms that hold a position of status and power in relation to markets and institutions (Galeano Galvan et al., 2020; Kungl and Geels, 2018; Turnheim and Sovacool, 2020). An incumbent can be described as "an organisation or an actor with a longstanding history; it is large in size, both in terms of personnel and revenue; in most cases it is a well-known firm; and it has political and economic power." (Apajalahti, 2018, p. 31).

While some might primarily consider large electric utilities (such as Vattenfall or E.ON) as energy incumbents (cf. Apajalahti, 2018; Frei et al., 2018; Kattirtzi et al., 2021; Pereira et al., 2022; Wadin et al., 2017), municipal electric utilities possess power and influence at the regional or municipal level (Mühlemeier, 2019). In the Swedish context, they have had a central role in building and operating electricity systems for over a century (Högselius and Kaijser, 2010) and are often important instrument for the municipalities' strive to achieve their sustainability goals (Gustafsson and Mignon, 2020), acting as the 'extended arm' of local policymakers in driving the energy transition forward. This is also one reason why they have started to offer solar turnkey systems and engage with other solar business models (Altunay et al., 2021). As described above, municipal electric utilities sell PV turnkey systems together with solar firms, who represent the 'new entrants' in these cases, being rather small firms that entered the energy sector recently to engage with the novel solar PV technology.

Second, we collected more detailed information of the municipal energy companies' involvement in the solar turnkey model and their partners and identified a number of interesting cases based on a combination of criteria: (a) the selected companies had to have a more active role than just forwarding 'leads' from the customer to a solar firm; (b) the cases should include solar firms active on different geographical scales; and (c) the cases should include electric utilities that worked with more than one solar firm as well as solar firms that worked with several utilities. Even though the cases were not theoretically sampled in a strict sense (cf. e.g. Eisenhardt and Graebner, 2007), this helped us select a varied enough set of cases to provide interesting patterns that could shed light on the interactions between these actors. The case selection was also limited by the willingness of both parts of the business relationship to participate in the study, as in a few cases we could not get the solar firm to participate even though the electric utility had committed. The final case selection consisted of six dyadic relationships between four municipal electric utilities and three solar firms, where most firms have multiple relationship connections as shown in Fig. 2. The case firms were anonymized and are referred to, for example, as

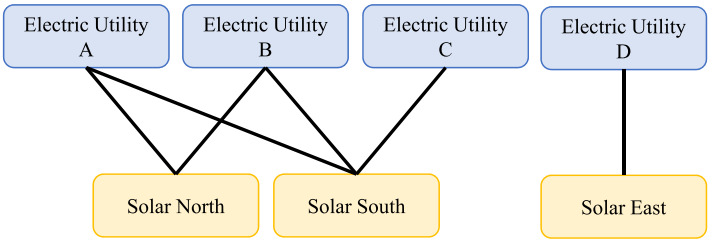


Fig. 2. Dyads of solar firms and electric utilities in this study.

"Electric Utility A" and "Solar East".

3.2. Data collection and analysis

While some case study researchers advocate starting with theoretically derived hypotheses or propositions (see, e.g., Yin, 1984), others are purely inductive and empirically "grounded" (cf., e.g., Glaser and Strauss, 1967). We adopted an abductive approach similar to "systematic combining" (Dubois and Gadde, 2014, 2002), in which theory is used to position the study and to develop a preliminary analytical framework with some key concepts, which guides the initial data collection but is revised as the work proceeds and the researchers' understanding of the case(s) and the focal phenomenon increases. As such, the framework presented in Section 2 is partly an outcome of the research process rather than the starting point.

The research process started with familiarizing ourselves with the industrial marketing and purchasing literature and discussing concepts that could be expected to be relevant based on our previous knowledge of the actors on the solar PV market. This resulted in an interview guide (see Appendix A) covering general questions about the firm, its current and future strategy, and the activities, resources, and actor bonds regarding the sales of PV turnkey systems. The guiding questions for electric utilities and solar firms were slightly different and the content and order of questions were adjusted throughout the research process. While the questions for the most part were formulated in terms of the current status and organization of each collaboration, data about the evolution of the collaborations were collected in two ways. First, the interviewees were asked, early in the interviews, to describe how the business model had developed over time (see question 3 in the guide). Second, throughout the interviews the interviewees provided information – either voluntarily or prompted by follow-up questions – about the development of the business model and their relationships to the extent that changes had occurred over time.

As described above, six dyadic relationships were part of this retrospective study, including seven firms. Ten semi-structured interviews were conducted between March and September 2021, with several interviewees informing multiple relationships (see Table 2). The interview statements were triangulated with additional interviews with customers, other electric utilities and solar firms, secondary data such as newspaper articles and the IEA-PVPS market reports from 2002 to 2022 (https://iea-pvps.org/national-survey-reports/), previous discussions at industry conferences (i.e. Solforum 2019 and Energidagen Väst 2021), as well as the authors' decade-long experience in the energy sector and previous research projects about the solar PV market in Sweden. The authors' experience includes previous studies of solar business models, including the turnkey business model, from the perspective of both electric utilities and solar firms (Altunay et al., 2021; Aspeteg and Bergek, 2020).

While a longitudinal study design as well as more interviews with different involved actors would have been ideal, each interviewee had a central role in his/her respective firm in driving the business relationships. In addition, the data covers a critical time period of experimentation with different collaborations for the turnkey business model. The interview material in combination with the abovementioned secondary data is therefore well-suited to provide a retrospective account of the development of the relationships.

The process of conducting, transcribing, and analysing interviews was both simultaneous and sequential. Single-case summaries and analysis of early interviews improved the understanding of critical aspects from the interviewee perspective and led to adjustments in later interviews. After finishing the data collection, the interviews were analysed in three rounds, using the MAXQDA software. First, all interviews were manually coded top-down with activity links, resource ties, and actor bonds as broad categories, refining the understanding of the data at hand. A second round of manual coding scrutinized the data from the bottom-up, coding inductively and in-vivo, as close to the interviewee words as possible. These two rounds of coding resulted in the dimensions of business relationships presented in chapter 5, which were inspired by earlier studies using the ARA (see examples presented in chapter 2). The final themes in chapter 6 evolved from a meta-analysis, in which the authors identified links between the characteristics of the studied business relationships and transitions literature. The final choice of themes to be presented in the paper was creative and subjective, given the abductive approach chosen in this study.

Table 2
Interviewees.

Case	Firm	Scope	Interviewee position	Duration (h:m)
A	Electric Utility A	Regional	Business developer services	00:36
	Solar South	International	CEO	01:51
	Solar North	National	Founder	00:55
B	Electric Utility B	National	Business developer services	01:08
	Solar South	International	CEO	*
	Solar South	International	Partner relations manager	00:29
	Solar North	National	Founder	*
C	Electric Utility C	Local	Business developer services	00:54
	Solar South	International	CEO	*
D	Electric Utility D	Local	Business developer solar	01:08
	Electric Utility D	Local	Salesperson (solar specialist)	00:35
	Solar East	Regional	Head of installations	00:40
	Solar East	National	Sales manager	00:27

*The marked interviews belong to multiple dyads.

4. Empirical context

Up until the first decade of the 2000s, the Swedish market for solar PV consisted of off-grid applications, such as holiday cottages and caravans, and a small market for publicly owned grid-connected systems (Lindahl et al., 2021). However, in 2009 an investment subsidy was introduced for all kinds of small-scale on-grid solar PV systems. Together with a change in regulation in 2010, which removed the grid connection fee and grid tariff for small solar PV systems (Lindahl, 2011), this resulted in a rapid expansion of grid-connected, roof mounted systems for households and companies.

As a consequence of both economies of scale (as solar firms could buy larger volumes) and falling prices for modules and system components in the international market, prices for turnkey systems fell and solar PV became increasingly competitive (Lindahl, 2014, 2013, 2012, 2011). At the same time, the number of distribution and installation firms increased rapidly (to over 100 firms at the end of 2013) (Lindahl, 2014). This resulted in intensified downstream competition, which pushed system prices down even further (Lindahl, 2013).

Another change in the industry in this period was that established energy companies started to pay attention to solar (see Fig. 3). Around 2009, several electric utilities (both electricity electric utilities and grid operators) started to introduce different types of compensations schemes for micro-producers feeding their surplus electricity into the grid, ranging from spot market prices to significantly higher feed-in tariffs (Altunay et al., 2021). In addition, some grid operators introduced net metering (Lindahl, 2012). In 2012, some electric utilities started to offer small turnkey systems to owners of residential houses in collaboration with (local) installation companies (Lindahl, 2014, 2013).

Around this time (2011–2013), Solar East, Solar South and Solar North all started their operations and, thus, took part in the industry's initial attempts to introduce a novel technology as a 'plug-and-play' (or *turnkey*) solution to the market. This required them to sort out the bits-and-pieces of a novel technology and the complementary services needed to make it work. They developed a model in which they purchased solar PV equipment from Asia, handled storage and distribution, and offered installation and service for solar PV plants.

In order to experiment with and scale up this new model quickly, Solar South and Solar North both proactively invited various types of established firms (including but not restricted to electric utilities) to enter into a collaboration with them:

> *"[W]e came to them with a full package and said, hey, guys, you have the, you have the market channels and we have the knowledge and let's collaborate. And we gave them a pretty much off the shelf solution that we could plug into pretty much any energy company." (Solar South, CEO)*

In the beginning, few municipal electric utilities were interested in their offer, but both Solar North and Solar South were able to spark an interest in their local utilities. Over time, many other utilities also changed their minds, as their ambition to retain their existing customers and grow their customer base beyond regional boundaries increased. This became possible as some of the solar firms started to build up national networks of sub-suppliers for distributing equipment and performing installations all over Sweden. In the following decade, this collaborative turnkey model, which is the focus of this paper, became the standard way of selling PV turnkey systems. Our study covers the period of 2015—2021, in which the six dyadic business relationships in focus were initiated, developed, and in some cases discontinued.

5. Business relationships

The characteristics of the relationships between the electric utilities and solar firms are presented along the three dimensions introduced in the analytical framework: activity links, resource ties and actor bonds. A summary of the findings for each case is available in Appendix B.

5.1. Activity links

The activity links in the business relationships between the solar firms and the electric utilities can be described along two core dimensions, which are neither exhaustive nor mutually exclusive: project operations and training.

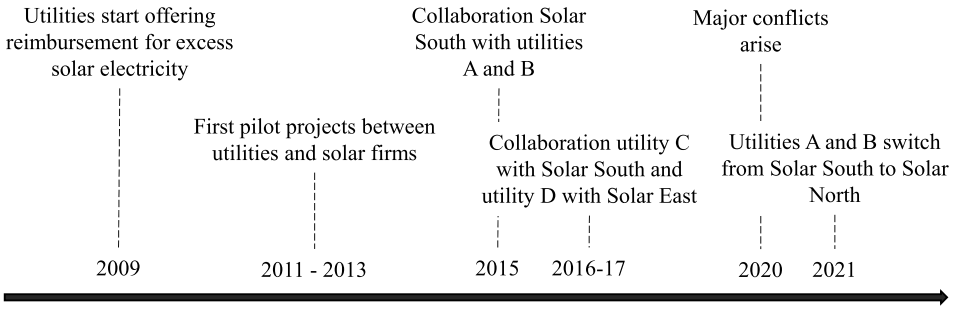


Fig. 3. Timeline of business relationships between electric utilities and solar firms.

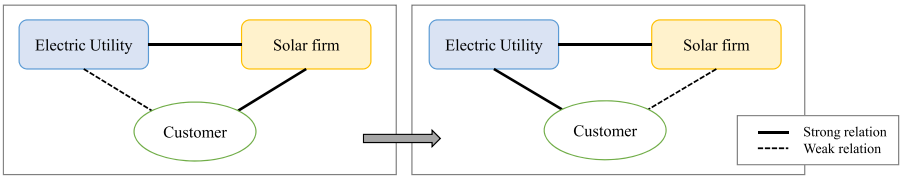


Fig. 4. Shift in relation to customers.

5.1.1. Project operations

In the initiation phase of the collaborations, the electric utilities had in most cases a passive and more administrative role, mainly invoicing the customer, whereas the solar firms were the main service providers and handled all project operations, i.e., setting prices, communicating with end customers, and coordinating installations of PV turnkey plants. Some solar firms performed the installations themselves, while others contracted sub-suppliers. They also handled formal registrations of the PV turnkey system before and after the installation. It is noteworthy that electric utilities usually did not perform any quality control during or after installations (although a technical control of the system was performed by the grid operator). Thus, the solar firms accompanied the end-customers through their entire journey and were responsible for customer satisfaction.

Over time, the division of labour changed. While the solar firms continued to perform installations of PV systems and handle all formal registrations related to that, the electric utilities were able to take over responsibility for system configuration and customer service:

> *"In the beginning when we [Electric Utility D] didn't have any expertise ourselves, we needed them on a project-by-project basis more. … [I]n the very beginning, they [Solar East] were involved in the sales as well. And now they are not at all [involved] in the customer interaction… part of the sales." (Electric Utility D, business developer solar)*

> *"They [Electric Utility B] have their own sales personnel, so they make the offer … and the projection of the solar installation for the customer usually without our help. And so before, I helped them a lot with their offering and their sales, but now they are doing most parts themselves. It's been a learning process for them." (Solar South, partner relations)*

In the new division of labour, electric utilities became the sole point of contact for end customers, except for the installation itself. They, thus, took on a coordinative role, where they communicated with the other two parties, held contracts, and controlled financial flows. This position is illustrated by electric utilities coordinating the installation date between the end customers and the solar firms, but even more by problem solving: If problems occurred, end customers would contact their electric utility, which they had a signed contract with, and the electric utility would, in turn, solve the problem together with the solar firm. As project operations, for example the configuration of PV systems, were now a shared responsibility, the two parties needed to communicate and coordinate projects daily.

5.1.2. Training

The shift in project operation responsibilities was enabled by training the electric utilities had received from the solar firms. This was established already from the beginning of the collaborations. In settings where the electric utility took as little responsibility as possible for project operations, this training could be as simple as establishing joint invoicing workflows. However, many electric utilities were eager to develop their own solar competence from the start. This required them to get the management team on board and build a sales organization which could configure PV systems and manage customer services, as described by Solar South:

> *"Teaching them what the customers really are looking for and want. … I mean, it's one thing [that] this is the package they want but, like, how do you sell it to them? How do you present it? What are their main concerns? I mean, what type of questions will they be asking and why? And so, it's really about understanding regular sales coaching." (Solar South, CEO)*

To build up a solar business unit with a more exhaustive competence on the electric utility side, rather intense training was required, which involved frequent meetings. Developing solar competence together did not only require training but also mutual commitment to common visions and goals (see 5.3.1).

As a result of a steep learning curve in the initial period, training activities decreased, and as frequent interactions became established on the level of project operations, training sessions were replaced by semi-annual technical meetings for introducing novel technologies and work routines.

5.2. Resource ties

The resource ties that have been created between solar firms and electric utilities can be grouped into three main categories: technology and competence, brand and sales channels, and local connections.

5.2.1. Technology and competence

The solar firms brought PV turnkey systems into the business relationships (as described in Section 4), as well as networks of sub-suppliers and a focus on end-customers. In addition, the solar firms developed customized software for project cost calculations and/or

project management. As the electric utilities entered into collaborations with these firms, they were introduced to and taught how to use the firm-specific software. Moreover, explicit as well as tacit knowledge was transferred from the solar firms to the electric utilities through the training activities described in Section 5.1. After the electric utilities learned to use the solar firms' software, no significant novelties were introduced at later stages of the collaboration. However, Solar East and Electric Utility D were collaboratively developing a new technological interface during the interview period.

As the market for solar PV matured, the former novelty of PV turnkey systems became a standard offer, which was available all over Sweden and offered by an expanding number of firms (as described in Section 4). Moreover, the electric utilities acquired the knowledge to work with the solar firms' software and to manage customer service themselves.

Meanwhile, two other resources increased in importance: the solar firms' purchasing supply chains and their installation competence. Bulk purchasing became a valuable resource of the solar firms in their relationship with the electric utilities as a consequence of the expansion of their sales volumes and partner network. Through that, the purchased quantities of solar modules grew, creating economies of scale, which led to a more beneficial position in price negotiations.

As a consequence of the initiation and development of the solar PV downstream market in Sweden, the demand for solar firms' installation competence grew larger than the supply, as illustrated in the following quotes:

> *"You know, we have scarce resources right now; there's not enough solar firms and there's like kind of a queue everywhere and everybody's trying to get the best solar firms and they move around, and they know their value in gold. They are really well-paid today." (Solar North, founder)*

> *"It is a really 'hot' sector right now, where they have a lot to do, they are just moving from job, to job, to job" (Electric Utility C, business developer services (translated from Swedish))*

5.2.2. Brand and sales channels

As the electric utilities' brand recognition (through electricity sales) was a central resource for the initiation of the collaboration, most projects were conducted under the electric utilities' brand:

> *"Some said: 'Yeah, we want to sell this, but we don't want to do anything, you can do everything for us. Basically, here is a list of our customers, call them, pretend to be us, and then sell it to them'." (Solar North, founder)*

> *"But they more or less sold the service and Solar South was the one doing the service. So, the only thing that we did was kind of adding our brand and kind of the sale." (Electric Utility A, business developer services)*

However, the solar firms simultaneously worked on establishing their own brand names in the market. The collaboration with the electric utilities was both positive and negative in this regard. On the one hand, the utilities' strong brand name spilled over on the solar firms. Solar South also hoped that successful initial collaborations would lead to further collaborations with other electric utilities, as they were aware that municipal electric utilities collaborate with each other. On the other hand, there was not much transparency about the solar firm providing the service, leaving their brand unrecognized:

> *"From a selfish perspective, if you … sort of rewind, one of our major success factors has been to work really closely to electric utilities and sort of piggyback on their brand names. … And the more we're working with the energy suppliers and or electric utilities, we get a stronger brand, and we get more traction on our own. (…) I mean, the main downside for us is sort of that our brand is in the shadow." (Solar South, CEO)*

Over time, as the solar firms expanded their networks and established their own brand, most electric utilities began communicating the brand name of their partner firms to their customers, as, for instance, Electric Utilities C and D:

> *"I think that Electric Utility D is pretty good to communicate with the customer that Solar East will arrive and do the installation. I never heard that they were surprised, no." (Solar East, head of installations)*

> *"We have to respect that Solar South also is a company that must live and be seen if they do a good job and have a good collaboration with us. We do not disadvantage them to be seen that way. So, we are quite open about whom we work with." (Electric Utility C, business developer services (translated from Swedish))*

As the solar firms accumulated more collaborations and showcased projects (e.g. in a competition to build the largest solar park in Sweden), the value of the electric utilities' brand and customer base for the collaboration decreased.

5.2.3. Local connection

The very first collaborations of the interviewed solar firms were all established locally with the municipal electric utility, meaning that the solar firms and the electric utilities shared the same 'home turf'. This local connection brought a confidence advantage to the relationship, which enabled informal communication channels :[1]

[1] Regarding Solar North and South, the electric utilities they initially collaborated with were not available for interviews. Therefore, this interpretation is based on the solar firms' perception and confirmed by the authors' knowledge of the solar market.

"One of the reasons [for collaborating with Solar East] is their local presence, which means that they could be very responsive, especially in the beginning when we didn't have any expertise ourselves." (Electric Utility D, business developer solar)

At a later stage, the solar firms started to spur their company growth by signing more partners. This weakened the local connection as their partner networks spanned a larger geographical area. However, the local collaboration in case D seems to have been more successful in this respect. Excellent customer service was key to sustaining a good reputation when operating and living close to end-customers. As described in the case description, Solar East only offers installation services to local partners. Solar East was aware of Electric Utility D's closeness to its customers, which makes formal quality controls superfluous, compared with its other electric utility partner, which has a much tighter control system.

"They have a really close relationship with their customers, because they are … strong locally in City D. And they have another relation with [them] because … they meet the customer at their house, and they have a discussion with them." (Solar East, head of installations)

"We don't want to be the bad salesmen people here because we live here as well. They're going to hunt us down." (Electric Utility D, salesperson)

"You know, it's owned by municipality D. … They really have a strong, strong brand. I've been talking to some people in City D and the reliability is high for Electric Utility D. (Solar East, Sales manager)

5.3. Actor bonds

At the layer of actor bonds, the two main dimensions are goals and strategies, and conflicts. While the findings concerning activities (5.1) and resources (5.2) often allowed for generalization across cases, this sub-chapter also highlights some divergence between them.

5.3.1. Goals and strategies

In the beginning, the collaborations were driven by the common goal to establish a solar PV market in Sweden as well as by individual – and at that time mutually conducive – goals to expand the sales channels (solar firms) or retain existing customers (electric utilities).

"Just to make the people understand that solar power actually works in Sweden. That was number one, [to] convince the people that it works. Because, of course, we've got all the arguments. It doesn't work here. It's too cold. (…) And we said, no…solar power is good. … [S]o we … developed this partly in a joint venture with some of these energy companies." (Solar North, founder)

However, as the collaboration reached this common goal and the market for solar PV in Sweden stabilized (see Section 4), conflicts started to emerge because of diverging goals and strategies, which challenged the future existence of the collaborations (see 5.3.2).

On the one hand, the electric utilities' motive to be involved in solar PV sales is sustainability and playing a role in the transition of the energy system:

"And we are a municipal energy company owned by the citizens of City C, so … we exist for them. Of course, the simplest thing could be to send everyone and all work to Solar South, but we also want to be part of raising our competence in this energy transition and be 'onboard'. (…) [W]e want to be involved in transforming the energy system." (Electric Utility C, business developer services (translated from Swedish))

The quote by Electric Utility C clearly illustrates their municipal ownership and their interests being broader than only of economic nature. The attention to social and environmental sustainability is a pattern which we have observed in this and earlier studies among municipal electricity electric utilities in Sweden: the electric utilities used solar PV as a means to reach social and environmental sustainability goals (Altunay et al., 2021).

On the other hand, the solar firms pursued other interests. Most notably, Solar South's main goal was company growth, which led Electric Utility A to believe that their collaboration has not been prioritized enough and choose to switch to Solar North:

"I think that that's also in the market maturing, and the CEO is driving Solar South bigger and bigger. We are big enough to have an impact on Solar North business model, and way of working. We are not big enough to have an impact on Solar South. So, for us, it's the better match. (Electric Utility A, business developer services)

An exception from these illustrations is Case D, where the local connection is based on the local strategies of the collaborating firms and the common goal to reach high customer satisfaction:

"We were[looking] for anyone that could help us on a local basis. And we found Solar East being based in City D, which is very close to here. (…) And we found that they could give us the best benefits … partly because we were not just looking for a 'grossist' [wholesaler for materials], we were looking for a partner. (…) We have a common goal to sell as much as possible (…). They know that we will be around and that we need to have happy customers. So that is extremely important for us." (Electric Utility D, business developer solar)

"We're only doing business with resellers and partners around in Sweden, but we help them to grow. And we're focused mainly on local strong customers. We believe that with a strong network, with local suppliers, local customers, we can grow together with them in a much stronger way.." (Solar East, Sales manager)

5.3.2. Conflicts

Judging by the interviews and our overall knowledge of the solar market, there seemed to have been few strategic conflicts in the early phases (although Solar North experienced some operational conflicts with its partners due to some late deliveries). Therefore, this sub-chapter does not describe a shift in time but the situation at the time of the interviews.

Despite the short period (less than one year) which Electric Utilities A and B have been working with Solar North, they have already experienced some issues. Solar North has increased prices abruptly for Electric Utility B, while Electric Utility A experienced some tensions regarding the hand-over in projects as well as an insufficient level of determination to satisfy the customers:

> *"I think that we have some issues in regards of us being very dependent, that the customer is happy afterwards, whereas Solar North … only needs to kind of deliver what they said and then send the bill and they don't care afterwards in the same way, I think, in the steering of our common goal." (Electric Utility A, business developer services)*

> *"All of these solar firms have a very high quality at their work. But we have had some problems in another way. We have problems with Solar North that their pricing is rising with pretty short announcement before." (Electric Utility B, business developer services)*

However, these are minor issues compared with the opportunistic behavior which all interviewed collaboration partners experienced with Solar South:

> *"Solar South can offer customers a lower price than us" (Electric Utility B, business developer services)*

> *"We are quite vigilant when we think, for example, that we have both competed for the same customer. They have 'priced themselves in' so that they can offer much cheaper solar plants than what we offer, sort of. Then you can start to question our cooperation, what it exists for." (Electric Utility C, business developer services (translated from Swedish))*

Both Electric Utility A and B considered this a major breach of trust and decided to enter new/additional collaborations with Solar North. Solar North was in a beneficial position as they did not compete with end-customers directly:

> "*Solar North put themselves in the part of the value chain where they, well, they're not our direct competition. (…) They could take a step backward and kind of be just the operational hand rather than go towards the end customer." (Electric Utility A, business developer services)*

All three electric utilities (A, B and C) also started to consider other alternatives, such as acquiring a solar installation firm or building up a solar subsidiary in collaboration with other utilities:

> *"I think this is a nut to crack for the energy companies. Depending on where we want to be in the value chain, either we can continue with Solar North, as is, but then we will be pretty dependent on them, or we can do as others and … go with the competition who is Solar South. Or a third option, doing the Electric utility L style, kind of buying our own 'grossist' [wholesaler] purchasing hub and installation. We will be too small to do that ourselves. But in collaboration with those other energy companies, that could be a point of view as well to purchase a company and kind of doing it in our brand." (Electric Utility A, business developer services)*

Solar South was well aware of this issue but might not have fully understood how serious it was for the electric utilities, as illustrated by the first quote below. The CEO also continued to justify the double strategy by referring to service levels:

> *"From time to time, we end up meeting each other with the same customer, right? [laughing] So we offer the same customer sometimes. But our main goal is not to, of course." (Solar South, partner relations)*

> *"We need to build it in a way, where we are not … competing [with] our electric utilities, because then they wouldn't be with us. It's a fine line. (…) If we go into an area and they are … approaching a customer, … we will not directly go after that customer, obviously, because we're in a collaboration. (…) And we are sort of justifying that by saying that one of the reasons why we need to do this is to ensure that we have good quality with local solar firms that we can have in that area. And if we are working with a small energy company, it's very tough for us to have the service level that we need by just supplying them. And so far, I'm not seeing a huge conflict with that in any of our suppliers." (Solar South, CEO)*

6. Discussion

This chapter merges the findings on activity links, resource ties, and actor bonds by discussing a number of themes which span all three layers. For instance, the creation of mutual benefits illustrates how ties in the *resource* layer, is enabled by *activity* links and requires bonds between individual *actors*. Each theme is further discussed in the context of niche-regime interaction from a transitions perspective.

6.1. Creation of mutual benefits

Access to resources was the central driver for all parties to enter these collaborations, and the exchange of resources created mutual benefits for the new entrants and the incumbents. When electric utilities entered collaborations with solar firms, the solar firms' technology and competence were 'rare' (unavailable on the market), while the electric utilities' sales channels and trust in their brand were 'imperfectly imitable' (cf. Barney, 1991). This perspective from the resource-based-view assumes that a firm's competitive

advantage lies within the firm. However, in business relationships in industrial networks, the value of a resource depends on its combination with other resources across firm boundaries (Håkansson and Snehota, 2017; Sundquist and Melander, 2021). Thus, synergetic value is created by combining complementary resources and tying them across company boundaries (Dyer and Singh, 1998). Our study illustrates this, as it was the combination of resources from the solar firms and the electric utilities that enabled them to establish a flourishing solar market in Sweden and propel the growth of their respective company.

These findings, thus, confirm some of the previous writings on niche-regime interaction by highlighting the combination of complementary resources as an important form of technology-related interaction (Kangas et al., 2021; Wadin et al., 2017). However, our study expands the knowledge about such interactions by showing how the value of some resources changed over time, which impacted the relationship dynamics. After years of collaboration, the solar firms' installation competence became a standard product (albeit still somewhat rare because of limited capacity to meet the rapidly increasing demand), while their negotiation skills and purchasing quantities in relation to Asian suppliers turned into a valuable resource. Thus, although the electric utilities had acquired sales knowledge and a service mindset towards customers through the training activities and common operations, the solar firms still had something to offer them. The solar firms, however, became less dependent on the electric utilities' brand names and sales channels as they built up their own brands.

As such, the observed interactions between the municipal electric utilities and the solar firms could be characterized as a process of co-creation, where the interaction between actors is dynamic and evolving and involves joint value creation that both parties contribute to on more or less equal terms (Ballantyne et al., 2011). This is discussed further in literature on open and collaborative innovation processes (Ollila and Yström, 2016), development of networked business models (Bankvall et al., 2017; Lind and Melander, 2021; Palo and Tähtinen, 2013) and value co-creation (Ballantyne and Varey, 2006; Lusch and Vargo, 2006).

6.2. Misalignment of logics

In the beginning of the business relationships, the resource synergies served a common purpose: to establish solar PV in Sweden. Thus far, one could argue that solar firms and electric utilities were able to create a shared vision in which the niche actors could take a leading role and the electric utilities could create new identities, as required for a reconfiguration of established regime structures (Yang et al., 2021). This could, potentially, be described as institution-related interaction in the form of an alignment of visions and problem framings, as discussed in previous niche-regime interaction literature (Bui et al., 2016; Elzen et al., 2012; Kangas et al., 2021; Yang et al., 2021), although there does not seem to have been much misalignment to begin with in our case.

However, once this goal had been (partly) achieved, conflicts started to arise in the relationships. The solar firms had entered the solar PV market mainly because of its economic prospects and the promise of company growth. In contrast, the electric utilities had several reasons to engage with solar; while they needed to create new ways of retaining customers in order to survive in the long run, they also wanted to be part of the energy transition and meet their social goals by enabling customers to become prosumers (Altunay et al., 2021). This indicates an incongruence of long-term strategies and respective values behind their common goal (cf. Hartmann and Herb, 2014; van der Valk and Van Iwaarden, 2011), which displayed itself in breaches of agreements by Solar North and the opportunistic behavior by Solar South competing for the same end-customers and bypassing their electric utility partners in order to reach international expansion targets.

This could be interpreted as a misalignment of institutional logics between new entrants and incumbents, as described in the literature on institution-related niche-regime interaction (Geels, 2018; Ingram, 2015; Pekkarinen and Melkas, 2019; Smink et al., 2015a) but with two new insights. First, in our case this misalignment was not apparent at the beginning but rather emerged as the relationships unfolded, which illustrates a different kind of dynamics than in most previous literature, where alignment is assumed to increase over time through (mutual) adaptation (cf. Bui et al., 2016; Diaz et al., 2013; Elzen et al., 2012; Kangas et al., 2021; Yang et al., 2021). Second, the roles were swapped compared with the traditional storyline, in which regime actors are assumed to be 'villains' (Turnheim and Sovacool, 2020) and entrants 'challengers' (Lee and Hess, 2019). Indeed, in our case, some new entrant solar firms were the ones determined to reach economic targets through national and international expansion, following a private sector logic and "piggybacking" on the brand and legitimacy of the incumbents to reach these targets (cf. Raven et al., 2016), while the incumbent municipal electric utilities used solar PV to define their role in the energy transition and reach broader sustainability targets (including access to prosumption for their citizens), following a public sector logic.[2] We also observed differences within the group of new entrants, with Solar East's local goals and collaborative behavior as an exception.

6.3. Shifts of power

At a first glance, at the start of the collaboration the position of power seems to have been in the favour of the incumbent electric utilities compared with the new entrant solar firms, which had no established sales channels, brand recognition, or professional connections. As explained in Section 6.1, however, both parties entered the collaboration with a certain power given their respective resources. Most notably, the electric utilities were dependent on the solar firms' competence and willpower to build up a market for solar PV, and the solar firms were dependent on the electric utilities' market channels. As the division of labour changed and the electric utilities developed the competence to handle both sales and customer services, the solar firms' connection with the customers

[2] While solar firms also contribute to environmental sustainability goals, the interviewees did not stress this as a main motive for entering the market.

increasingly weakened, as illustrated in Fig. 3. This would commonly be interpreted as a loss of power. This shift in the micro-structure of the dyad in relation to its customers, however, occurred in mutual agreement and did not lead to any perceived negative influence on the business relationship.

In order to understand the dynamics of power and influence over time, however, the two parties' positions in the larger network also needs to be taken into consideration (Ford et al., 2010; Håkansson and Johanson, 1992; Håkansson and Snehota, 2017). In this regard, an exchange of indirect resources took place behind the scenes, namely the solar firms' growing brand recognition through word-of-mouth spreading in the electric utilities' partner networks. By signing more contracts with electric utilities, the solar firms expanded, signed more contracts, and got the chance to realize more showcase projects (such as large solar parks). This, in turn, increased their brand recognition in society as whole, allowing them to establish their own sales channels to both household and business customers. Consequently, their dependence on the electric utilities' resources decreased by achieving a superior position in the network (cf. Madhavan et al., 2004; Raskovic, 2015), which Solar South (mis)used to bypass their electric utility partners to compete directly for customers. This seems to indicate that Solar South prioritized its (international) expansion targets higher than continued relationships with its electric utility partners, to which the electric utilities responded by searching for exit strategies.

These findings contribute to the literature on network-related niche-regime interaction. While previous literature has tended to focus on the establishment of relationships between new entrants and incumbents as such (cf. Kangas et al., 2021; Laakso et al., 2021), our case adds new insights about the detailed interactions within such relationships, as also stressed by Bui et al. (2016) and Elzen et al. (2012). In this regard, the most important aspect is the dynamic nature of the interactions between the actors, where shifts in power created conflicts over time. In our cases, power conflicts thus did not emerge directly when the solar firms entered the energy sector to develop the solar PV niche, as often assumed in previous literature (cf. Geels, 2006b). In contrast, the interactions started harmonically, with knowledge exchange and the creation of mutual benefits (as described in Section 6.1) and common visions (as described in Section 6.2). It was only when the power balance shifted towards the new entrants – partly with the help of the incumbents – and one of the solar firms started to exploit its strengthened network position that we started to see a shift to a more competitive mode. Solar South was also well aware that it was walking a thin line between collaboration and competition. Such tensions have been illustrated in situations when new entrants and incumbents engage in co-opetition, where opportunistic behavior can diminish joint value creation (cf. Kangas et al., 2021). However, we again see the opposite of the 'David versus Goliath' story which has been observed in previous studies (Hess, 2016; Geels, 2014; Wadin et al., 2017), as in our case some of the new entrants were much more competition-focused than the incumbents.

6.4. A critical view on new entrants and incumbents

As described in Section 3, we started our study by adopting the same approach as most of the previous niche-regime interaction literature, that is to associate niche actors with new entrant and regime actors with incumbent. However, based on our findings we have identified two main arguments why we should not assume *ex ante* that niches are populated with small, resource-weak (and heroic) 'Davids' and regimes with large, resource-rich (and villainous) 'Goliaths'.

First, our study shows that the behavior of both incumbents and new entrants depends on organization-level factors. Indeed, incumbent actors that are equally embedded in an established sociotechnical regime can engage in quite different types of interactions, depending on their individual goals and strategies. In our cases, the public sector logic, sustainability goals, and local anchoring of the municipal energy companies clearly contributed to them engaging in mutually beneficial collaborative relationships with the solar firms. In a contrasting case, also from Sweden, the private, profit-orientated multinational utility "Big Energy" started to collaborate with "Small Solar" only to extract as much value as possible from the collaboration, and in the end bypassed Small Solar in the market (Wadin et al., 2017). New entrants can also have different goals, strategies, and resulting behaviors, as illustrated by the differences between Solar East, with its local scope and collaborative approach, and Solar South, with its international expansion plans and more competitive behavior.

Second, the difference between new entrants and incumbents in terms of resources and power is not necessarily as big as often assumed. Previous literature has, for example, highlighted that new entrants can be large, established firms from other sectors (Geels, 2014; Ruggiero et al., 2021), and our study provides another nuance by showing that resource and power positions can shift over time. In our cases, the relative importance of the new entrants' resources increased, and the power shifted to their favour in the studied relationships. Two of the new entrant firms also grew quite rapidly and at the end of the period almost matched the incumbents in terms of number of employees. These changes influenced the interactions between the actors, as some of the new entrants also used their improved positions to engage in increasingly competitive behavior.

Taken together, these two arguments lead us to conclude that it cannot be generally determined either which categories of actors (if any) should be seen as Davids vs. Goliaths in a particular case or whether they will take on the roles of heroes vs. villains in a relationship or a transition process. However, in contrast to some previous writings on this topic (e.g. Elzen et al., 2012), we do not think that this means that we should question the niche-regime dichotomy as such. On the contrary, we see great value in distinguishing between different degrees of structuration of sociotechnical configurations (cf. Fuenfschilling and Truffer, 2014). Instead, what we advocate is a more nuanced and reflexive view on actors, which allows for heterogeneous characteristics and behaviors in relation to both incumbents and new entrants.

7. Conclusion and implications

The starting point of this paper was the premise that the understanding of niche-regime interaction in the literature on socio-technical transitions is limited. In particular, we argued that there is a need for new micro-level approaches to studying such interaction, focusing on the development of collaborative and business-related relationships between incumbents and new entrants. The purpose of the paper was, therefore, to study the evolution of business relationships between incumbents and new entrants over time, in order to contribute to the conceptualization of niche-regime interaction.

Our study of collaborations around the solar turnkey system business model between electricity utility incumbents and solar installation firms in Sweden addressed the research question of how activity links, resource ties, and actor bonds evolve in business relationships between new entrants and incumbents and what types of interactions result from the interplay between these three key dimensions. Regarding the first part of the research question, the electric utilities took over more of the project operations after receiving training from the solar firms, initially valuable resources decreased in importance but were replaced by other resource dependencies, goals started to diverge, and misunderstandings and conflicts emerged as the solar firms improved their network positions. Regarding the second part of the research question, we discussed creation of mutual benefits (technology-related interactions), misalignment of logics (institution-related interactions), and shifts of power (network-related interactions). These findings contribute to the conceptualization of niche-regime interaction by showing that (1) the relative importance of different kinds of resources may change over time, (2) interaction does not necessarily result in increased goal alignment, and (3) the relative power position of new entrants vis-à-vis incumbents differs between cases and may also shift as relationships unfold.

These findings also led us to question the common association of niches with new entrants and regimes with incumbents. Most notably, we argued that the behavior of both new entrants and incumbents is affected by organization-level goals and strategies and that the difference between new entrants and incumbents in terms of resources and power can decrease over time as resource and power positions shift. We, therefore, suggest that future research on niche-regime interaction should focus more on the observed behavior of different actors and how this behavior influences how technology-, institution-, and network-related interactions unfold.

CRediT authorship contribution statement

Maria Altunay: Conceptualization, Formal analysis, Investigation, Writing – original draft. **Anna Bergek:** Conceptualization, Writing – original draft, Writing – review & editing, Supervision, Project administration, Funding acquisition.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The authors do not have permission to share data.

Acknowledgments

Funding from the Swedish Energy Agency [grant number 40642-2] is gratefully acknowledged. The funder has not been involved in study design; data collection, analysis, or interpretation; the writing of the article; or the decision to submit the article for publication.

Appendix A. Exemplary interview guide to electric utilities

General questions about the company

1 Please describe your position and responsibilities in the company and how your work relates to selling turnkey systems.
2 Who else of your colleagues works with selling turnkey systems? How is it embedded in the organizational structure of the company?

Sales of turnkey systems – Introduction

1 When did you start selling turnkey systems and how has that business evolved over time?
2 What were the motives to start in the first place?
3 How many systems have you sold?
4 Have you collaborated with solar firms from the beginning?

Value creation

1. Are you aware of other business models than the one you are using?
2. Why have you chosen to collaborate with solar firms for selling turnkey systems, instead of selling directly to customers?
3. Which benefits do you see for your company? Any sacrifices?
4. What do you think the solar firms think is your main contribution is in this business model? What do you bring to the table (next to the obvious activity and resource parts)?
5. What added value does your involvement bring in comparison with a (direct) dyadic relationship between solar firms and customers?

Sales of turnkey systems - Activities & Resources

1. For which purposes do you use solar firms? Do you work with more than one installation firm? Why?
2. You started working with solar firm X, how did this influence later collaborations? How did retailer X's acquisition of solar firm X influence your collaboration?
3. What does the general turnkey process look like, exactly? (discuss activity flow chart)
   a. Which activities do you perform?
   b. Which activities do solar firms X and Y perform?
   c. Who is the project owner?
4. Which activities work smoothly? Where have you experienced issues?
5. At which stages are you dependent on inputs from others? (activities, resources, information)
6. Can things work in parallel or do critical paths exist? If so, how is it coordinated?
7. Do you need access to resources owned/controlled by the installer or customer? (e.g. expertise)
8. Do you make installations under your own brand?
9. Do your sub-contractors use your brand or their own? Why? What are the pros and cons of this choice?
10. How (and how often) are all involved parties updated during the process? (information systems?)
11. How is customer contact handled?
12. How many different persons does the end-customer have talk to?
13. In what stages of the process is there customer contact (and with whom) + intensity in different stages?
14. How often do you meet, who meets, and what is discussed at these meetings?
15. Which feedback & learning mechanisms are in place, e.g. are customer complaints collected and forwarded from the solar firms?

Contracts

1. Who initiated the collaboration? (does it differ for different partners?)
2. What makes these firms better than competitors? Why have you chosen these firms?
3. What did the negotiation process look like? Main areas of discussion?
4. What is regulated in the contracts, how detailed are things specified?
5. What do the financial flows look like?
6. Are there monitoring mechanisms? (Who monitors/checks whom and in what way(s)?)
7. How do you ensure the quality of the installation firms and its sub-contractors?

Bonds

1. How would you describe the relationships to everyone involved?
2. Do you have matching goals and interests?
3. Would you say that they are competent, knowledgeable?
4. Honest and transparent, e.g. admitting mistakes?
5. Do they fulfil the contract agreements?
6. How is their reputation?
7. Are you thinking of the organization as a whole or a specific person?
8. Would you say that you trust them/this person?
9. Does any involved party conduct activities which serve to improve the business relationship? "Do you work on the relationship in some other way?"
10. Do you refer customers to other firms if they ask for a product/service which you do not sell?
11. Do you mediate between the other two parties?
12. Do you have seminars/activities to improve the business relation? Networking?

Strategy

1 Do you have strategic goals/future plans around this business model?
2 Are you considering to develop installation competence in-house? Why (not)?
3 In which way would the solar firms' business be influenced? (does it pose a threat?)
4 From the other perspective, do you think that solar firms will try to "steal" customers from you, i.e. sell services directly to customers in the future?
5 In which way would your business be influenced? (threat?)
6 Did we forget to ask you something that you consider would be important for us to know?

Appendix B. Summary of findings for each case

	Activity links	Resource ties	Actor bonds
Cases A + B - Solar South	Solar South had already developed workflows for project operations with a previous partner. Solar South was responsible for the project operations while training Utilities A and B to take over customer service and pre-configuration of PV systems. Later reduced to technical training (new equipment etc.) when necessary	In the early collaboration phase: Utilities A and B received access to Solar South's installation and customer competence, while offering their brand and customer channels. Implicit knowledge was transferred from Solar South to the utilities in form of sales training, tacit knowledge in working with the solar firms' software. Later, installation turned into a scarce resource and bulk purchasing became relevant.	Electric Utilities A and B mainly saw a chance to retain their existing customers by offering new services, while Solar South could expand their sales channels. They experienced conflicts because Solar South's first priority was company growth, while the Utilities wanted to (enable citizens to) participate in the energy transition and retain customers through high customer satisfaction
Cases A + B - Solar North	As Utilities A and B have extensive knowledge from earlier collaboration, Solar North had the role of an external service provider from the beginning	Solar North had already developed workflows with previous partners and established its brand name when entering this collaboration, Utilities A + B were similar to many firms in their partner portfolio	Utility A moved from Solar South to Solar North because of a better fit of values but had problems with project process. Utility B started working with Solar North in addition to Solar South, experienced problems with ad-hoc price increases
Case C	Solar South was responsible for the project operations while training utilities to take over customer service and pre-configuration of PV systems. Later reduced to technical training (new equipment etc.) when necessary	Solar South had already established its brand name when entering this collaboration, mainly trying to increase sales volumes	Utility C had a goal to participate in the energy transition, saw no conflict if Solar South mainly wanted to expand sales as long as they did not compete for the same customers
Case D	Solar East and Utility D established workflows together, Utility D was involved in customer service from the start	They used both company brands as they were well-known locally. Moreover, continuously tried to improve resource ties	Both firms wanted to enable citizens to participate in (local) energy transition and highly prioritize customer satisfaction, i.e. organized local events for micro-producers together

References

Adner, R., Kapoor, R., 2010. Value creation in innovation ecosystems: how the structure of technological interdependence affects firm performance in new technology generations. Strateg. Manag. J. 31, 306–333.
Altunay, M., Bergek, A., Palm, A., 2021. Solar business model adoption by energy incumbents: the importance of strategic fit. Environ. Innov. Soc. Transitions 40, 501–520.
Andersson, D., Dubois, A., Eriksson, V., Hulthén, K., Holma, A.M., 2019. The transport service triad: a key unit of analysis. J. Bus. Ind. Mark. 34, 253–266.
Apajalahti, E.-L., 2018. Dissertation Thesis at Aalto University. Departement of Management Studies.
Apajalahti, E.L., Temmes, A., Lempiälä, T., 2018. Incumbent organisations shaping emerging technological fields: cases of solar photovoltaic and electric vehicle charging. Technol. Anal. Strateg. Manag. 30, 44–57.
Arvidsson, A., Melander, L., 2020. The multiple levels of trust when selecting suppliers – Insights from an automobile manufacturer. Ind. Mark. Manag. 87, 138–149.
Aspeteg, J., Bergek, A., 2020. The value creation of diffusion intermediaries: brokering mechanisms and trade-offs in solar and wind power in Sweden. J. Clean. Prod. 251, 119640.
Aspeteg, J., Mignon, I., 2019. Intermediation services and adopter expectations and demands during the implementation of renewable electricity innovation – Match or mismatch? J. Clean. Prod. 214, 837–847.
Avelino, F., Grin, J., Pel, B., Jhagroe, S., 2016. The politics of sustainability transitions. J. Environ. Policy Plan. 18, 557–567.
Ballantyne, D., Frow, P., Varey, R.J., Payne, A., 2011. Value propositions as communication practice: taking a wider view. Ind. Mark. Manag. 40, 202–210.
Ballantyne, D., Varey, R.J., 2006. Creating value-in-use through marketing interaction: the exchange logic of relating, communicating and knowing. Mark. Theory 6, 335–348.
Bankvall, L., Dubois, A., Lind, F., 2017. Conceptualizing business models in industrial networks. Ind. Mark. Manag. 60, 196–203.
Baraldi, E., Proença, J.F., Proença, T., de Castro, L.M., 2014. The supplier's side of outsourcing: taking over activities and blurring organizational boundaries. Ind. Mark. Manag. 43, 553–563.
Barney, J., 1991. Firm Resources and Sustained Competitive Advantage. J. Manage. 17, 99–120.
Bui, S., Cardona, A., Lamine, C., Cerf, M., 2016. Sustainability transitions: insights on processes of niche-regime interaction and regime reconfiguration in agri-food systems. J. Rural Stud. 48, 92–103.
Dewald, U., Truffer, B., 2012. The local sources of market formation: explaining regional growth differentials in German Photovoltaic Markets. Eur. Plan. Stud. 20, 397–420.

Diaz, M., Darnhofer, I., Darrot, C., Beuret, J.E., 2013. Green tides in Brittany: what can we learn about niche-regime interactions? Environ. Innov. Soc. Transitions 8, 62–75.
Dubois, A., Araujo, L., 2005. Research methods in industrial marketing studies. In: Åkansson, H., Harrison, D., Waluszewski, A. (Eds.), Rethinking Marketing: Developing a New Understanding of Markets. John Wiley & Sons, Ltd, Chichester, pp. 207–228.
Dubois, A., Gadde, L.E., 2014. Systematic combining"-A decade later. J. Bus. Res. 67, 1277–1284.
Dyer, J.H., Singh, H., 1998. The relational view: cooperative strategy and sources of interorganizational competitive advantage. Acad. Manag. Rev. 23, 660–679.
Easton, G., 2010. Critical realism in case study research. Ind. Mark. Manag. 39, 118–128.
Eisenhardt, K.M., Graebner, M.E., 2007. Theory building from cases: opportunities and challenges. Acad. Manag. J. 50, 25–32.
Elzen, B., Van Mierlo, B., Leeuwis, C., 2012. Anchoring of innovations: assessing Dutch efforts to harvest energy from glasshouses. Environ. Innov. Soc. Transitions 5, 1–18.
Escher, I., Brzustewicz, P., 2020. Inter-organizational collaboration on projects supporting sustainable development goals: the company perspective. Sustain 12, 4969.
Fabrizio, K.R., Hawn, O., 2013. Enabling diffusion: how complementary inputs moderate the response to environmental policy. Res. Policy 42, 1099–1111.
Finch, J., Wagner, B., Hynes, N., 2010. Trust and forms of capital in business-to-business activities and relationships. Ind. Mark. Manag. 39, 1019–1027.
Ford, D., Gadde, L.-.E., Håkansson, H., Snehota, I., Waluszewski, A., 2010. Analysing business interaction. IMP J 7, 1–37.
Frei, F., Sinsel, S.R., Hanafy, A., Hoppmann, J., 2018. Leaders or laggards? The evolution of electric utilities' business portfolios during the energy transition. Energy Policy 120, 655–665.
Fuenfschilling, L., Truffer, B., 2014. The structuration of socio-technical regimes—Conceptual foundations from institutional theory. Res Policy 43, 772–791.
Galeano Galvan, M., Cuppen, E., Taanman, M., 2020. Exploring incumbents' agency: institutional work by grid operators in decentralized energy innovations. Environ. Innov. Soc. Transitions 37, 79–92.
Geels, F.W., 2006a. The hygienic transition from cesspools to sewer systems (1840-1930): the dynamics of regime transformation. Res. Policy 35, 1069–1082.
Geels, F.W., 2006b. Major system change through stepwise reconfiguration: a multi-level analysis of the transformation of American factory production (1850-1930). Technol. Soc. 28, 445–476.
Geels, F.W., 2014. Reconceptualising the co-evolution of firms-in-industries and their environments: developing an inter-disciplinary Triple Embeddedness Framework. Res. Policy 43, 261–277.
Geels, F.W., 2018. Disruption and low-carbon system transformation: progress and new challenges in socio-technical transitions research and the Multi-Level Perspective. Energy Res. Soc. Sci. 37, 224–231.
Geels, F.W., 2019. Socio-technical transitions to sustainability: a review of criticisms and elaborations of the Multi-Level Perspective. Curr. Opin. Environ. Sustain. 39.
Geels, F.W., Sovacool, B.K., Schwanen, T., Sorrell, S., 2017. The socio-technical dynamics of low-carbon transitions. Joule 1, 463–479.
Glaser, B., Strauss, A., 1967. The Discovery of Grounded Theoury. Weidenfeld & Nicolson, London.
Goodstein, E., Lovins, L.H., 2019. A pathway to rapid global solar energy deployment? Exploring the solar dominance hypothesis. Energy Res. Soc. Sci. 56, 101197.
Gustafsson, S., Mignon, I., 2020. Municipalities as intermediaries for the design and local implementation of climate visions. Eur. Plan. Stud. 28, 1161–1182.
Håkansson, H., Johanson, J., 1992. A model of industrial networks. In: Axelsson, B., Easton, G. (Eds.), Industrial Networks: A New View of Reality. Routledge, pp. 28–34. London.
Håkansson, H., Snehota, I., 1995. Developing relationships in business networks. Routledge.
Håkansson, H., Snehota, I., 2017. No Business is an island: Making sense of the Interactive Business World. Emerald Group Publishing.
Hartmann, E., Herb, S., 2014. Opportunism risk in service triads - a social capital perspective. Int. J. Phys. Distrib. Logist. Manag. 44, 242–256.
Heiskanen, E., Apajalahti, E.-.L., Matschoss, K., Lovio, R., 2018. Incumbent energy companies navigating energy transitions: strategic action or bricolage? Environ. Innov. Soc. Transit. 28, 57–69.
Hess, D.J., 2016. The politics of niche-regime conflicts: distributed solar energy in the United States. Environ. Innov. Soc. Transitions 19, 42–50.
Högselius, P., Kaijser, A., 2010. The politics of electricity deregulation in Sweden : the art of acting on multiple arenas. Energy Policy 38, 2245–2254.
Horváth, D., Szabó, R.Z., 2018. Evolution of photovoltaic business models: overcoming the main barriers of distributed energy deployment. Renew. Sustain. Energy Rev. 90, 623–635.
Ingram, J., 2015. Framing niche-regime linkage as adaptation: an analysis of learning and innovation networks for sustainable agriculture across Europe. J. Rural Stud. 40, 59–75.
Kangas, H.L., Ruggiero, S., Annala, S., Ohrling, T., 2021. Would turkeys vote for Christmas? New entrant strategies and coopetitive tensions in the emerging demand response industry. Energy Res Soc Sci 76, 102051.
Kattirtzi, M., Ketsopoulou, I., Watson, J., 2021. Incumbents in transition? The role of the 'Big Six'energy companies in the UK. Energy Policy 148, 111927.
Kungl, G., Geels, F.W., 2018. Sequence and alignment of external pressures in industry destabilisation: understanding the downfall of incumbent utilities in the German energy transition (1998–2015). Environ. Innov. Soc. Transitions 26, 78–100.
Laage-Hellman, J., Lind, F., Perna, A., 2021. The role of openness in collaborative innovation in industrial networks: historical and contemporary cases. J. Bus. Ind. Mark. 36, 116–128.
Laakso, S., Aro, R., Heiskanen, E., Kaljonen, M., 2021. Reconfigurations in sustainability transitions: a systematic and critical review. Sustain. Sci. Pract. Policy 17, 15–31.
Lee, D., Hess, D.J., 2019. Incumbent resistance and the solar transition: changing opportunity structures and framing strategies. Environ. Innov. Soc. Transitions 33, 183–195.
Li, M., Choi, T.Y., 2009. Triads in services outsourcing: bridge, bridge decay and bridge transfer. J. Supply Chain Manag. 45, 27–39.
Lind, F., Melander, L., 2021. Networked business models for current and future road freight transport: taking a truck manufacturer's perspective. Technol. Anal. Strateg. Manag. 1–12.
Lindahl, J., 2011. National Survey Report of PV power applications in Sweden 2010. IEA-PVPS. https://iea-pvps.org/wp-content/uploads/2020/01/nsr_2010_SWE.pdf.
Lindahl, J., 2012. National Survey Report of PV power applications in Sweden 2011. IEA-PVPS. IEA-PVPS. https://iea-pvps.org/wp-content/uploads/2020/01/nsr_2011_SWE.pdf.
Lindahl, J., 2013. National Survey Report of PV power applications in Sweden 2012. IEA-PVPS. https://iea-pvps.org/wp-content/uploads/2020/01/nsr_2012_swe.pdf.
Lindahl, J., 2014. National Survey Report of PV power applications in Sweden 2013. IEA-PVPS. https://iea-pvps.org/wp-content/uploads/2020/01/IEA_PVPS_NSR_2013_Sweden.pdf.
Lindahl, J., Oller-Westerberg, A., Vanky, K., 2021. National Survey Report of PV Power Applications in Sweden 2020. IEA-PVPS. https://iea-pvps.org/wp-content/uploads/2020/08/NSR_Sweden_2019.pdf.
Lusch, R.F., Vargo, S.L., 2006. Service-dominant logic: reactions, reflections and refinements. Mark. Theory 6, 281–288.
Madhavan, R., Gnyawali, D.R., He, J., 2004. Two's company, Three's a crowd? Triads in cooperative-competitive networks. Acad. Manag. Exec 47, 918–927.
Markard, J., Truffer, B., 2008. Technological innovation systems and the multi-level perspective: towards an integrated framework. Res. Policy 37, 596–615.
Mühlemeier, S., 2019. Dinosaurs in transition? A conceptual exploration of local incumbents in the swiss and German energy transition. Environ. Innov. Soc. Transitions 31, 126–143.
Mylan, J., Morris, C., Beech, E., Geels, F.W., 2019. Rage against the regime: niche-regime interactions in the societal embedding of plant-based milk. Environ. Innov. Soc. Transitions 31, 233–247.
Nätti, S., Pekkarinen, S., Hartikka, A., Holappa, T., 2014. The intermediator role in value co-creation within a triadic business service relationship. Ind. Mark. Manag. 43, 977–984.
Ollila, S., Yström, A., 2016. Exploring design principles of organizing for collaborative innovation: the case of an open innovation initiative. Creat. Innov. Manag. 25, 363–377.

Palm, A., 2015. An emerging innovation system for deployment of building-sited solar photovoltaics in Sweden. Environ. Innov. Soc. Transitions 15, 140–157.
Palm, J., 2018. Household installation of solar panels – Motives and barriers in a 10-year perspective. Energy Policy 113, 1–8.
Palo, T., Tähtinen, J., 2013. Networked business model development for emerging technology-based services. Ind. Mark. Manag. 42, 773–782.
Pekkarinen, S., Melkas, H., 2019. Welfare state transition in the making: focus on the niche-regime interaction in Finnish elderly care services. Technol. Forecast. Soc. Change 145, 240–253.
Pereira, G.I., Niesten, E., Pinkse, J., 2022. Sustainable energy systems in the making: a study on business model adaptation in incumbent utilities. Technol. Forecast. Soc. Change 174, 121207.
Raskovic, M., 2015. Economic sociology and the ara interaction model. J. Bus. Ind. Mark. 30, 472–485.
Raven, R., Kern, F., Verhees, B., Smith, A., 2016. Niche construction and empowerment through socio-political work. A meta-analysis of six low-carbon technology cases. Environ. Innov. Soc. Transit. 18, 164–180.
Ruggiero, S., Kangas, H.L., Annala, S., Lazarevic, D., 2021. Business model innovation in demand response firms: beyond the niche-regime dichotomy. Environ. Innov. Soc. Transit. 39, 1–17.
Smink, M., Hekkert, M.P., Negro, S.O., 2015b. Keeping sustainable innovation on a leash? Exploring incumbents' institutional strategies. Bus. Strateg. Environ. 24, 86–101.
Smink, M., Negro, S.O., Niesten, E., Hekkert, M.P., 2015a. How mismatching institutional logics hinder niche-regime interaction and how boundary spanners intervene. Technol. Forecast. Soc. Change 100, 225–237.
Smith, A., Raven, R., 2012. What is protective space? Reconsidering niches in transitions to sustainability. Res. Policy 41, 1025–1036.
Smith, A., Voß, J.P., Grin, J., 2010. Innovation studies and sustainability transitions: the allure of the multi-level perspective and its challenges. Res. Policy 39, 435–448.
Späth, P., Rohracher, H., Von Radecki, A., 2016. Incumbent actors as niche agents: the German Car Industry and the Taming of the "Stuttgart E-Mobility Region. Sustain 8, 252.
Strupeit, L., Palm, A., 2016. Overcoming barriers to renewable energy diffusion: business models for customer-sited solar photovoltaics in Japan, Germany and the United States. J. Clean. Prod. 123, 124–136.
Sundquist, V., Melander, L., 2021. Mobilizing resources in product development by organizational interfaces across firms, units and functions. J. Bus. Ind. Mark. 36, 307–323.
Turnheim, B., Sovacool, B.K., 2020. Forever stuck in old ways? Pluralising incumbencies in sustainability transitions. Environ. Innov. Soc. Transitions 35, 180–184.
van der Valk, W., Van Iwaarden, J., 2011. Monitoring in service triads consisting of buyers, subcontractors and end customers. J. Purch. Supply Manag. 17, 198–206.
Vedel, M., Holma, A.M., Havila, V., 2016. Conceptualizing inter-organizational triads. Ind. Mark. Manag. 57, 139–147.
Vlachos, I., Dyra, S.C., 2020. Theorizing coordination, collaboration and integration in multi-sourcing triads (B3B triads). Supply Chain Manag 25, 285–300.
Wadin, J.L., Ahlgren, K., Bengtsson, L., 2017. Joint business model innovation for sustainable transformation of industries – A large multinational utility in alliance with a small solar energy company. J. Clean. Prod. 160, 139–150.
Yang, J., Brashear Alejandro, T., Boles, J.S., 2011. The role of social capital and knowledge transfer in selling center performance. J. Bus. Ind. Mark. 26, 152–161.
Yang, K., Schot, J., Truffer, B., 2021. Shaping the directionality of sustainability transitions: the diverging development patterns of solar photovoltaics in two Chinese provinces. Reg. Stud. 1–19.
Yin, R.K., 1984. Case Study research: Designs and Methods. Sage Publications, Beverly Hills, CA.