

Constructing Expectations for Solar Technology over Multiple Field-Configuring Events: A Narrative Perspective

Heli Nissilä, Tea Lempiälä and Raimo Lovio

The existence of positive expectations is of particular importance for emerging clean energy technologies that are not yet competitive on the market in terms of cost or performance. The sociology of expectations literature studies how expectations can further technological fields. We contribute to this literature by studying expectations work through multiple “field-configuring events” in an effort to map out field development over time. Our analysis demonstrates six narrative themes and the evolution of expectations work to further solar technology. We suggest that event-based expectations work is fruitful for exploring complementary visions and expectations for a new technology. Rather than explicitly aligning expectations, events can lead to an initially narrow storyline gradually spreading into multiple narratives upon which to build a field’s future and, thereby, guide and strengthen the advocacy. This form of guidance is especially important in early phases of field formation.

Keywords: expectations work, field-configuring events, emerging clean energy technology

Introduction

Solar energy is a promising emerging clean energy technology that is anticipated to play an important role in the future energy system due to its great availability and minimal environmental effects (cf. Solangi et al., 2011: 2150). Especially, solar photovoltaic (PV) technology is a rapidly growing business sector internationally that contains possibilities for technology companies working with the technology.

Yet in several countries the solar technology field is in its early development in terms of energy supply and technology business. As a technology is not yet competitive against established energy sources and a range of market criteria is still unstable, it is important for field development that there is an active ‘technological community’ (cf. Rappa & Debackere, 1992) promoting it and creating positive expectations concerning its future performance.

The sociology of expectations literature studies how expectations can further emerging fields (e.g. van Lente, 1993; Brown & Michael, 2003). Studies have accentuated the importance of expectations work and the alignment of visions and expectations for novel fields (van Lente, 1993; Borup et al., 2006; Brown, 2003). The significance of events for the configuration of new fields has been recognized by a number of articles in organization and management studies (e.g. Garud, 2008; McInerney, 2008), pointing towards the need to address the phenomenon of event-based expectations also within the expectations literature. Insight is needed into how expectations work evolves through multiple ‘field-configuring events’, i.e. seminars or other gatherings where technology proponents come together. Such examinations are valuable in mapping out the development of a new field and assessing the ways in which event series may aid in promoting technology.

This article contributes to the expectations literature by investigating how expectations work was carried out for a new energy technology through multiple events. In this study the term ‘event’ is used to describe field-configuring events, i.e. seminars where “... people from diverse social organizations assemble temporarily with the conscious, collective intent to construct an organizational field...” (Meyer et al., 2005: 467). In particular, we carry out an ‘analysis of narratives’ (Polkinghorne, 1988) of the presentations and discussions taken place at events for the Finnish solar cluster in 2010-2013; an example of a non-established technological market. Based on observations and written material gathered from ten events altogether, we seek to explicate what type of common narrative themes were put forth by the proponents and how the expectations work evolved within the examination period. We suggest that

event-based expectations work is fruitful for exploring complementary visions and expectations for a new technology. Whereas prior studies highlight the importance of explicitly aligning visions and expectations (Brown & Michael, 2003; Bakker et al., 2011), we found that event series can lead to an initially narrow storyline gradually spreading into multiple narratives upon which to build a field’s future. Thereby, events can guide and strengthen the advocacy for a new clean technology. In our view, guidance through the multiplication of expectations is especially important for new and unsettled fields, whose priority lies in building credibility and legitimacy for the field as a whole.

The paper proceeds as follows. In the next section we summarize prior research concerning (a) expectations work conducted by ‘technological communities’ (b) the role of narratives in innovation processes and (c) the role of field-configuring events for organizational fields. Then we present the methods and empirical data. The section after that depicts the events that were investigated in this study and discusses their interconnections. Then we illustrate the six narrative themes that emerged from the data, as well as the involvement of the expectations work in the course of the event series. Finally, we discuss our findings in reference to extant research and draw conclusions from the analysis.

Creating Expectations for Emerging Technology

Expectations Work by Technological Communities

The existence of positive expectations is of particular importance for emerging clean energy technologies that are not yet competitive against established energy sources and face uncertainty concerning future market criteria. (e.g. van Lente, 1993;

Borup et al., 2006; Konrad et al., 2012). Van Lente's (1993) pioneering work in sociology of expectations points to how expectations, promises and political ideographs function in technology development. His research demonstrates expectations as significant for i) bringing actors together and generating a common purpose ii) attracting resources like finances for R&D and political support for institutional and regulatory change iii) providing meaning and orientation for scientists and engineers and iv) reducing the perceived uncertainty of decision-making (van Lente, 1993). Also Borup et al. (2006) have found expectations to be important for stimulating, steering and coordinating field development. Furthermore, van Lente (1993) has recognized ideographs as central for legitimizing new technology, as they serve as additional symbolic and cultural resources. Ideographs, such as 'technological progress' are "... high order abstraction[s], representing collective commitments to particular but equivocal and ill-defined normative goal[s] ..." (McGee, 1980: 15).

The expectations literature has also paid attention to the formation of collective expectations, referring to expectations that are shared by many actors or widely known and referred to (Konrad, 2006; van Lente & Rip, 1998; Borup et al. 2006). Because of this, they form prospective structures for actors in a field (van Lente & Rip, 1998) and both enable and constrain innovative activities. Also, it has been acknowledged that aligning visions and expectations is important to new fields (Brown & Michael, 2003), as robustness of expectations is needed to mobilize resources for a field as a whole. Technology proponents can create generic expectations referring to expectations that further a technological field as a whole (c.f Pollock & Williams, 2010 with respect to promissory organizations). On the other hand, actors can also promote

particular expectations around proposed technological developments containing actor-specific agendas and interests. This may lead to the contestation of expectations against each other in so-called "arenas of expectations" (Bakker et al., 2011, discussed in more detail in the last section of the literature review).

Finally, studies have addressed the "dynamics of expectations" and pointed out how unmet expectations may lead to harmful disappointment cycles with respect to field development (Brown & Michael, 2003; Konrad, 2006). This wide range of research has helped to establish clarity with respect to the role of expectations work in furthering new technology. As noted above, particularly the notion of event-based expectations work has not been clearly articulated within the expectations literature.

The concept of 'technological community' is useful for understanding expectations work at events that are inclusive by nature and allow multiple narrators and perspectives to be taken into account. The term has been used to understand inter-organizational behaviour in innovation and it has been defined as "a group of scientists and engineers, who are working towards solving an interrelated set of technological problems and who may be organizationally and geographically dispersed but who nevertheless communicate with each other" (Rappa & Debackere, 1992). Within a technological community, a distinction is made especially between the expectations work conducted by scientists and industrial actors. While scientists lay emphasis on legitimizing their field of research, industrial actors are generally interested in economically viable business on a shorter time horizon (Bakker et al., 2011). Furthermore, research organizations and technology companies are usually engaged with certain technological applications

making them natural proponents of these applications, in particular (Bakker et al., 2011). Technological communities may also include policy and other public bodies and industry associations acting in various supporting roles to the community. These tend to take interest in developing the field as a whole. In sum, the concept points out the role of actors of technology development and underlines both differences and similarities between different members of the community (Rappa & Debackere, 1992).

The Role of Narratives in Innovation Processes

The role of narratives in innovation processes has been discussed e.g. in the expectations literature (Eames et al. 2008), in innovation studies (Bartel & Garud, 2009) and in the sustainability transitions literature (Garud & Gehman, 2012). Studies have shown narratives to serve as spaces where diverging interests and agendas can be promoted (Eames et al., 2008) or, as Bartel and Garud (2009) have put it, as boundary objects that can generate interpretive flexibility. Furthermore, narratives have been claimed to co-ordinate innovation activities within organizations (Bartel & Garud, 2009). They have also been found useful in sustainability journeys. An organization may need to re-narrate its identity and purpose according to the ups and downs occurring on the way towards sustainability so as to remain credible to key stakeholders (Garud & Gehman, 2012). Finally, narratives are seen as a means of creating protective spaces for new technologies and enhancing a technology's competitive position on the market (Smith & Raven, 2012; Verhees et al., 2013).

Several studies have also paid attention to the narrative means of furthering emerging clean technologies with findings pointing to general themes present in technology promotion. The studies have discovered

themes like 'ecotopia', 'inevitability and technical progress' and 'staying in the race' with respect to the hydrogen economy (Eames et al., 2008: 363-368) or 'urgency and threat of climate change' and 'ecological modernization' in relation with the societal debate around wind farms (Barry et al., 2008). With respect to solar technology Laird (2003) discovered that it was promoted through business values by conventional advocates and social and ecological values by non-conventional advocates. Altogether, the themes detected in prior research can be roughly summarized into three categories: one pointing to technological progress and scientific evidence, another pointing to economic issues like business potential and employment and a third one emphasizing ecological sustainability. These themes seem common to clean energy technology discourse in general.

The Role of Field-Configuring Events in the Emergence of Organizational Fields

Bakker et al. (2011) regard the formation of collective expectations to occur in so-called 'arenas of expectations'. In these, enactors voice competing expectations that are assessed by selectors like policy makers and investors. This is a collective social process taking place at conferences, in journals and the wider media, to name a few. The particular role of conferences and other events for the emergence of organizational fields has also been addressed by several authors in organization studies (e.g. Garud, 2008; Oliver & Montgomery, 2008; McInerney, 2008). Especially, the role of events as loci for contestation and selection between different accounts has been emphasized (e.g. Garud, 2008; Bakker et al., 2011), but also their function as arenas for shared cognitive sense-making (Oliver & Montgomery, 2008) and for conventionalizing accounts has been identified (McInerney, 2008). For

example, McNerney depicts a process where institutional entrepreneurs of a social movement create legitimacy for their accounts by anchoring them to “situationally-appropriate orders of worth” (2008: 1111) and by convincing powerful actors on the field to accept and promote them further.

These studies have also specifically addressed the functions of events. Garud (2008) has suggested events to serve as (i) forums for actors to meet, interact and exchange information (ii) contestation and selection environments between competing visions and (iii) spaces for creating legitimacy for one approach over another and bringing about institutional closure. Furthermore, events have been found helpful in aiding loose networks of individuals and organizations to transform into cohesive fields with an established institutional identity (McNerney, 2008), and in the creation of explicit conclusions among actors (Oliver & Montgomery, 2008). Generally, it is thought that events have a crucial role in field change and evolution and that they, thus, merit close investigation (Lampel & Meyer, 2008). Also Garud (2008) has argued that events with experts and other stakeholders provide a fruitful arena for investigating, how a new field is generated in real time.

Analytical Framework

In this paper we analyse ‘event-based expectation work’ for an emerging sustainable energy technology. This means that we investigate how expectations are mutually constructed in a series of field-configuring events. In our understanding at the core of event-based expectations work is that visions and expectations are likely to evolve over time and, thereby, influence the development of a new field. We place particular focus on the the narrative means

of furthering emerging technology (c.f. Eames et al., 2008). Furthermore, we use the concept “technological community” (Rappa & Debackere, 1992) to point out that, at the studied events, a range of different proponents were present, promoting their own perspectives and interests. Thus, the expectations work is understood as inter-organizational, communicative behavior within the community.

Empirical Data and Methods

We studied ten events organized between February 2010 and February 2013 in Finland as an effort to support the field emergence of solar technology. Table 1 provides a list of the events, participants and the types of data collected at each event. Our data consists of field-notes of the presentations and discussions, the in-print presentation slides (ca. 1250 slides), brochures distributed at events and video material shown at one event (ca. 15 minutes of expert interviews). Some of the events included workshop sessions, which were also noted and analysed. Observation data was gathered at six of the ten events and it covers 50 out of the 80 presentations. In half of the events field-notes were taken by two or more persons. In our notes we gave particular attention to arguments and phrases, yet we also took notes on general atmosphere and other interactions. Specific attention was paid to how the events evolved over time.

Our empirical analysis is grounded in narrative inquiry (Kramp, 2004). Narrative inquiry consists of a range of qualitative approaches that share an interest in how people give meaning to things and events in a narrative or storied form (Kramp, 2004: 108; Riessman, 2005: 1). The guiding thought behind these approaches is that people create meaning by connecting events, actions, and experiences and moving them through time (Kramp, 2004: 110). As defined

Table 1. Studied field-forming events 2010–2013: Organizing party, date and data used for the analysis.

	Phase 1		Phase 2			Phase 3					
Event number	1	2	3	4	5	6	7	8	9	10	
Organizing party	Tekes	Tekes	Tekes	Tekes	Cleen & Finpro	Tekes	Aalto University	Tekes	Tekes	Aalto University & ATY	
Date	16.2.2010	15.2.2011	28.4.2011	8.12.2011	31.1.2012	7.2.2012	27-28.3.2012	21.6.2012	11.2.2013	4.5.2013	
Observation data available	no	no	yes	yes	yes	no	yes	no	yes	yes	
Presentations by different types of narrators	Number of presentations by different types of narrators ¹										Major narrators in each category
Manufacturing equipments for the solar industry			1	1		1			1		Beneq
Components for solar power and heat systems		2	1	4+1		1		1	1		ABB, The Switch, Luvata (later on Aurubis Finland)
Solar PV products			1	2			1	1	1		Naps Systems, Suntrica
Solar heat products		1		2+3			1		2	1	Savo-Solar, Oilon
Importers and installing businesses									2	1	Finnwind, Sonnenkraft
Energy companies				1+1				1	1	1	Fortum, Helsingin Energia (municipal energy company)
Construction business and their customers				3+3				5	5	1	Ruukki, Järvenpään mestariasunnnot, TA.fi, City of Helsinki
Universities and research institutes			3	1+2			2		3		Aalto University, VTT, Tampere University of Technology

Table 1 cont.

	Phase 1		Phase 2			Phase 3					
Event number	1	2	3	4	5	6	7	8	9	10	
Organizing party	Tekes	Tekes	Tekes	Tekes	Cleen & Finpro	Tekes	Aalto University	Tekes	Tekes	Aalto University & ATY	
Date	16.2.2010	15.2.2011	28.4.2011	8.12.2011	31.1.2012	7.2.2012	27-28.3.2012	21.6.2012	11.2.2013	4.5.2013	
Observation data available	no	no	yes	yes	yes	no	yes	no	yes	yes	
Presentations by different types of narrators	Number of presentations by different types of narrators ¹										Major narrators in each category
Industry associations				2+1			1		1	1	European Photovoltaic Industry Association (EPIA), European Solar Thermal Industry Federation (ESTIF)
Consulting organizations				3	1		1			1	Pöyry
Investors	1	1		2							VNT Management, Cleantec Invest, China Energy, Finnvera
Innovation & energy policy bodies				1+3						1	Tekes, Sitra, Ministry of Employment and the Economy

by Polkinghorne (1988: 13-14) a narrative is "... a meaning structure that organizes events and human actions into a whole ...". Narratives, thus, depict the point of view of the narrator and are bound to a particular time and place (Czarniawska, 2000).

There is great variance as to how narratives are conceptualized and handled by different scholars (Rhodes & Brown, 2005: 175). Polkinghorne (1988) has suggested a distinction between 'analysis of narratives' and 'narrative analysis'. In the former the researcher proceeds inductively giving first attention to an individual narrator and after that moving on to identifying shared themes or categories that emerge out of the data. In the latter the researcher constructs a narrative of his/her own and inflicts to it meaning and order that is not apparent in the data.

In Polkinghorne's (1988) terms, we carried out an 'analysis of narratives' giving attention to emic phrases and categories used by the narrators themselves. The method can also be conceived as an inductive theme analysis (Boje, 2001). In our analysis we use the term "narrator" (c.f. Kramp, 2004: 3) and "proponent" interchangeably to refer to event participants who, by giving presentations or taking part in the discussions, engaged in imposing meaning on the issue. The term "sub-plot" is used to describe single threads (often supported by several narrators) that, when woven together, form more complex and layered narrative themes (cf. Polkinghorne, 1988).

We began by thoroughly reading the field notes and written material with a focus on the point of view of the particular narrator. After that we proceeded to distinguishing themes in the particular narratives and finally common themes across proponents. In the theme analysis we gave attention to the nuanced, narrator-specific images within a category and iterated between the

particular and the common components of the themes. In our empirical analysis we gave most attention to the presentations as they dominated the events in terms of time. These were analyzed based on field notes collected at the events and written text and visual imagery of the presentation slides. Our observations concerned the ways in which written slides were presented, questions directed at the presenters, reactions of the audience and follow-up discussions. The two forms of data were regarded as equally important parts of our analysis, and we did, thus, not treat them differently.

In the second phase, we analysed the involvement of the expectations work in the course of the event series. This was done by re-visiting the empirical data and carefully assessing at what point in time each theme arose in the expectations work. Attention was also paid to the objectives of organizing parties with regards to the events and how the events related to each other.

Field-Configuring Events for Solar Technology

The position of solar technology in Finland has traditionally been weak. Although an industry association was founded already in the 1970's and building demonstrations have been conducted since the 1980's, the field has not been able to establish credible momentum. However, the recent advancements in the international solar market seem to have given a push to market formation. For instance, a recent cluster report illustrates the status of the Finnish national field as weak but promising (Finnish Solar Cluster Report, 2012). In the national history of solar energy, the events observed in this study could be entitled as a first serious attempt to establish a field in the area.

Interestingly, the events were organized by intermediary organizations instead of

the industry association or the technology developers themselves. The industry association for solar energy in Finland (ATY) is relatively weak, representing mainly solar enthusiasts and small businesses. Large incumbent companies are not a part of the association, and at the beginning of the events series, they were not active in the field altogether. The intermediary organizations included the Finnish Funding Agency for technology and innovation (Tekes), the research and innovation network Cluster for energy and environment (CLEEN), The National Trade, Internationalization and Investment Development Organization (Finpro), and Aalto University (national university for technology, business and art). The seminar series thus displayed an intentional effort of these organizations to push for field formation. The events were mostly open for all. The narrators present in the events included e.g. small and medium sized solar technology companies, large power and energy technology companies, construction firms, European industry associations, innovation and policy bodies and research organizations (see Table 1). The composition of the participants evolved as the events progressed.

By and large, the event series can be conceptualized as having proceeded in three phases. The first phase was focused on supporting the export activities of high tech SME's, while in the second phase emphasis was placed on the attractiveness of the solar industry per se. In the third phase attention was brought towards home market creation.

The first two events formed the first phase of the expectations work process. These events were organized by the Funding agency for technology and innovation whose purpose is to support the growth and exports of national industries and innovation activities. The first event was a kick off-seminar of a programme on renewable energy. Most of the analysed events were

organized under this programme which sought to increase the growth and export possibilities of the clean tech industry. The second event was the yearly seminar of this programme. Directly in line with the role of the intermediary organization, these events had a focus on displaying the growth potential of the national clean-tech domain. Solar companies were included among the presenters but no particular focus was placed on the solar industry as such.

The second phase laid emphasis on the solar sector and its business potential at an international level and was formed by the following three events. During this phase the Funding agency for technology and innovation stepped out of its traditional position and begun to push for field formation. The other organizing party i.e. the research network for energy seemed to follow in these footsteps. The third event "Solar energy in Finland and EU" was the first to have a clear focus on solar. As novel elements, presentations from researchers were included in the program and time was also allocated for a workshop concerning the "will of Finnish companies" with respect to solar energy. This workshop did not, however, produce any concrete results and the participants seemed quite passive with respect to the discussion in general. Event number four, the "Solar Energy Forum", raised the profile of the events to a new level. It featured keynote speakers from the European solar associations as well as all relevant Finnish companies and researchers. For the first time large energy incumbents were also present. This event also included policy makers, to whom many of the key notes seemed to be directed. Also in this event time was allocated for workshops facilitated by an outside consultant. As a concrete result, a summary of the workshop outcomes was emailed to all participants. The fifth event was a workshop entitled "Innovating for Solar

Energy”, and it was a direct continuation of the previous grand event with similar participants. An important goal was to establish understanding about whether the organizing institution should start a novel research program concentrated on solar energy. However, no concrete conclusions were reached.

Finally, the third phase created movement towards home market formation. Emphasis was now laid on convincing participants of the potential of solar technology even in the challenging conditions of Finland, combined with the practical goal of enabling connections between the supply and demand side participants. The last four events were positioned in this phase. While the sixth event made a temporary return to the traditional approach and featured only presentations from well-known export companies in the renewables field, already the seventh event, a course on solar energy, made a clear move to this direction. It was explicitly directed at the building construction industry and laid focus on solar as a small-scale distributed solution for Finland. The eighth event was a solar-energy workshop in which the construction companies and large incumbents were the most visible participants. The ninth event held in February 2013 had a taste of the same greatness as the grand event attracting first-line experts from business, academia and industry organizations and featuring stands from solar companies. However, it did not produce any concrete outcomes. Finally, the tenth event was organized in collaboration with the national university and the industry association. This event was strongly centered on home market creation, and the presentations and discussions followed this theme.

In general, the three stages make visible the transition in the roles of the intermediary organizations hosting the events. In the course of the events these enlarged their

agendas to facilitate field formation. At large, the events seemed to serve the three crucial processes of field formation proposed by Geels & Deuten (2006, 273), that is (i) the establishment of a social network and community (ii) the emergence of intermediary actors that speak for the field and (iii) the creation of a knowledge infrastructure that enables the circulation of experiences and the emergence of common knowledge and vision. In the following we will demonstrate the narrative themes and their evolution that we distinguished in the expectations work.

Narrative Themes in Expectations Work

Six interrelated narrative themes emerged from our analysis. These are Solar as (1) Progression and Modernization (2) Sustainability (3) Booming Business (4) Convenience and Usability (5) National Competitive Advantage and (6) Distributed Production. The themes should not be taken as clear entities – although they have been conceptualized as such for reasons of clear communication. Each theme contains sub-plots reflecting certain aspects of the theme and shared among multiple narrators as well as expectations typical for single narrators. Furthermore, many of the themes raised concerns that were brought up especially in the discussions following presentations. Four out of the six themes were supported by strong ideographs; claimed important for legitimizing new technology.

Table 2 summarizes the detected narrative themes including sub-plots, main narrators, theme related concerns and important ideographs. In the following we first depict the detected themes after which we analyze the evolution of the expectations work. The themes are presented in the order of their appearance during the three phases of the event series.

Table 2. Narrative themes in expectations work.

Narrative Themes	Sub-plots	Main Proponents	Theme-Related Concerns	Ideographs
1. Progression and Modernization	<ul style="list-style-type: none"> - A natural consequence of scientific work and technological development - Coming along with other “smart” technologies - Part of modern architectural design 	<ul style="list-style-type: none"> - SME’s - Research organizations - Innovation and policy bodies - Industry associations 		<ul style="list-style-type: none"> - Technological progress
2. Sustainability	<ul style="list-style-type: none"> - Sustainable energy source - Ecological lifestyle choice - Expansion of renewables - Ethically and morally right choice - Abundance compared to other energy sources 	<ul style="list-style-type: none"> - Most narrators 		<ul style="list-style-type: none"> - Sustainability
3. Booming Business	<ul style="list-style-type: none"> - Exceptional regional successes in international markets - Cost reduction and approaching grid-parity - Natural flow of finances to solar 	<ul style="list-style-type: none"> - Innovation and policy bodies - Large technology and energy companies - Venture capitalists 	<ul style="list-style-type: none"> - Price competition due to Asian suppliers - Low ability of national organizations to be a part of the success 	<ul style="list-style-type: none"> - Technology-led economic growth - Employment
4. Convenience and Usability	<ul style="list-style-type: none"> - Usability in extreme conditions - Fitting well to natural and built environment - Contributing to energy challenges in developing countries and secluded areas 	<ul style="list-style-type: none"> - Technology companies - Municipalities - Industrial organizations 		
5. National Competitive Advantage	<ul style="list-style-type: none"> - National know-how in technical engineering - Success of national solar companies - Feasibility of solar in the Northern sphere 	<ul style="list-style-type: none"> - Technology companies - Research organizations - Innovation and policy bodies 	<ul style="list-style-type: none"> - Lacking commercial ability of Finnish companies - Lack of a home market - Negative attitudes locally - Insufficient policy measures 	<ul style="list-style-type: none"> - Staying in the race - Scientific know-how
6. Distributed Production	<ul style="list-style-type: none"> - Consumer empowerment - Potential of building-integrated solar - Bringing about a new economic system based on solar energy 	<ul style="list-style-type: none"> - Technology companies - Innovation and policy bodies - Energy incumbents 	<ul style="list-style-type: none"> - Existing bureaucracy related to connecting distributed solutions to the grid - Need to bring system integrators and turnkey solutions to the market 	

Solar as Progression and Modernization

Since the very beginning solar technology was presented as 'progressive' and an integral part of modern future. Technological development seemed to be thought of as unavoidable, almost like an "inevitable self-evident logic along a single, pre-ordained path" (cf. Stirling, 2007: 290). Thus, solar was perceived as a natural consequence of scientific work. This was fortified with the use of 'technical convincing' (cf. Reuss, 2008) by many narrators, which meant that often the broader context and exact meaning of technical details remained unexplained and impossible to understand for non-experts. The values of innovation and technological progress thus seemed to be taken as self-evident by the narrators. Stirling (2007: 292) has also noted this tendency, stating that expert language often capitalizes on universal pro-technology and pro-innovation arguments whilst the content and meaning are left undifferentiated. Also Schatzberg (1994) has argued that technology advocates frequently project progress onto the promoted technology whereas Eames et al. (2006: 366) have recognized the theme 'inevitability and technical progress' used to further the 'hydrogen economy'.

This theme was visible especially in the presentations by the SMEs, the research organizations, policy bodies and the industry associations. For example, Beneq, a supplier of production and research equipment for thin film coating, presented pictures demonstrating modern laboratory equipment and microscopic images of solar application materials. The research organizations illustrated extensive amounts of technological information on research projects accompanied by wiring diagrams and graphs on cell performance. We also observed people getting deeply

engrossed in technical detail. For instance, people would show enthusiasm related to exhibited technical applications or refer to some technical specifics as 'real eye-openers'. Alternatively, some presentations evoked questions and counter-arguments concerning technological performance.

Many narrators used future- and progression-oriented phrases in their presentations. Thus, the narrators talked about "future emerging technologies" (Tekes), "innovative cell processes" (Aalto University) and "next generation applications" (ABB). Some envisioned a more distant future. A spokesperson for Tekes appeared hopeful for the future beyond 2020 to bring surprising advancements like "ultra low cost technologies", "very high efficiency approaches" and "integration concepts for very high levels of PV penetration". Frequently, solar was understood in connection with other emerging technologies. The narrators talked about "nano cells", "hydrogen and fuel cells" (Aalto University) and "the terrestrial use of space photovoltaics" (Tekes) as areas of up-coming research. They also presented possible side-products of and diffusion supporting technologies for solar technology. Solar was seen to come along with a range of other 'smart' technologies such as energy-efficient "smart living" (Fortum), "smart heating" (ESTIF), "smart metering" (ABB) and, of course, the "smart grid" (e.g. ABB, VTT, EPIA), which is an established term to describe emerging electricity grids that use information and communication technology to improve grid performance.

At times solar technology appeared as a part of futuristic architectural design. The narrators presented pictures of Asian megacities with solar integrated skyscrapers and other modern buildings or major solar applications internationally like the world's first commercial concentrating solar power

tower PS 10 located in Andalucia, Spain. These constellations became symbols for solar technology, more broadly, making it appear as an intellectual celebration of modern science and technology and an inevitable part of a science-based future.

Solar as Sustainability

Arguments about solar technology as an unavoidable part of a sustainable energy system and necessary for mitigating climate change started to increase from the beginning of the second phase. Current energy production was conceived as damaging the environment, and if not transformed to a more ecological direction, leading to a gloomy future. Here, solar was thus understood as an alternative energy source rather than a display of technological excellence. Sustainability seemed a largely shared ideology in the background of the proponents, whereas clear anti-environmentalist perspectives were virtually non-existent at the events. Ecological arguments are common in energy technology discourse and have been distinguished e.g. in proponent visions on hydrogen (Eames et al., 2006) and wind energy (Barry et al., 2008). The theme was widely promoted by different narrators.

For many narrators solar appeared as an ethically correct, 'good' energy source that would come along with other sustainable technologies and practices. One narrator associated solar with e.g. composting, recycling, public transport and local food, i.e. as an ecological lifestyle choice in general (Helsinki City). Furthermore, pictures of solar panels frequently purported other ecological energy technologies like wind mills, biofuel fields or geothermal generators (e.g. VNT Management, EPIA, Tekes). Also the follow-up discussions pointed out that renewables should not compete against each other but be promoted as a unified group contributing to sustainability. Some

narrators appealed to the audience's sense of compassion and responsibility: Fortum, a large energy incumbent, and Järvenpään mestariasunnot, a housing company, purported the famous image of a polar bear on an ice raft with titles pointing to the urgency of acting upon climate change. Many presentations ended with slogans hinting towards the 'righteousness' of solar energy, such as "Let us work together to change the world towards the better" (EPIA) or "Power and Productivity for a Better World" (ABB).

In conjoint with the inevitability argument, many narrators highlighted resource scarcity (the limited amount of oil and gas reserves, in particular) and pointed out the abundance of solar energy in relation to other energy sources. Particularly policy and research bodies stated that a range of social institutions and policies had been established that would limit prevailing consumption patterns and increase the use of renewables. The use of solar was regarded as deriving naturally from its sheer quantity on earth. It was furthermore suggested, that great availability would eventually lead to solar energy becoming proportionally cheaper than other power sources. For instance, the energy incumbent Fortum described solar as an "infinite fuel resource". Arguments about inevitability and urgency are typical of new technology discourse, and have been recognized in previous literature, too (cf. e.g. Eames et al., 2006; Barry et al., 2008).

Solar as Booming Business

Starting from the second phase an increasing number of narrators took the internationally growing solar market as a starting point and regarded solar technology as a promising business sector. In this context global developments, like the outstanding technology diffusion in Germany and the emerging markets in China and the USA,

seemed important for the proponents. Within this theme the narrators referred to powerful ideographs such as ‘technology-led economic growth’ and positive effects on ‘employment’ (e.g. Tekes, Aalto University, ESTIF). As with most new technology discourse, these themes have been found central in political discussions on energy (e.g. Teräväinen, 2010). Main narrators for this theme included innovation and policy bodies, venture capitalists and large technology and energy companies.

Graphs demonstrating the remarkable growth of the solar market internationally appeared relevant, and these were frequent in the presentations (e.g. Tekes, Fortum, EPIA). For instance Naps Systems, the pioneering Finnish solar electricity systems company, talked of market development as “exponential” and “so fast that anything I say is already outdated”. In addition, the proponents seemed convinced of the approaching “grid parity”, that was mostly associated with economies of scale and accumulation of experience. They also showed enthusiasm over exceptional regional successes like the job creating effect of clean energy technologies in Germany (VNT Management). However, the discussions also raised concerns related to market development like the fierce price competition on the solar panel market.

An important sub-plot was the natural flow of finances into this booming sector. Many regarded investor interest in clean technology as increasing. VNT Management portrayed graphs on the remarkable growth rates of investments in clean technology in the past and on prognoses that foresaw investment volume nearly triple within the next decade. Within this subplot also doubts were expressed with respect to investor interest in solar nationally. In one event a proponent from the audience asked how many investors were presents in the event. As no hands were raised, he laconically stated to “rest his case”.

Solar as Convenience and Usability

In the second phase arguments about solar technology as convenient and highly adaptable begun to gain ground. For instance, it was illustrated as fitting well to the built and natural environment. The narrators underlined its value to the consumer and framed it as convenient to use, even in challenging conditions. Out of all the detected themes, this theme was most reflective of solar-specific promises rather than general promises of new energy technologies. Main proponents of this theme included technology companies, municipalities and the industrial organizations.

In the presentations architectural landscape pictures displayed solar as an aesthetic part of urban planning and not disturbing city scenery (e.g. Helsinki City, Aurubis). The technology company Aurubis crystallized this image in a headline stating “Solar technology becomes one with architecture”. Other pictures visualized it as merging with nature. Naps Systems and the industry associations presented photography with natural elements like forests, animals and mountains coming together with solar panels. A picture by ABB demonstrated an aerial view of grass fields with a ‘solar panel field’ in between. Almost like an extension of nature, the solar installation formed a field-like-shape similar to the living environment.

A visible sub-plot was the usability of solar in extreme conditions. In conference handouts Suntrica, a small technology company focused on portable solar chargers, associated the technology with adventurous individuals relying on solar batteries on the go. Naps Systems expressed a similar storyline and pointed to solar as working flexibly in differing geographical settings. As a curious example the company presented a picture of the “camel fridge”: a

portable solar-panel-fridge carried on the back of a camel.

A sub-plot within this theme was the potential of solar in contributing to the energy issue in developing countries. Solar was presented as enabling energy to be provided to secluded geographical areas, thus, furthering their prosperity. Like in the 'sustainability theme,' moral connotations were central here as well. Naps Systems illustrated solar as "improving the quality of life [in rural communities]" whereas Aalto University presented a topic entitled "Hope to the developing countries from solar solutions". The incumbent energy company Fortum depicted a picture of a Native African standing next to a solar panel, pointing clearly to power production in third world countries.

Solar as National Competitive Advantage

In the third phase solar technology was, to an increasing extent, regarded as a favorable business sector at the national level. In this respect the narrators spoke of the country's long tradition and great know-how in technical engineering i.e. national scientific expertise in the area. 'Science' and 'technology' have been recognized as important cultural values in Finland (Michelsen, 1999; Litmanen, 2009), and the narrators seemed to be drawing from the legitimacy of the theme in national political culture. Main proponents of this theme included technology companies, research organizations and innovation and policy bodies.

The narrators pointed out the superiority of Finnish companies compared to international competitors. Like in the 'progression and modernization' theme, 'technical convincing' (Reuss, 2008) was used to refer to national companies as globally unique and fulfilling niche market demands. Representatives of Tekes characterized e.g. the small solar thermal

company Savosolaras "world's only company capable of equipping their collector with a selective absorption coating" and reported on how Finnish companies had succeeded in international competitions with headlines such as "Finnish Innovations in the Final". Finnish technical know-how was understood as boosting the rise of the solar sector internationally, and statements like "Finnish technology empowers the rise of solar energy" were given.

A sub-plot within this theme centered on displaying confidence in the feasibility of solar energy in Nordic conditions. The narrators underlined the sufficiency of radiation in Finland and presented this as an important factor supporting the emergence of home markets and, thus, the establishment of the field altogether. A common argument was that "In Southern Finland, where most people live, the sun shines [per annum] as much as in North-Germany".

However, the follow-up discussions raised concerns over the capability of national companies to capitalize on business opportunities. For instance, the absence of a home market, general attitudes towards solar technology at the national level, and the insufficiency of policy measures raised concerns. The concerns were largely related to the ability of Finland to 'stay in the race'. One company (Beneq), for instance, stated that "Not many companies have time to wait around until the home market proves the product successful - the train passes, let's hope that Finnish innovations are on board." 'Staying in the race' is a common ideograph used to promote technological change and innovation, irrespective of the technology in question. It has played a role in the promotion of hydrogen (Eames et al., 2006) and is also highly visible e.g. in Finland's roadmap for furthering wind energy (cf. Teknologiateollisuus, 2009).

Solar as Distributed Production

Some narrators perceived solar technology as promoting distributed small-scale energy and consumer empowerment, as it allows households to gain access to power production. The theme was further strengthened in the follow-up discussions, where participants pointed out the great role that distributed energy has had in the German energy transition. However, the discussions also brought to light concerns related to this theme, as the narrators pointed out the bureaucracy and the pragmatic problems related to connecting distributed applications to the grid. Argumentation about empowerment is common for clean energy discourse and, for instance, Eames et al. (2006) and Laird (2003) have recognized similar arguments in their empirical studies. The main proponents of the theme included technology companies, innovation and policy bodies and an energy incumbent.

A sub-plot within the theme lied in the potential of building-integrated solar energy. The proponents seemed to conceive successful demonstrations conducted nationally as important, considering the frequent references to them. For instance, they presented the net zero-energy apartment and the passive-energy-house (Helsinki City, Luvata, VTT). Obviously, these appeared as a source of credibility by “grounding [the technology] in local contexts” (cf. Eames et al., 2006: 361). This particular sub-plot presented solar as it appears in the Long-Term Climate and Energy Strategy of the Finnish Government (Ministry of Employment and the Economy, 2008: 38). In it solar technology is advocated a role only in heating, at least in the short run. Other technologies that are conventionally furthered in the same manner include i.e. heat pumps, biofuels and wood pellets.

The energy incumbent Fortum (with production from nuclear- and hydro

power as well as fossil fuels) represented an exceptional case among the narrators. Recently the company has created a business unit for solar energy and started to campaign visibly on the topic. In its presentations it depicted a vision of the ‘Solar Economy’: a ‘deep green’ energy system combining several renewable energy technologies to achieve “inexhaustible and emissions-free, solar-based production”. In ‘Solar Economy’ consumers were purported as operating as co-producers in a distributed system. Solar was thus regarded as a ‘technical fix’ (cf. Eames et al., 2006: 364) that would not only provide inexhaustible energy but also lead to profound social benefits. Fortum’s vision was crystallized in a picture portraying the shift from today’s energy system to the ‘Solar Economy’. In the picture the traditional energy system was presented on the left, situated low in the horizon and painted in dark colors. Next, the picture portrayed the “transition phase” including nuclear power plants and other low-emission plants. These were purported almost as if leading the way from the ‘valley of darkness’ towards the emerging solar economy, positioned on a hill on the far right and portrayed in bright colors. It seemed that with its depiction of “Solar Economy” the company was investing effort into re-narrating its past accomplishments and purpose (c.f. Garud & Gehman, 2012) in order to fit solar into its profile and to frame itself as a legitimate actor in renewable energy. Towards the end of the events it had launched a solar panel package to private households and, later on, invested also in a large solar power plant in India. Fortum’s campaign carried the same title as the visionary book by Scheer (2004): ‘The Solar Economy’. In the book Scheer foresees an energy system in which fossil fuels and nuclear energy are replaced by renewables, leading to benefits alike the ones presented here.

Evolution of Expectations Work

As indicated above, the narrative themes evolved in conjunction with the three phases of the field-configuring events. The categorization of the themes to the phases is not unambiguous, but reflects the points in time where the themes started to gain considerable ground in the expectations work. As the events progressed, previously emerged themes matured and took new forms.

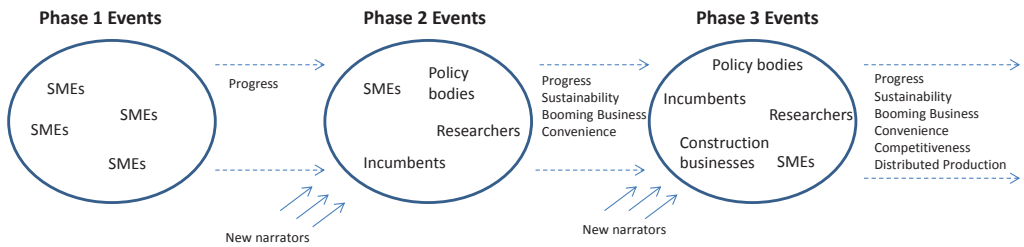
The theme (1) Progression and Modernization was dominant in the first phase, as the events were mostly adhering to the purpose of the mediating organization instead of creating expectations for the solar field as such. As can be seen from Table 1, the range of narrators was limited and the theme was mainly visible in the presentations by the solar SMEs purporting company products as a part of advanced technologies and themselves a part of progressive industries.

The themes (2) Sustainability (3) Booming Business and (4) Convenience and Usability appeared in the second phase, as attention shifted towards portraying the business potential of solar at an international level. At this stage researchers and policy bodies joined the events opening up new perspectives to the field, such as sustainability concerns. Also new SME companies specialized in adaptable solutions entered and emphasized the convenient use of solar solutions. The theme 'Booming Business' emerged as a strong theme and was further fortified as large companies, including energy incumbents, joined the events and pointed to developments in leading markets. The 'Progression and Modernization' theme got further strengthened during the second phase as innovation-focused events were

organized and the research community was invited to participate.

The third phase introduced the two latter themes (5) National Competitive Advantage and (6) Distributed Production. At this point the focus shifted from the attractiveness of the international markets towards domestic developments, and especially the last event was centered on home market formation. Also the national building construction companies became more visible in the last stage focusing on solar as a small-scale energy source. In the last phase the themes Sustainability, Booming Business and Convenience matured and became more diverse, as new narrators like, for example an NGO and another energy incumbent, gave their presentations on the issue.

Hence, the expectations work evolved gradually as an exploration of complementary visions and expectations for the technology. The narrators started off with a fairly narrow storyline defined by the rationale of the intermediary organization. In the course of the events, this storyline spread into multiple narratives upon which to build the field's future. This happened as the event series progressed with more diverse and solar-focused events taking place and, the intermediary organizations stepping outside their primary roles and inviting new narrators to join. In general, the evolution of the expectations work represents a widening of the narrative space for different expectations and benefits of solar technologies. The storyline moved from a high-tech export focus towards a more diversified set of arguments and conceiving solar as interesting for several societal reasons. During the events, focus also shifted closer towards the Finnish society and home market creation, and led to a wider range of national actors to identify with the field. Picture 1 presents the evolution of the expectations work throughout the event series.



Picture 1. Evolution of Expectation Work.

Discussion and Conclusions

The main purpose of this study was to investigate how expectations work was carried out for a new clean energy technology through a series of field-configuring events. This is an important perspective in mapping out the development of an emerging field over time and understanding the nature of expectations work conducted through an event series. While the sociology of expectations literature has emphasized the importance of expectations for field emergence (e.g. Bakker et al, 2011), the notion of event-based expectations work has not been articulated in this context. The present study helps in understanding the evolution of event-based expectations work in early phases of field formation. Our analysis of narratives offers an empirical starting point for addressing the phenomenon within the expectations literature and invites additional theoretical and empirical discussion on the topic.

We suggest that event-based expectations work is fruitful for exploring complementary visions and expectations for a new technology. Whereas prior findings highlight the importance of explicitly aligning visions and expectations for the development of new fields (Brown & Michael, 2003; Bakker et al., 2011), our study shows that event series can lead to an initially narrow storyline gradually spreading into multiple narratives upon which to build a field's future. In this

manner, events can guide and strengthen the advocacy for a new clean technology, even if they do not lead to immediate concrete results. We found this to happen as the expectations work evolved through three stages, each of which was focused on particular aspects of field-configuration. The expansion of the narrative themes was enabled as the intermediary organizations enlarged their agendas from their core purpose towards a more explicit effort on field formation, invited a more diversified group of participants to join the events and came up with new event topics. Also the events were allowed to be increasingly focused on the networking of different actors in this field. Consequently, our findings suggest that, besides an alignment of visions and expectations, also their multiplication can be valuable.

Based on our findings it seems that guidance through the multiplication of narratives is particularly important for new and unsettled fields that have not reached the stage of contestation between different technologies and solutions. Instead, the priority of weak fields lies in building credibility and legitimacy for the entire technological community. It thus seems that at early stages of field formation as technology proponents begin to interact with each other, expectations work is likely to be focused on a mutual exploration of multiple technological opportunities. In the course of an event series participants

gradually become aware of each other's standpoints and develop a sense for the presence of multiple narratives and viewpoints within them. Recently, the strategic niche management literature has found the "widening of narratives" to be important in the development of niche spaces for sustainable innovation (Smith et al., 2014). This further accentuates the significance of this phenomenon and calls for attention towards it when studying expectations work in a pre-market phase of technological fields.

Compared with previous accounts on arenas of expectations (cf. Bakker et al., 2011) and field-configuring events (cf. Garud, 2008) it is notable that contestations between different viewpoints or technologies were absent from the events studied in this paper. Instead, the proponents seemed focused on building a convincing set of arguments for furthering the field as a whole. In line with this, also the six narrative themes detected should not be understood as competing storylines for the field but as complementary visions. The themes themselves were highly flexible and did not exclude any narrator-specific standpoint from the expectations work. We perceive the themes as common denominators for different narrators at which they could create mutual understanding and connect with others. More, specifically, we found the narratives to function as reference points that were flexible enough to allow for a simultaneous advancement of generic expectations promoting the entire field and narrator-specific expectations promoting the agenda of a single proponent. Our findings, thus, complement those that have shown narratives to allow diverging interests and agendas to be advanced simultaneously (Eames et al., 2008), or to serve as boundary objects that can generate interpretive flexibility (Bartel & Garud, 2009). Our findings are complementary,

as we emphasize the role of narratives in promoting two layers of expectations - generic and particular. Finally, we also found that in early phases, field-configuring events are likely to support this specific type of interpretive flexibility in expectations work. Events may provide a unifying and inclusive context for a wide range of narrators linking different perspectives to a common agenda.

More specifically, our analysis yielded six themes through which solar technology was promoted: Solar as (1) Progression and Modernization (2) Sustainability (3) Booming Business (4) Convenience and Usability (5) National Competitive Advantage and (6) Distributed Production. The themes were not explicitly referred to, but appeared as embedded in the presentations and discussions. This embeddedness made the themes look like taken-for-granted promises of new technology rather than something that should be critically scrutinized or elaborated upon. The impression was further reinforced through the use of powerful ideographs, that is, self-justifying normative goals (McGee, 1980) to which many of the themes were closely connected. As suggested in extant literature ideographs like 'technological progress' or 'sustainability' may serve as additional symbolic and cultural resources for legitimizing new technology (van Lente, 1993).

The narrative themes detected in this study are rather typical of clean technology discourse and seem to be largely shared across technologies and regions. Technological arguments (pointing e.g. to technological progress), economic arguments (pointing e.g. to new business potential), and sustainability arguments (pointing e.g. to climate change) have been identified by several authors in relation to various clean energy technologies (e.g. Eames et al., 2006; Barry et al., 2008). As

such, they could be seen to reside within the confines of ecological modernization (Pataki, 2009); technological optimism combined with the aim of generating sustainability within current institutional order. However, in the national Finnish context the themes represented a renewal of the social discussion on energy. In Finland, energy policy targets have traditionally focused on providing sufficient energy at affordable prices to secure the operating conditions of established industries, accompanied with objectives to mitigate climate change (e.g. Ruostetsaari, 2010). Yet, here the narrators clearly aimed to shift this approach by pointing out the importance of generating new industries and presenting the technology as an emerging value innovation. The proponents thus aimed to reposition the discussion on solar technology from a mere energy policy issue to promoting industry, innovation and energy policy targets simultaneously. Hence, the detected themes can also be perceived as an effort to re-narrate the issue in a way that would make sense in a particular context (c.f. Garud & Gehman, 2012) and to make a case for a novel approach towards energy. In the studied case, the narrators drew e.g. from the long national tradition in engineering as well as the cultural values of 'science' and 'technology' (c.f. Michelsen, 1999) to achieve this and create legitimacy for new lines of thinking.

Acknowledgements

The research on which this article is based has received funding from the following sources: the Academy of Finland (contract 140906), Helsinki Institute of Science and Technology Studies, Walter Ahlström Foundation, the Foundation for Economic Education and the Marcus Wallenberg Foundation for Research in Business Economics. We also thank S&TS reviewers

and editor Sampsa Hyysalo for their valuable comments on this paper.

References

- Bakker, S., H. van Lente & M. Meeus (2011) 'Arenas of expectations for hydrogen technologies,' *Technological Forecasting & Social Change* 78: 152-162.
- Barry, J., G. Ellins & C. Robinson (2008) 'Cool Rationalities and Hot Air: A Rhetorical Approach to Understanding Debates on Renewable Energy,' *Global Environmental Politics* 8(2): 66-98.
- Bartel, C. & R. Garud (2009) 'The Role of Narratives in Sustaining Organizational Innovation,' *Organization Science* 20(1): 107-117.
- Boje, D.M. (2001) *Narrative methods for organizational and communication research* (London: Sage).
- Borup, M., N. Brown, K. Konrad & H. van Lente (2006) 'The sociology of Expectations in Science and Technology,' *Technology Analysis & Strategic Management* 18 (3/4): 285-298.
- Brown, N. & M. Michael (2003) 'A Sociology of Expectations: Retrospecting Prospects and Prospecting Retrospects,' *Technology Analysis & Strategic Management* 15(1): 3-18.
- Czarniawska, B. (2000) *The uses of Narrative in Organization Research*, GRI Report 2000:5, Göteborg.
- Eames, M., W. McDowall, M. Hodson & S. Marvin (2006) 'Negotiating Contested Visions and Place-Specific Expectations of the Hydrogen Economy,' *Technology Analysis & Strategic Management* 18(3/4): 361-374.
- Finnish Solar Cluster Report (2012) Pöyry Management Consulting Oy, Tekes.
- Garud, R. (2008) 'Conferences as Venues for the Configuration of Emerging Organizational Fields: The Case of Cochlear Implants,' *Journal of Management Studies*, 45(6): 1061-1088.

- Garud, R. & J. Gehman (2012) 'Metatheoretical perspectives on sustainability journeys: Evolutionary, relational, durational,' *Research Policy* 41: 980-995.
- Kramp, M.K. (2004) 'Exploring Life and Experience Through Narrative Inquiry,' in K. deMarrais & S.D. Lapan (eds), *Foundations for Research: Methods of Inquiry in Education and the Social Sciences* (New Jersey: Lawrence Erlbaum Associates): 103-121.
- Konrad, K. (2006) 'The Social Dynamics of Expectations: the Interaction of Collective and Actor-Specific Expectations on Electronic Commerce and Interactive Television,' *Technology Analysis & Strategic Management* 18(3/4): 429-444.
- Konrad, K., J. Markard, A. Ruef & B. Truffer (2012) 'Strategic responses to fuel cell hype and disappointment,' *Technological Forecasting & Social Change* 79: 1084-1098.
- Laird, F. (2003) 'Constructing the Future: Advocating Energy Technologies in the Cold War,' *Technology and Culture* 44 (1): 27-49.
- Lampel, J. & A.D. Meyer (2008) 'Field-Configuring Events as Structuring Mechanisms: How Conferences, Ceremonies, and Trade Shows Constitute New Technologies, Industries, and Markets,' *Journal of Management Studies* 45: 1025-1035.
- Litmanen, T. (2009) 'The temporary nature of societal risk evaluation: Understanding the Finnish nuclear decisions,' in Kojo, M. & Litmanen, T. (eds), *The renewal of nuclear power in Finland* (London: Palgrave MacMillan): 192-217.
- McGee, M.C. (1980) 'The 'Ideograph': A Link Between Rhetoric and Ideology,' *The Quarterly Journal of Speech* 66: 1-16.
- McInerney, P-B. (2008) 'Showdown at Kykuit: field-configuring events as loci for conventionalizing accounts,' *Journal of Management Studies* 45(6): 1089-116.
- Meyer, A.D. & V. Gaba & K. Colwell (2005) 'Organizing far from equilibrium: non-linear change in organizational fields,' *Organization Science* 16(5): 456-73.
- Michelsen, K-E. (1999) *Viides sääty, Insinöörit suomalaisessa yhteiskunnassa* (Helsinki: Tekniikan Akateemisten Liitto). [The fifth class, engineers in Finnish society].
- Ministry of Employment and the Economy (2008) *Long-Term Climate and Energy Strategy: Government Report to Parliament* 6 November 2008. https://www.tem.fi/files/20585/Selontekoehdotus_311008.pdf. 01.09.2012.
- Oliver, A.L. & K. Montgomery (2008) 'Using field-configuring events for sense-making: a cognitive network approach,' *Journal of Management Studies* 45(6): 1147-67.
- Pataki, M. (2009) 'Ecological Modernization as a Paradigm of Corporate Sustainability,' *Sustainable Development* 17: 82-91.
- Polkinghorne, D.E. (1988) *Narrative knowing and the human sciences* (Albany: State University of New York Press).
- Pollock, N. & R. Williams (2010) 'The Business of Expectations: How Promissory Organizations Shape Technology and Innovation,' *Social Studies of Science* 40(4): 525-548.
- Rappa, M.A. & K. Debackere (1992) 'Technological communities and the diffusion of knowledge,' *R & D Management* 22(3): 209-220.
- Reuss, M. (2008) 'Seeing like an engineer - Water projects and the mediation of the incommensurable,' *Technology and Culture* 49(3): 531-46.
- Rhodes, C. & A.D. Brown (2005) 'Narrative, organization and research,' *International Journal of Management Reviews* 7(3): 167-188.

- Riessman, C.K. (2005) 'Narrative analysis,' in N. Kelly, C. Horrocks, K. Milnes, B. Roberts & D. Robinson (eds), *Narrative, memory and everyday Life* (Huddersfeld: University of Huddersfeld): 1-7.
- Ruostetsaari, I. (2010) *Energiavalta: Eliitti ja Kansalaiset Muuttuvilla Energiamarkkinoilla* (Tampere: University Press). [Energy authority: The elite and the citizens on a changing energy market].
- Schatzberg, E. (1994) 'Ideology and Technical Choice: The Decline of the Wooden Airplane in the United States,' *Technology and Culture* 35(1): 34-69.
- Scheer, H. (2004) *The Solar Economy: Renewable Energy for a Sustainable Global Future* (London: Earthscan Publications).
- Smith, A., F. Kern, R. Raven & B. Verhees (2014) 'Spaces for sustainable innovation: Solar photovoltaic electricity in the UK,' *Technological Forecasting and Social Change* 81: 115-130.
- Smith, A. & R. Raven (2012) 'What is protective space? Reconsidering niches in transitions to sustainability,' *Research Policy* 41: 1025-1036.
- Solangi, K.H., M.R. Islam, R. Saidur, N.A. Rahim & H. Fayaz (2011) 'A Review on Global Solar Energy Policy,' *Renewable and Sustainable Energy Reviews* 15: 2149-2163.
- Stirling, A. (2007) 'Deliberate Futures: Precaution and Progress in Social Choice of Sustainable Technology,' *Sustainable Development* 15: 286-295.
- Teknologiatoimisto (2009) *Tuulivoimatiekartta*. [Road-map for wind energy]. <http://www.teknologiatoimisto.fi/fi/ryhmat-ja-yhdistykset/tiekartta.html>. 24.11.2012.
- Teräväinen, T. (2010) 'Political opportunities and storylines in Finnish climate policy negotiations,' *Environmental Politics* 19(2): 196-216.
- Van Lente, H. (1993) *Promising technology: the dynamics of expectations in technological development*, PhD thesis (University of Twente, NL: Enschede).
- Van Lente, H. & A. Rip (1998) 'Expectations in Technological Developments: An Example of Prospective Structures to be Filled in by Agency,' in Disco, C. & van der Meulen, B. (Eds.), *Getting New Technologies Together, Studies in Making Sociotechnical Order* (Berlin: Walter de Gruyter): 203-231.
- Verhees, B., R. Raven, F. Veraart, A. Smith & F. Kern (2013) 'The development of solar PV in The Netherlands: A case of survival in unfriendly contexts,' *Renewable and Sustainable Energy Reviews* 19: 275-289.

Heli Nissilä
Aalto University School of Business
Department of Management Studies
PO Box 21230, FI-00076 Aalto, Finland
heli.nissila@aalto.fi

Tea Lempiälä
Aalto University School of Business
Department of Management Studies
PO Box 21230, FI-00076 Aalto, Finland
tea.lempiala@aalto.fi

Raimo Lovio
Aalto University School of Business
Department of Management Studies
PO Box 21230, FI-00076 Aalto, Finland
raimo.lovio@aalto.fi