



Industry legitimacy: bright and dark phases in regional industry path development

Suyash Jolly & Teis Hansen

To cite this article: Suyash Jolly & Teis Hansen (2021): Industry legitimacy: bright and dark phases in regional industry path development, *Regional Studies*, DOI: [10.1080/00343404.2020.1861236](https://doi.org/10.1080/00343404.2020.1861236)

To link to this article: <https://doi.org/10.1080/00343404.2020.1861236>



© 2021 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group



[View supplementary material](#)



Published online: 11 Jan 2021.



[Submit your article to this journal](#)



Article views: 2340



[View related articles](#)



[View Crossmark data](#)



Citing articles: 3 [View citing articles](#)

Industry legitimacy: bright and dark phases in regional industry path development

Suyash Jolly^a  and Teis Hansen^b 

ABSTRACT

The paper contributes to debates on dark phases of regional industry path development processes. We focus on the role of industry legitimacy and study legitimacy spillovers from contextual structures in the case of the biogas industry in Scania, Sweden. Previously presented as a success case, we show how legitimacy spillovers from various contextual structures influenced the path development process, in both the emergence and acceleration phases, and in the recent decline period. The analysis highlights how previously accumulated resources in the form of knowledge, finance and market were insufficient to prevent industry decline when it suffered a loss of legitimacy.

KEYWORDS

legitimacy; biogas; industry decline; Scania; contextual structures; regional industry path development

JEL B52, N7, Q55, Z31

HISTORY Received 3 September 2019; in revised form 13 November 2020

INTRODUCTION

The literature in evolutionary economic geography (EEG) on regional industry path development focuses on qualitative changes to the industrial composition of regions, including the emergence of new industries (e.g., Hassink et al., 2019; Steen, 2016). While the literature has emphasized the role of firms as main agents of change for understanding the evolution of regional industries, here defined as the elements of an industry that are located in a specific region, recent approaches have also focused on the role of institutions and broader multi-scalar linkages which affect regional industrial path development (Hassink et al., 2019; MacKinnon et al., 2019).


However, while EEG has offered elaborated explanations for understanding the success stories of regional industrial path development, limited attention has been given to failures and dark phases of path development processes (Blažek et al., 2019; Phelps et al., 2018). Analyses of such negative paths generally focus on difficulties of diversification of sunset industries in old industrial regions (Cho & Hassink, 2009; Schmidt et al., 2020), while other types of failed path development processes are less

studied. Further, while Binz et al. (2016b) suggest that path development processes require multiple resources, in particular knowledge, markets, financial investments and legitimacy, failure cases generally emphasize deficiencies in competencies and skills as a key explanatory factor (e.g., Isaksen, 2015, 2018).


Consequently, in this paper we focus on the role of industry legitimacy for emerging industrial paths and propose a framework for understanding developments in industry legitimacy, which adds to our understanding of negative path development processes for emerging industries. We suggest that to study developments in regional industry legitimacy over time, there is a need to consider legitimacy spillovers from multiple contextual structures, which may exercise significant influence on both bright and dark phases of path development processes.¹

While insights in organizational studies have focused on the legitimacy of organizations and entrepreneurial ventures (Deephouse & Suchman, 2008; Soublière & Gehman, 2020), creation of legitimacy has also been discussed as an essential process for the development of emerging industries (Markard et al., 2016). According to Kwak and Yoon (2020), the legitimacy of an emerging industry is

CONTACT

^a (Corresponding author)  Suyash.Jolly@keg.lu.se

Department of Human Geography, Lund University, Lund, Sweden.

^b  Teis.Hansen@keg.lu.se

Department of Human Geography and CIRCLE, Lund University, Lund, Sweden; and Department of Technology Management, SINTEF, Trondheim, Norway.

 Supplemental data for this article can be accessed at <https://doi.org/10.1080/00343404.2020.1861236>

the ‘perceived consonance of an industry with its institutional environment, i.e., a socially constructed set of norms, values, beliefs, and practices in its context’ (p. 2).

A new industry becomes taken for granted when the different stakeholders stop questioning the usefulness of the industry (Rao, 2004). Emerging industries need to overcome the liability of newness and often do not follow linear development paths as a result of political and economic shocks (Zhao et al., 2017, p. 106). Despite promising developments, emerging industries may run into legitimacy challenges and, for example, fail to create wider user acceptance and lose regulatory support (Binz et al., 2016a). Thus, failures, setbacks and loss of legitimacy are central to understand the development of new industries (Garud et al., 2019; Rao, 2004).

Empirically, we study the development of the biogas industry in Scania, Sweden. While previous studies have highlighted the positive developments of the biogas industry in this region (Martin & Coenen, 2015; Martin & Martin, 2017), the industry has in most recent years experienced significant difficulties, illustrated by financial problems for major biogas producers, absence of further investments, and loss of market shares in core application domains (Andersson, 2017). In the current paper, we revisit this case, focusing on the role played by developments in industry legitimacy, and how this depends on spillovers from the contextual structures.

The paper is organized as follows. In the next section, we position our paper in the EEG literature and develop a framework for understanding the role of legitimacy spillovers from multiple contextual structures. We then introduce our empirical case study and research methods in the subsequent section followed by the case study analysis. Finally, we discuss the main findings, conclude the paper and provide avenues for future research.

THEORETICAL BACKGROUND

Negative path development processes

The EEG literature over the last decade has elaborated extensively on the concept of regional industry path development, following Martin and Sunley’s (2006, p. 429) suggestion that ‘[w]e need to know much more about how local economic paths emerge, develop, become rigidified and are eventually destroyed’. From its evolutionary starting point, EEG suggests that the opportunities for a given industrial path to emerge are influenced – but not determined – by previous developments in the region (Boschma & Frenken, 2006), not least the existence of industries with related competencies (Neffke et al., 2011).

The literature has elaborated on the processes of industry path development (Karnøe & Garud, 2012) and suggested multiple taxonomies of different types of path development processes (e.g., Grillitsch & Asheim, 2018; Isaksen & Trippl, 2017), distinguishing between the upgrading of existing industries, the emergence of new industries using knowledge from existing regional industries, and the development of new industries unrelated to knowledge in the existing regional industrial fabric.

However, as evident from the types of path development processes considered here, an emphasis has been placed on positive development paths where new industries emerge, existing industries are upgraded or a greening of industries (Grillitsch & Hansen, 2019) takes place. Conversely, negative path development processes have been overlooked, as suggested by Blažek et al. (2019), who partly mirror the typology of Grillitsch and Asheim (2018) by adding path downgrading, path contraction and path delocalization as new types of path development processes.

To the extent that negative path development processes have previously been analysed, most attention has been given to barriers towards ‘de-locking’ sunset industries in old industrial regions (e.g., Cho & Hassink, 2009). Drawing on the seminal work of Grabher (1993), these challenges are generally connected to lock-ins into established ways of thinking (cognitive), existing production systems (functional) and protection of vested interests (political).

Conversely, very few studies have analysed negative path development processes in relation to emerging industries, that is, cases of failed establishment of new industries (Phelps et al., 2018). An exception is Isaksen’s (2015) study of path development processes in the Lister region in Norway, which highlights the difficulties of diversifying into new industries in peripheral regions. In particular, the absence of sufficiently sophisticated competencies is highlighted as a central barrier, which follows the general emphasis on myopia and inadequate knowledge creation as sources of decline in EEG (Maskell & Malmberg, 2007).

However, as suggested by Binz et al. (2016b), knowledge is not the only resource that matters for path development processes: markets, financial investments and legitimacy are also considered key resources for the development of new industrial paths. While formation processes leading to the development of these resources may be interconnected (Njøs et al., 2020), our analysis focuses on legitimacy. The next section focusses on the role of industry legitimacy for emerging industrial paths and proposes a framework for understanding developments in industry legitimacy, which adds to our understanding of negative path development processes for emerging industries.

Legitimacy and the development of new industries

Legitimacy is seen as a general perception that the ‘actions of an entity are socially desirable or appropriate within some socially constructed system of norms, values, beliefs, and definitions’ (Suchman, 1995, p. 574). It is a central construct in institutional theory, which highlights that organizations require not just material and technical resources to survive, but also broader cultural support, including credibility and endorsement from high-status stakeholders such as regulators (Suddaby et al., 2017). Legitimacy once attained cannot be assumed to be present always and instead greater attention is required to

maintain legitimacy and scenarios where the legitimacy declines over time (Deephouse et al., 2017; Fisher et al., 2016).

The legitimacy of an organizational unit in a particular institutional environment is not completely independent from the legitimacy of other organizational entities which are cognitively related to the organizational unit (Kostova & Zaheer, 1999, p. 75). Legitimacy spillover occurs ‘when the legitimacy of a primary subject (the originator of the spillover) alters the legitimacy of a “cognitively related” secondary subject (the recipient of the spillover) without altering the former’s legitimacy’ (Haack et al., 2014, p. 642). For example, the legitimacy of existing incumbent healthcare organizations spilled over to support the development of new healthcare organizations, and the legitimacy of commercial banking organizations spilled over to influence the development of financial cooperatives (Kuilman & Li, 2009, p. 229). Positive legitimacy spillovers contribute towards enhancing legitimacy, while negative spillovers reduce the legitimacy. The effects of positive and negative legitimacy spillovers are not symmetric in nature (Haack et al., 2014; Kostova & Zaheer, 1999). Negative spillovers are likely to have a greater effect on legitimacy than positive spillovers as they lead to reduced access to resources, and uncertainty about the future activities (Desai, 2011). Legitimacy spillovers can be strategically created to legitimize and delegitimize organizational entities. Organizations even develop measures to shield themselves from the effect of negative spillovers (Haack et al., 2014). We suggest it is important to understand the role of positive and negative legitimacy spillovers while looking at the legitimacy of emerging industries.

In the prior literature, only a limited number of studies have analysed the increase and decline of legitimacy at the level of an emerging industry (e.g., Aldrich & Fiol, 1994; Markard et al., 2016; Rao, 2004). The legitimacy of emerging industries is largely based upon the extent to which the core technologies on which the industry relies are considered appropriate (Markard et al., 2016). However, the social desirability of an industry may also follow from aspects that are not directly related to the technologies, for example, realized and expected job creation and value addition to the regional economy. Thus, while technology legitimacy influences industry legitimacy, it does not fully determine it.

Drawing on insights from the literature on the role of spillovers between different technologies and the role of contextual structures (Bergek et al., 2015; Markard & Hoffmann, 2016; Sandén & Hillman, 2011), we suggest that developments in a regional industry’s legitimacy are in particular influenced by relations to (1) other regional industries, (2) broader regional sectors, (3) the industry’s development in other geographical contexts and (4) the wider political context. The relationships between a regional industry and the relevant contextual structures can take multiple forms ranging from positive to neutral or negative. When there is a negative legitimacy spillover, contextual structures can hamper the development of the

emerging industry, but the impact of the contextual structures can change rapidly over time (Mäkitie et al., 2018). The four types of contextual structures function as magnifying glasses, which serve to highlight and foreground certain type of dynamics (Bergek et al., 2015, p. 61) in order to understand whether or not individual contextual structures are important during different phases of regional industrial path development.

Furthermore, a relation between an industry and a contextual structure will not necessarily be reciprocal. As exemplified by Sandén and Hillman (2011), in the age of climate change, the Swedish fossil natural gas industry has benefitted from relations to the biogas industry, while this relationship has conversely been a burden for the biogas industry. Thus, while we acknowledge that relations between an emerging industry and the contextual structures are often bidirectional, the current paper focuses on the legitimacy development of emerging industries and our main concern is, therefore, the influence of contextual structures on the emerging industry, rather than the opposite direction. Thus, we suggest that spillovers from the contextual structures will influence legitimacy for the new industrial path. The following sections describe the four different contextual structures, which allow us to arrive at a more fine-grained understanding of developments in legitimacy for emerging regional industries.

Spillovers with other regional industries

Recent contributions in economic geography highlight the importance of spillovers between different regional industrial paths. Competition over scarce local resources implies that one particular regional path might undermine the development of another, but two different regional paths may also be mutually beneficial by fostering cross-industrial flows of skilled workers, private and public risk capital, and policy support mechanisms such as public procurement (Frangenheim et al., 2020; Hassink et al., 2019). While this topic is underdeveloped in economic geography, contributions in innovation studies have provided considerable attention to relations between technologies and how this may affect the development of industries (Hanson, 2018; Magnusson & Berggren, 2018; Sandén & Hillman, 2011).

Competition between technologies that fulfil similar functions or require similar inputs will lead to legitimacy challenges for an emerging industry that competes with a well-established regional industry. Conversely, in situations where an emerging industry will strengthen a strong regional industry, this will likely lead to increased legitimacy of the former. To exemplify, the development of technologies for renewable energy or biofuel production will be viewed favourably in regions with technological strongholds in battery–electric or biofuel vehicles (see also Sandén & Hillman, 2011).

Spillovers with broader regional sectors

Emerging regional industries interact with broader contextual sectors, which are here defined as stable, institutionalized and regulated sociotechnical systems that serve

particular societal needs such as provision of energy, food, water, etc. Sectors rely on several industries to provide inputs needed for the production and distribution activities that allow sectors to fulfil certain functions for end-users (Bergek et al., 2015; Malerba, 2002). Consequently, established sectors may influence the development of emerging industries that deliver such inputs.

The sectoral contextual structures contain broader societal values, legal and political systems, and economic support mechanisms, which may significantly condition the further development of an emerging industry. An emerging industry will often relate to several sectors, with varying degrees of spillovers between them (Hanson, 2018). Established sectors can support emerging industries by providing financial resources to start-ups and enabling access to knowledge brokers who connect the sector and the emerging industry (Mäkitie et al., 2018). Furthermore, legitimation may also follow if the development of the emerging industry is expected to lead to new markets for regional sectors. To exemplify, the legitimacy of emerging industries related to biofuel and bioenergy technologies have benefitted from the presence of regional agricultural sectors, which foresee future market opportunities (Hansen et al., 2016).

Spillovers with the industry's development in other geographical contexts

Of particular importance are spillovers from the same industry in other geographical contexts. This follows the recognition that extra-regional (but intra-industrial) relations of various types have been found to play a significant role in multiple contributions on industry path development (e.g., Binz et al., 2016b; Hansen & Coenen, 2015; Isaksen & Trippel, 2017; Murphy, 2015). Such relations can take multiple forms: from actors that are active and tap into different contexts, to network or market relations. Spillovers may also happen indirectly, for example, through highly visible events such as the Fukushima nuclear accident in Japan leading to a phase out of nuclear energy in Germany (Quitrow, 2015). Thus, we conceptualize such spillovers in a broad manner, rather than relate them to specific channels such as value chain relations or divisions of labour within organizations.

The legitimacy of an emerging industry may be positively affected if a regional actor can refer to successful industry development trajectories in other regions, display collaborations with leading actors in frontrunner regions or showcase commercial success in foreign markets. Often, emerging regional industries can benefit from relations to other contexts where the industry is more mature (Bergek et al., 2015).

However, industry legitimation may also be negatively affected by competition from external industry rivals, or by unfortunate industry developments in other contexts. Consequently, regional industry development processes will also be affected by developments happening in other regions and nations, which affect legitimation through multi-scalar relations (Binz et al., 2016b).

Spillovers with the broader political context

The broader political context, which includes aspects such as political ideologies, political culture and policy traditions, impacts the development of emerging industries, most notably in terms of conducive or unfavourable policies and regulations (Bergek et al., 2015; Hess, 2014). However, before policy support materializes for an emerging industry, it needs to be conceived as providing solutions to pertinent problems. Our conceptualization of this process follows Kingdon's (1995) multiple streams framework, which suggests that political agenda-setting processes are influenced by three streams: *the policy stream*, which consists of ideas or solutions that constitute policy alternatives; *the problem stream*, which contains conditions that are generally acknowledged as problematic and in need of government attention; and *the political stream*, which is constituted by aspects such as public opinion and negotiation among political representatives.

An emerging industry can be considered as part of the policy stream as the *raison d'être* is to offer new solutions through the goods or services offered (Normann, 2015). However, whether or not an emerging industry is considered legitimate depends on the coupling to the other streams. Thus, industry legitimacy is positively affected if the solutions answer to important problems that are considered the responsibility of government, and if solutions are in line with public opinion and the interests of political coalitions. Sudden changes in the problem and political streams may create windows of opportunity where this coupling can happen, but windows may also suddenly close. Consequently, the legitimacy of emerging industries to a large extent rely on changes in the problem and political streams (Edmondson et al., 2019; Kingdon, 1995).

Summary

We suggest that developments in a regional industry's legitimacy are particularly influenced by spillovers from four contextual structures: other regional industries, broader regional sectors, the industry's development in other geographical contexts, and the broader political context. Still, in a given period, not all contextual structures will necessarily exercise significant influence on the legitimacy of the emerging industry: spillover from contextual structures may be absent in some development phases. However, in empirical analyses, it is important to be attentive to potential spillovers from the four contextual structures, and how they develop over time.

RESEARCH METHOD

Data collection

The paper uses a qualitative case study approach (Yin, 2013) to study the legitimacy dynamics by reconstructing the long-term development of biogas in the region Scania. We chose to study the biogas industry in Scania for several reasons and provide background information about the industry (see Appendix A in the supplemental data

online). For the details about the data collection process, see Appendix B online.

Data analysis

The paper focuses on analysing the development of biogas in Scania from 1990 to 2018. We describe the development of the regional biogas industry in three distinct phases: phase 1: 1990–2002; phase 2: 2002–13; and phase 3: 2013–18. We describe the process of preparing the case narrative in each phase (see Appendix C in the supplemental data online).

CASE STUDY ANALYSIS

For each of the three phases, we first describe the legitimacy of the biogas industry. Subsequently, we analyse spillovers from contextual structures before finally considering implications for the path development of the biogas industry.

Emergence phase (1990–2002)

The initial activities related to the production and distribution of biogas in Scania began in the late 1980s and early 1990s. In the emergence phase, the legitimacy of the biogas industry was increasing. The archival sources portray biogas as an interesting technology and a promising fuel for the future: ‘For a year the buses have been running biogas, a cleaner fuel than natural gas. The investment is our entrance ticket to an even more environmentally friendly traffic in Skåne’ (Appelqvist, 2000, p. 7). While it was acknowledged that the technology could allow for broader industry development in Scania, the legitimacy of the industry was in this phase primarily connected to the promises of the technology.

At the same time as the gasoline price reached a new record level on Wednesday, Eslöv [city in Scania] showed a passenger car model that can run on biogas. The propellant is made from all compostable material from the waste disposal, including household garbage. The technology represents a relatively new form of gas-powered vehicles.

(*Borås Tidning*, 2000, p. 15)

Spillovers from broader regional sectors

The biogas industry in Scania benefitted from positive spillovers from the *regional energy sector*. Previous financial investments in a well-developed natural gas grid through the western part of the region provided legitimacy for biogas: given the possibility of using existing infrastructure, biogas was promoted as a favourable solution for tackling the problem of urban air pollution. Thus, companies such as German utility E.ON and Scania-based Lunds Energikoncernen, and Öresundskraft could actively showcase their engagement in transitioning towards renewable energy, and this legitimacy facilitated additional investments in infrastructures for upgrading, distribution and selling of biogas (Ericsson et al., 2013; Martin & Martin, 2017; interview 11). As remarked by one interviewee

regarding the presence of supportive infrastructure conditions in the region:

Of course, you have the National Transmission Grid, with the natural gas coming in close to Malmo and going through Scania up north, and also, you have the distribution grids for gas. So, you have this kind of interplay between infrastructure and different opportunities and possibilities.

(interview 8)

Biogas development in the region accelerated also as a result of positive spillovers from the *regional public transport sector*. Given the regional transport provider’s focus on reducing greenhouse gas emissions, reducing traffic noise and improving urban air quality, replacing diesel buses with biogas buses was considered a favourable option (Martin & Coenen, 2015; interviews 3 and 7).

Strong positive spillovers with the *regional agricultural sector* provided further support to the emerging regional biogas industry. Biogas plants were reliant on farm-based substrates and access to waste from local food-manufacturing plants (Ericsson et al., 2013; Martin & Martin, 2017; interview 8). From the viewpoint of the agricultural sector, the emerging biogas industry provided an opportunity for earning additional income by supplying the waste feedstock material, which contributed positively to the industry’s legitimacy.

The *regional waste management sector* also provided positive spillovers to the biogas industry in Scania. The municipalities in the region showed an early interest in expanding the biogas production at water treatment plants into producing biogas, as it helped to reduce the volume of the sewage in the wastewater and the biogas produced from the plants could be used for internal heating production or sold for a profit (Ericsson et al., 2013; interview 10). Municipalities were proactive in steering biogas development by collecting waste from large-scale waste producers such as food producers, slaughterhouses as well as the agricultural farms and using it for biogas production (Ericsson et al., 2013; interview 12).

Implications for the biogas path development

In the first phase (Figure 1), we see positive legitimacy spillovers from the broader regional sectors (agricultural, energy, waste management and public transport) to the regional biogas industry. The biogas industry gained legitimacy by receiving endorsement from different types of biogas value chain stakeholders. The key legitimisation narrative, which supported the development of biogas in this phase, was related to reducing emissions and air pollution in the regional cities and handling waste management problems including waste from food industries, landfill and sewage sludge in the region. In addition, previous investments in gas infrastructure that could be used for biogas were also important in providing legitimacy spillovers from the broader sectors to the emerging biogas industry.

The positive spillovers supported the path development process in various ways. The energy sector provided

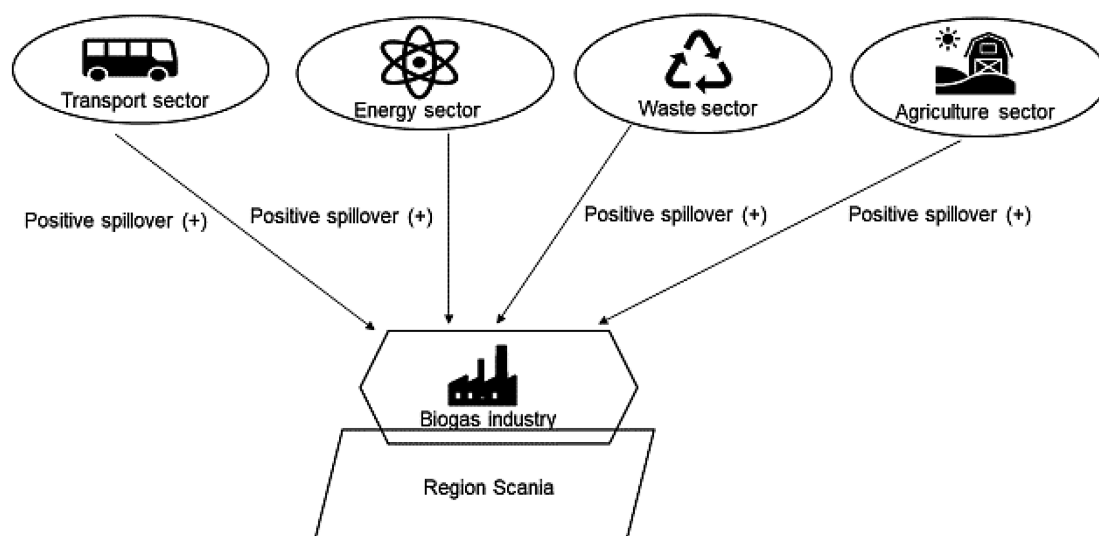


Figure 1. Legitimacy spillovers from contextual structures: emergence phase.

financial support to research and development (R&D) activities in regional universities. The universities established several demonstration and pilot projects, leading to spinoff firms engaged in biogas technology. The energy sector also invested in additional infrastructures for biogas up-gradation, distribution and retail. Finally, actors from the waste management and energy sectors invested in several production facilities, starting from the second half of the 1990s (Ericsson et al., 2013; Martin & Coenen, 2015; Martin & Martin, 2017; interview 11).

Acceleration phase (2002–13)

A further strengthening of the legitimacy of the Scanian biogas industry was evident in the acceleration phase of the industrial development path. In addition to expectations and characteristics related to the technology, the legitimacy of the industry was also connected to the increasing economic importance of the industry:

The number of gas stations for biogas in the county has doubled since 2005. ... There are now 6,125 gas-powered passenger cars rolling on the Scanian roads, which can be compared with 1,343 in 2007. It should be remembered that locally produced biogas serves several good causes. It creates jobs and saves the environment.

(*Sydsvenskan Tematidningar*, 2013, p. 10)

Biogas is not only a matter of environment and climate but also of growth and employment. It is a regional growth area that can benefit the whole of Sweden. The production potential in Skåne of 3 TWh of biogas can drive an incredible 7,500 buses annually, create more than 3,300 jobs and increase regional growth by SEK 6.6 billion.

(*HD*, 2013, p. 3)

Spillovers from the broader political context

During this phase, biogas development benefitted from positive spillovers with the broader political context. In

the problem stream (Kingdon, 1995), the need for tackling greenhouse gas emissions and air pollution in the regional cities was becoming increasingly evident. Simultaneously, political coalitions at various levels of government were formed to support biogas. Consequently, the period starting around 2002 can be considered a window of opportunity for developing the biogas industry, as we witness a coupling between the different streams: the biogas industry provides a credible solution to important societal problems, and supportive political coalitions are formed.

The opening of the window of opportunity happened also due to the presence of positive and the absence of negative side-effects from the solution offered by the biogas industry to the problems of greenhouse gas emissions and air pollution. In addition to job creation, biogas was also seen as contributing to security of energy supply and reduced emissions of eutrophic substances to waterbodies (Ingvarsson, 2003).

As a result of this window of opportunity, promotion of the biogas industry became a political priority at both the local and regional level: several Scanian municipalities became active in promoting biogas to reduce city pollution (Olsson & Falde, 2015); the County Administrative Board of Scania published an environmental action plan (Martin & Coenen, 2015) with a focus on reducing greenhouse gas emissions and highlighting the importance of biogas for the region (interviews 2 and 11); and Region Skåne published a roadmap for biogas (Region Skåne, 2011).

Further, Scanian policy support for biogas was augmented by changes at the European Union (EU) and national level. The EU issued a ban on landfilling of organic waste, quota obligations to promote use of biogas, fuel tax exemptions, and investment grants for biogas production and up-gradation facilities (Ericsson et al., 2013; Olsson & Falde, 2015). At the national level, the Swedish government introduced the Climate Investment Programme (KLIMP) to serve as a complementary effort for meeting the Swedish climate change targets formulated in the Swedish climate bill. KLIMP constituted a seven-year

grant for the period 2002–08 and focused on local initiatives for the reduction of greenhouse gas. Biogas received a large share of the funds (SEK622 million) from the programme because it was considered important for its contribution to regional climate change goals and regional economic development. Nearly half these funds were allocated to projects in Scania (Martin & Coenen, 2015; Tamm & Fransson, 2011; interview 11).

Spillovers from broader regional sectors

The positive spillovers from the regional sectors reported in phase 1 continued to support the biogas industry in phase 2. To exemplify, biogas still allowed actors from the *regional energy sector* to showcase a commitment to locally produced renewable energy, thereby unlocking additional financial investments in biogas. As remarked by two representatives from Lunds Energikoncernen: ‘This is part of our work on locally produced bioenergy. ... We are very proud to be able to help create the conditions for the necessary conversion to fossil-free fuels that must be implemented for future generations’ (Krafringen, 2012). However, related to the developments in the political context described above, the significance of legitimacy spillovers from the *regional public transport sector* increased significantly. In order to live up to the political priorities regarding reduction of emissions of greenhouse gases and improvement of air quality in cities in Scania, the regional public transport operator examined possible alternatives and their economic viability. In this process, biogas quickly emerged as the central vehicle fuel to solve the challenges (Olsson & Falde, 2015; interviews 2 and 11). Further, procuring regionally produced biogas enhanced the environmentally friendly image of the public transport operator, and it was also considered important to invest in one fuel and thereby provide a clear signal for investors to prioritize biogas (Aldenius & Khan, 2017; Martin & Coenen, 2015; Martin & Martin, 2017; interview 4).

Implications for the biogas path development

In the second phase (Figure 2), we see an increase in the legitimacy of the biogas industry in Scania due to positive spillovers from the broader political context and strengthened spillovers from the regional public transport sector. The biogas industry legitimacy in the second phase is related to the opportunities for reducing greenhouse gas emissions and improving air quality in Scania cities, but also job creation in the industry, improved security of energy supply and reduced emissions of eutrophic substances.

These positive spillovers supported the path development process in various ways. The legitimacy of biogas stimulated biogas market creation, for example, through decisions by the regional council to use biogas-powered cars for its fleet to promote biogas development (Ericsson et al., 2013), and by the use of procurement requirements, which specified parameters aimed at prioritizing biogas over other renewable fuels (Aldenius & Khan, 2017; interviews 3 and 4). The institutionalization of the industry was strengthened by the formation in 2005 of a regional biogas association, Biogas Syd, consisting of public and private

actors aiming to support the biogas industry in Scania (Martin & Coenen, 2015; interview 12). Finally, due to the positive endorsements from key regional actors and the resulting stable market conditions for the biogas industry, financial investments from private actors also continued in several different types of production facilities, from land-fill and wastewater treatment plants to farm-scale plants.

Decline phase (2013–18)

Following positive developments towards 2013, the legitimacy of the biogas industry declined rapidly in the following years. Voices started questioning the energy efficiency of biogas, and negative expectations towards the industrial development prospects stand in stark contrast to the exceedingly positive outlooks presented a few years earlier.

Biogas is in decline in many places (even if not all). The main reason is the – relative to other alternatives – low energy efficiency.

(Ecotraffic, 2015, p. xii (xxix))

They are afraid that the biogas producers will end up in the same situation as in Jordberga outside Trelleborg. Skåne’s largest biogas plant no longer has any Swedish customers but must export the gas. It’s a pure loss business.

(Johansen, 2017, p. 21)

Spillovers from other regional industries

The regional biogas industry experienced negative spillovers from another regional industry: electric transport. The sudden presence of a directly competing industrial pathway had significant negative consequences for the legitimacy of the biogas industry: biogas was suddenly considered an old and outdated technology. Despite biogas being promoted as a significant contributor to the regional economy, its use was concentrated in the public transport sector, with only smaller niche markets in cars, tractors and trucks. Within manufacturing, the use of biogas was limited due to its high cost compared with natural gas, as manufacturing paid limited energy and carbon dioxide tax (interviews 5 and 11). Consequently, as remarked by an interviewee: ‘the biogas business, they haven’t succeeded in finding any other customers. So, you only have one customer, and that’s the Skånetrafiken’ (interview 1). From this position, the biogas industry lost legitimacy as the electric transport industry could showcase solutions with higher energy efficiency, lower emissions and reduced noise. These advantages were particularly important when operating in urban environments, which constituted a central application domain for biogas (Mutter, 2019; interviews 3, 4 and 12). Thus, the legitimacy of the biogas industry declined when the characteristics of biogas technology were compared with electric vehicles. As suggested by an interviewee: ‘Biogas is something old technique, that is not good. We must learn something new, for example, more fun, new technology, something more interesting’ (interview 5).

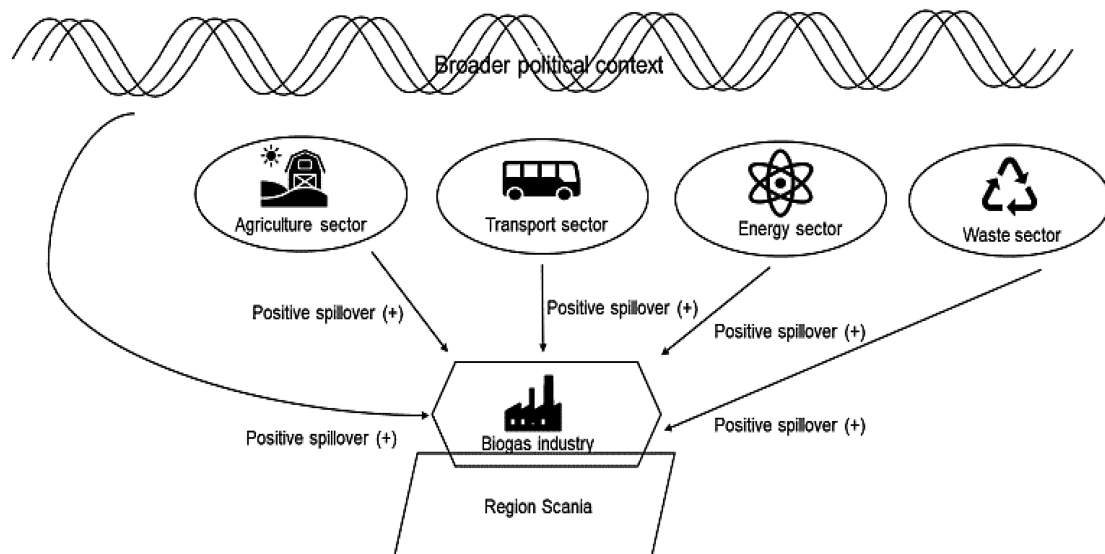


Figure 2. Legitimacy spillovers from contextual structures: acceleration phase.

Spillovers from the industry's development in other geographical contexts

The regional biogas industry experienced negative spillovers from the industry's development in Denmark. The Danish biogas industry developed rapidly during this period, and exports to Sweden grew significantly. In Denmark, production subsidies were provided for biogas, while Sweden subsidized the consumption of biogas. As the result, the Danish biogas producers benefitted from double subsidies when selling on the Swedish market (Smith, 2017; Afvall Sverige, 2017; interviews 4 and 12). 'Swedish biogas is plagued by murderous competition – imported biogas benefits from subsidies both in Sweden and in the country of production. For the largest biogas plant in Sweden, in Jordberga in southern Skåne, the future is uncertain right now' (HD, 2017).

As remarked by one interviewee, the problem of cheap import of biogas from Denmark was anticipated by stakeholders in Scania, but it did not lead to a proactive response from legislators.

[W]e've said for so many years that the Danish biogas would become a problem and nothing has happened until it happened to someone in the Stockholm region. Yes. Especially here in Scania; we've said it for a lot of years that this situation, it's difficult.

(interview 12)

Spillovers from the broader political context

After 2013, positive spillovers from the broader political context were weakened significantly. The problem stream remained stable with the challenge of limiting greenhouse gas emissions taking up a prominent position; however, changes happened in the political stream where the possibilities for forming broad coalitions in support of biogas narrowed. Consequently, with the decoupling of the streams, the window of opportunity for biogas closed and its privileged position on the political agenda was lost.

The changes in the political stream were clearly connected to the entry of electric transport as a rivalling solution in the policy stream: offering even more convincing solutions to the problem of climate change than biogas, politicians were increasingly agreeing on the attractiveness of electric transport solutions. As remarked by one interviewee:

So, many of the politicians that before discussed biogas, they are not talking about biogas any longer. They are only talking about electricity, and as the Swedish electricity market is, what they believe, rather green, everyone thinks that it's perfect with ... with electricity, and I think it's a good product, but it doesn't solve all the problems. But the politicians have moved from being very positive to biogas to be still positive to biogas, but they have a lot of other alternatives instead.

(interview 9)

Consequently, despite actions from actors within the region such as the biogas interest organization, BiogasSyd, which attempted to maintain and promote the framework conditions for the biogas industry, the political prioritization of the biogas industry declined. Municipalities and regional authorities prioritized investments in pilot projects and infrastructures for electric buses, and changed the favourable (for biogas) procurement criteria, even in cities, which were self-sufficient in biogas (*Bussmagasinet*, 2018). In the eyes of Scanian biogas proponents, biogas was unfairly compared with alternative options, as the focus was only on greenhouse gas emissions and noise reduction potential, and not considering the wider socio-economic benefit of biogas for a transition to a circular regional economy (interview 5).

Again, these developments were in accordance with changes at the national level, as the Swedish electric vehicle industry increasingly benefitted from support provided by the Swedish government in terms of industrial policies, subsidies, funds for research and development

and setting up of new demonstration projects (Magnusson & Berggren, 2018).

The government allocates a total of SEK 350 million in a special premium for buses that run entirely or partly on electricity. Biogas buses, with the same climate benefit, get zero. Also, the Environmental Party's initiative, 'the urban environment agreement', is almost exclusively supporting tramways and electric buses. The result is not only that the competition is distorted, but also that the biogas plants risk losing the public transport sector as a user of the gas.

(*Dagens Samhälle*, 2017, n.p.)

Furthermore, despite recognition of the problem following from the lack of harmonization of Swedish policy support for biogas with other EU countries (Energigas Sverige, 2018), the politicians did not act swiftly (interviews 6 and 12). As suggested by an interviewee:

[W]e can't wait till 2020. Because if we wait till 2020 ... we will have a couple of years where we don't have any subsidies and the risk then, is that the entire biogas sector will collapse because we need to have something, unfortunately. We are fairly dependent on subsidies as the market looks right now. So, from our perspective, it's very much trying to get the national politicians to start moving and start looking at it.

(interview 12)

Implications for the biogas path development

In the third phase (Figure 3), we see a decrease in the legitimacy of the regional biogas industry due to negative spillovers from the electric transport industry and the biogas industry in Denmark. Further, positive spillovers from the broader political context were strongly reduced. The biogas industry's legitimacy suffers from the emergence of competing technologies, but also from decreasing expectations for the future role of the industry in regional

economic development and in meeting regional reduction goals regarding greenhouse gas emissions.

The negative development had significant consequences for the path development process. The market for biogas was hurt as the exclusive focus on procuring biogas for buses was replaced by a more diversified focus in public procurement on different types of renewable fuels (Khan et al., 2017; interview 4). Financial support for infrastructure investments was limited as no replacement programme for the KLIMP programme was initiated (Martin & Martin, 2017), and public authorities increasingly supported infrastructure and testing of electric buses rather than biogas (Aldenius et al., 2016). Finally, investments in biogas plants in Scania were put on hold due to the increasing political risk associated with the uncertainty concerning future policy incentives for biogas (interview 10).

DISCUSSION

We summarize the legitimacy spillovers from the contextual structures in the three phases (see Appendix D in the supplemental data online). While the analysis focuses on the role of legitimacy for the path development process of the biogas industry, we do not suggest that legitimacy dynamics fully determined the development path of the industry. Following Binz et al. (2016b), path development trajectories can be considered as conditioned by resource formation processes relating to knowledge, markets, financial investments and legitimacy. Thus, legitimacy is just one of the resources needed for path development processes. In the case of the Scanian biogas industry, initially, legitimacy was supported by previous financial investments in infrastructures that could also be used for biogas. However, subsequently, legitimacy was essential in facilitating formation and destruction of the other types of resources. In the formation and acceleration phases, the legitimacy of the biogas industry led actors from the broader regional sectors to invest in biogas infrastructure and knowledge

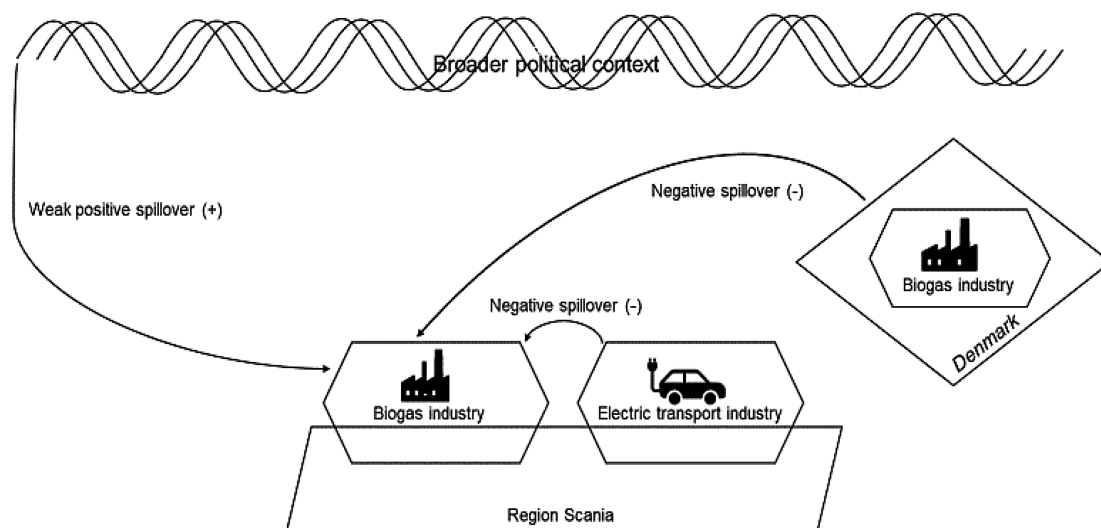


Figure 3. Legitimacy spillovers from contextual structures: decline phase.

creation, and supported the formation of biogas markets. Similarly, in the decline phase, the decrease in legitimacy implied that biogas investments were stopped and biogas markets were disappearing.

Considering the general emphasis in EEG on availability of knowledge as the central resource for explaining the success of new industry development paths, we suggest that this is an important insight for the literature. Drawing on the work of Suurs (2009), we propose that there can be different ‘motors’ of path development processes. In some cases, knowledge creation may drive industry development, but knowledge creation may also happen as a response to, for example, the formation of niche markets or the legitimacy of an emerging industry. In the case of biogas in Scania, industry legitimacy was a central motor for industry development in the emergence and acceleration phases, which facilitated the formation of other resources: markets, capital and knowledge. When industry legitimacy weakened, the other resources formation processes were harmed and the industry went into a decline phase.

We suggest that this insight has important implications for our understanding of dark phases of regional path development processes. Contrary to existing studies focused on sunset industries in old industrial regions, we analyse path decline in the case of a recently established industry. While our study does not allow for drawing firm conclusions concerning differences in sources of path decline across the industry life-cycle, we do note that studies of the development of sunset industries highlight the central importance of knowledge and competences in explaining cases of decline and reinvigoration (e.g., Isaksen, 2015; Isaksen et al., 2019; Trippel & Otto, 2009), while our study follows other recent contributions highlighting the role of legitimacy in the development of emerging industries. Arguably, legitimacy is particularly important for emerging industries, which suffer from *liability of newness* (Binz et al., 2016a; Gong, 2020). From a policy perspective, this indicates the need for attention to legitimacy dynamics in sustaining the development of emerging industries and avoiding phases of decline.

The analysis highlights that such policy efforts should pay attention to development in the multiple contexts that may produce legitimacy spillovers to the focal industry. Thus, supporting legitimacy creation requires constant attention to the relations of the industry with the external contexts. For industry proponents, this will for instance entail adjustments of industry narratives as changes happen in the problem and political streams. Various forms of institutional work, including mimicry and imagery, can be employed to achieve this purpose (Binz et al., 2016a). However, promoting industry legitimacy may also entail deliberate efforts aimed at delegitimizing developments in other industries and geographical contexts that result in negative legitimacy spillovers (Lee & Hess, 2019). Attention to the construction of counternarratives is possibly particularly important for avoiding phases of path decline. While it can be debated whether it is the role of public policy to support such efforts, they are likely of significant importance for regional industrial path development.

In the analysis, we have focused on the contextual structures as sources of legitimacy spillovers; however, a complete analysis of the role of legitimacy in path development processes would also necessitate attention to agency and the role of institutional entrepreneurs in shaping contextual structures (Gong, 2019). Consequently, the paper is complementary to the recent emphasis in the path development literature on the role of agency, actors and strategic activities in such processes (Binz et al., 2016a; Gong, 2019; Jolly et al., 2020; MacKinnon et al., 2019). Thus, following Martin and Sunley (2015, p. 721), our analysis is focusing ‘upward’ and ‘outward’ towards the constraining and facilitating role of contextual structures, rather than ‘downward’ on the role of agency and purposive action by regional actors.

Finally, this study complements existing research on development of the biogas industry, in particular Martin and Coenen (2015) and Martin and Martin (2017), which also focus on Scania. Our analysis supports core findings of these papers, in particular concerning the role played by the Scanian agriculture and energy sectors as well as political support at various governmental levels for the development of the biogas industry. However, as we analyse an extended time period, this paper has the possibility of providing an updated and more nuanced account of the development of the Scanian biogas industry.

The present analysis also relates to previous research on biogas development in different geographical contexts. These studies highlight how the absence or presence of symbiotic relationships with multiple established sectors matter significantly for the development of biogas. Smink et al. (2015), Sutherland et al. (2015) and Markard et al. (2016) all illustrate that conflicting interests between, for example, the agriculture and energy sectors may significantly limit the development of the biogas industry. Markard et al. (2016) conclude that conflicting institutional demands between the energy sector and the agriculture sector were central to understand the loss of legitimacy of biogas in Germany. In our analysis, we did not identify conflicting interests between established sectors. Rather, the analysis highlights that spillovers from multiple contextual structures (including, but not limited to, established sectors) influenced the legitimacy of the biogas industry in Scania.

CONCLUSIONS

This paper started from the observation that limited attention has been given to failures and dark phases of path development processes (Blažek et al., 2019; Phelps et al., 2018; Rodríguez-Pose, 2018), in particular beyond the difficulties of industry diversification in old industrial regions. Further, to the extent that research has considered cases of failure, this is frequently attributed to insufficient competences (Isaksen, 2015, 2018). Drawing on the insight of Binz et al. (2016b) that path development processes are conditioned by formation processes of multiple types of resources, specifically knowledge, markets, financial investments and legitimacy, we focus on the role of industry legitimacy for emerging industrial paths. We suggest that

path development processes are influenced by legitimacy spillovers from multiple contextual structures, which may be of significant importance for both bright and dark phases of path development processes. In this, we explicitly consider both regional and non-regional processes that shape regional industrial path development trajectories (MacKinnon et al., 2019; Martin & Sunley, 2015).

The empirical analysis of the development of the biogas industry in Scania extends previous studies of this specific case (Martin & Coenen, 2015; Martin & Martin, 2017). Previously considered a successful case of path development, the industry in recent years has suffered from declining legitimacy, which in turn has led to negative developments in other resource formation processes. Summarizing the findings, we show that positive legitimacy spillovers from broader regional sectors and the political context played central roles in the emergence and acceleration phases of the industry, while negative legitimacy spillovers from the electric vehicle industry and the Danish biogas industry, as well as weakened positive spillovers from the political context, were central in the decline phase.

Given the very limited attention in the literature to dark phases of path development processes, this study adds to the understanding of sources of decline, beyond sunset industries in old industrial regions. Specifically, the analysis highlights how already accumulated resources in the form of knowledge, markets and previous investments were insufficient to prevent industry decline when legitimacy was lost. This indicates that legitimacy dynamics play a central role for understanding decline in the case of emerging industries. Further, it highlights the need for attention to legitimacy spillovers from different contexts, but also how actors may pursue strategies for enhancing positive and preventing negative spillovers.

Based on the analysis and discussion, we suggest three topics for future research. First, while previous studies have identified conflicting legitimacy demands from the contextual structures in studies of the biogas industry (e.g., Markard et al., 2016), we did not identify this in our case. However, future research may consider the implications of such conflicts for path development processes and in particular the possibilities for actors to develop institutional strategies that overcome such challenges. This would complement existing work on micro-processes of agency and the institutional work needed for legitimizing new and emerging industries and, in particular, coping with legitimacy loss (Binz et al., 2016a; Gong, 2020).

Second, the influence of legitimacy spillovers from contextual structures may vary between different types of path development processes. In particular, the legitimacy of industries that are 'new to the world' may be influenced by different contextual structures than industries that are 'new to the region' (Binz, 2019). Future studies may analyse this using comparative research designs.

Third, this paper is one of the few studies so far on the decline and dark phases of path development processes. Consequently, additional knowledge is needed on the characteristics of such dark phases, their triggering factors and the possibilities for policy to address the causes.

ACKNOWLEDGEMENTS

The authors are grateful to all the interviewees who dedicated their valuable time to this research. They are also thankful to the three anonymous reviewers and the editor for the valuable comments and constructive suggestions for improving the paper.

DISCLOSURE STATEMENT

No potential conflict of interest was reported by the authors.

FUNDING

This research work was carried out within the Geography of Nordic Sustainability Transitions (GONST) project, funded by the Nordic Green Growth Research and Innovation Programme in cooperation with NordForsk [grant number 83130].

NOTE

1. Work on technological innovation systems has provided important insights into the dynamics of technology legitimacy and suggested that its development is influenced by multiple contextual structures (Andersen & Markard, 2020; Bergek et al., 2015; De Oliveira & Negro, 2019; Markard et al., 2015).

ORCID

Suyash Jolly  <http://orcid.org/0000-0001-9771-930X>
Teis Hansen  <http://orcid.org/0000-0001-9383-3471>

REFERENCES

- Afvall Sverige. (2017). *Utredning och analys av lämpliga styrmedel för svenskproducerad biogas efter 2020*. Report No. 2017:33. https://www.avfallsverige.se/kunskapsbanken/rapporter/rapportera/?tx_news_pi1%5Bcontroller%5D=News&tx_news_pi1%5Baction%5D=detail&tx_news_pi1%5Bnews%5D=1894&cHash=e22636c76eac495a1031a238cc877eda
- Aldenius, M., Forsström, E., Khan, J., & Nikoleris, A. (2016). *Elektrifiering av stadsbussar – En genomgång av erfarenheter i Sverige och Europa*. K2 Working Papers 2016:12. https://lup.lub.lu.se/search/ws/files/37941174/elektrifiering_av_stadsbussar_k2_wp_2016_12.pdf
- Aldenius, M., & Khan, J. (2017). Strategic use of green public procurement in the bus sector: Challenges and opportunities. *Journal of Cleaner Production*, 164, 250–257. <https://doi.org/10.1016/j.jclepro.2017.06.196>
- Aldrich, H. E., & Fiol, C. M. (1994). Fools rush in? The institutional context of industry creation. *Academy of Management Review*, 19(4), 645–670. <https://doi.org/10.5465/amr.1994.9412190214>
- Andersen, A. D., & Markard, J. (2020). Multi-technology interaction in socio-technical transitions: How recent dynamics in HVDC technology can inform transition theories. *Technological Forecasting and Social Change*, 151, 119802. <https://doi.org/10.1016/j.techfore.2019.119802>

- Andersson, K. (2017). *Rädda biogasen från attacker från Danmark och övriga EU*. <https://www.svebio.se/press/blogginlagg/radda-biogasen-fran-attacker-fran-danmark-och-ovriga-eu/>
- Appelqvist, L. (2000, July 23). Malmö bäst på miljövänliga bussar. *Sydsvenskan*. <http://emedialub.lu.se/db/info/499>
- Bergek, A., Hekkert, M., Jacobsson, S., Markard, J., Sandén, B., & Truffer, B. (2015). Technological innovation systems in contexts: Conceptualizing contextual structures and interaction dynamics. *Environmental Innovation and Societal Transitions*, 16, 51–64. <https://doi.org/10.1016/j.eist.2015.07.003>
- Binz, C. (2019, May 22). Legitimation dynamics in industrial path development: new-to-the-region versus new-to-the-world industries. Paper presented at the CIRCLE Seminar. <http://www.design.lth.se/kalendarium/?event=circle-seminar-series-christian-binz-eawag-circle>
- Binz, C., Harris-Lovett, S., Kiparsky, M., Sedlak, D. L., & Truffer, B. (2016a). The thorny road to technology legitimation – Institutional work for potable water reuse in California. *Technological Forecasting and Social Change*, 103, 249–263. <https://doi.org/10.1016/j.techfore.2015.10.005>
- Binz, C., Truffer, B., & Coenen, L. (2016b). Path creation as a process of resource alignment and anchoring: Industry formation for on-site water recycling in Beijing. *Economic Geography*, 92(2), 172–200. <https://doi.org/10.1080/00130095.2015.1103177>
- Blažek, J., Květoň, V., Seiringer, S. B., & Tripl, M. (2019). The dark side of regional industrial path development: Towards a typology of trajectories of decline. *European Planning Studies*. <https://doi.org/10.1080/09654313.2019.1685466>
- Borås Tidning. (2000, May 18). Saab visar upp biogasdriven bil. *Borås Tidning*. <http://emedialub.lu.se/db/info/499>
- Boschma, R. A., & Frenken, K. (2006). Why is economic geography not an evolutionary science? Towards an evolutionary economic geography. *Journal of Economic Geography*, 6(3), 273–302. <https://doi.org/10.1093/jeg/lbi022>
- Bussmagasinet. (2018). Skåne i elektrisk ledning. *Bussmagasinet*. <https://www.bussmagasinet.se/2018/12/skane-i-elektrisk-ledning/>
- Cho, M. R., & Hassink, R. (2009). The limits to locking out through restructuring: The textile industry in Daegu, South Korea. *Regional Studies*, 43(9), 1183–1198. <https://doi.org/10.1080/00343400802171973>
- Dagens Samhälle. (2017). Gynna biogas på riktigt genom konkret politik. *Dagens Samhälle*. <https://www.dagenssamhalle.se/debatt/gynna-biogas-pa-riktigt-genom-konkret-politik-31891>
- De Oliveira, L. G. S., & Negro, S. O. (2019). Contextual structures and interaction dynamics in the Brazilian biogas innovation system. *Renewable and Sustainable Energy Reviews*, 107, 462–481. <https://doi.org/10.1016/j.rser.2019.02.030>
- Deephouse, D. L., Bundy, J., Tost, L. P., & Suchman, M. C. (2017). Organizational legitimacy: Six key questions. In R. Greenwood, C. Oliver, T. B. Lawrence, & R. E. Meyer (Eds.), *The SAGE handbook of organizational institutionalism* (2nd ed., pp. 27–54). SAGE.
- Deephouse, D. L., & Suchman, M. C. (2008). Legitimacy in organizational institutionalism. In R. Greenwood, C. Oliver, K. Sahlin, & R. Suddaby (Eds.), *The SAGE handbook of organizational institutionalism* (pp. 49–77). Sage.
- Desai, V. (2011). Mass media and massive failures: Determining organizational efforts to defend the field's legitimacy following crises. *Academy of Management Journal*, 54(2), 263–278. <https://doi.org/10.5465/amj.2011.60263082>
- Ecotraffic. (2015). *Kunskapsammansättning – EURO VI stadsbussar. En rapport för Trafikverket*. Report No, 157078. http://www.ecotraffic.se/media/10543/rapport_7078_-_kunskapspm-euro_vi-stadsbussar_final.pdf
- Edmondson, D. L., Kern, F., & Rogge, K. S. (2019). The co-evolution of policy mixes and socio-technical systems: Towards a conceptual framework of policy mix feedback in sustainability transitions. *Research Policy*, 48(10), 103555. <https://doi.org/10.1016/j.respol.2018.03.010>
- Energigas Sverige. (2018). *National biogas strategy, 2.0*. www.energigas.se/library/2303/national-biogas-strategy-2_0.pdf
- Ericsson, K., Nikoleris, A., & Nilsson, L. J. (2013). *The biogas value chain in the Swedish region of Skåne*. Environmental and Energy System Studies, Lund University.
- Fisher, G., Kotha, S., & Lahiri, A. (2016). Changing with the times: An integrated view of identity, legitimacy and new venture life cycles. *Academy of Management Review*, 41(3), 383–409. <https://doi.org/10.5465/amr.2013.0496>
- Frankenheim, A., Tripl, M., & Chlebna, C. (2020). Beyond the 'single path view': Inter-path relationships in regional contexts. *Economic Geography*, 96(1), 31–51. <https://doi.org/10.1080/00130095.2019.1685378>
- Garud, R., Lant, T. K., & Schildt, H. A. (2019). Generative imitation, strategic distancing and optimal distinctiveness during the growth, decline and stabilization of Silicon Alley. *Innovation*, 21(1), 187–213. <https://doi.org/10.1080/14479338.2018.1465822>
- Gong, H. (2019). *Structure and agency in local path development: A comparative study of the online games industry in Shanghai and Hamburg*. https://macau.uni-kiel.de/receive/diss_mods_00026081
- Gong, H. (2020). Multi-scalar legitimation of a contested industry: A case study of the Hamburg video games industry. *Geoforum: Journal of Physical, Human, and Regional Geosciences*, 114, 1–9. <https://doi.org/10.1016/j.geoforum.2020.05.005>
- Grabher, G. (1993). The weakness of strong ties: The lock-in of regional development in the Ruhr area. In G. Grabher (Ed.), *The embedded firm: On the socioeconomics of industrial networks* (pp. 255–277). Routledge.
- Grillitsch, M., & Asheim, B. (2018). Place-based innovation policy for industrial diversification in regions. *European Planning Studies*, 26(8), 1638–1662. <https://doi.org/10.1080/09654313.2018.1484892>
- Grillitsch, M., & Hansen, T. (2019). Green industry development in different types of regions. *European Planning Studies*, 27(11), 2163–2183. <https://doi.org/10.1080/09654313.2019.1648385>
- Haack, P., Pfarrer, M., & Scherer, A. G. (2014). Legitimacy-as-feeling: How affect leads to vertical legitimacy spillovers in transnational governance. *Journal of Management Studies*, 51(4), 634–666. <https://doi.org/10.1111/joms.12071>
- Hansen, T., & Coenen, L. (2015). The geography of sustainability transitions: Review, synthesis and reflections on an emergent research field. *Environmental Innovation and Societal Transitions*, 17, 92–109. <https://doi.org/10.1016/j.eist.2014.11.001>
- Hansen, U. E., Fold, N., & Hansen, T. (2016). Upgrading to lead firm position via international acquisition: Learning from the global biomass power plant industry. *Journal of Economic Geography*, 16(1), 131–153. <https://doi.org/10.1093/jeg/lbu050>
- Hanson, J. (2018). Established industries as foundations for emerging technological innovation systems: The case of solar photovoltaics in Norway. *Environmental Innovation and Societal Transitions*, 26, 64–77. <https://doi.org/10.1016/j.eist.2017.06.001>
- Hassink, R., Isaksen, A., & Tripl, M. (2019). Towards a comprehensive understanding of new regional industrial path development. *Regional Studies*, 53(11), 1636–1645. <https://doi.org/10.1080/00343404.2019.1566704>
- HD. (2013, January 17). Krafttag för biogasen i Skåne och Sverige. *HD*. <https://www.hd.se/2013-01-17/krafttag-for-biogasen-i-skane-och-sverige>
- HD. (2017, March 16). Sverige subventionerar importerad biogas. *HD*. <https://www.hd.se/2017-03-16/sverige-subventionerar-importerad-biogas>
- Hess, D. J. (2014). Sustainability transitions: A political coalition perspective. *Research Policy*, 43(2), 278–228. <https://doi.org/10.1016/j.respol.2013.10.008>

- Ingvarsson, A. (2003). *Good for the environment if the farmer invests in biogas*. <https://www.atl.nu/lantbruk/bra-for-miljon-om-bonden-satsar-pa-biogas/>
- Isaksen, A. (2015). Industrial development in thin regions: Trapped in path extension? *Journal of Economic Geography*, 15(3), 585–600. <https://doi.org/10.1093/jeg/lbu026>
- Isaksen, A. (2018). From success to failure, the disappearance of clusters: A study of a Norwegian boat-building cluster. *Cambridge Journal of Regions, Economy and Society*, 11(2), 241–255. <https://doi.org/10.1093/cjres/rsy007>
- Isaksen, A., Jakobsen, S. E., Njøs, R., & Normann, R. (2019). Regional industrial restructuring resulting from individual and system agency. *Innovation: European Journal of Social Science Research*, 32(1), 48–65. <https://doi.org/10.1080/13511610.2018.1496322>
- Isaksen, A., & Trippel, M. (2017). Exogenously led and policy-supported new path development in peripheral regions: Analytical and synthetic routes. *Economic Geography*, 93(5), 436–457. <https://doi.org/10.1080/00130095.2016.1154443>
- Johansen, C. (2017, December 2). Regionala tungviktare vill rädda biogasproduktionen. *Kristianstadsbladet*. <https://www.kristianstadsbladet.se/kristianstad/regionala-tungviktare-vill-radda-biogasen/>
- Jolly, S., Grillitsch, M., & Hansen, T. (2020). Agency and actors in regional industrial path development. A framework and longitudinal analysis. *Geoforum: Journal of Physical, Human, and Regional Geosciences*, 111, 176–188. <https://doi.org/10.1016/j.geoforum.2020.02.013>
- Karnøe, P., & Garud, R. (2012). Path creation: Co-creation of heterogeneous resources in the emergence of the Danish wind turbine cluster. *European Planning Studies*, 20(5), 733–752. <https://doi.org/10.1080/09654313.2012.667923>
- Khan, J., Aldenius, M., Norinder, H., Palm, J., & Backman, F. (2017). *Grön offentlig upphandling i transportsektorn*. Swedish Knowledge Centre for Renewable Transportation Fuels (f3).
- Kingdon, J. (1995). *Agendas, alternatives, and public policies*. HarperCollins College.
- Kostova, T., & Zaheer, S. (1999). Organizational legitimacy under conditions of complexity: The case of multinational enterprise. *Academy of Management Review*, 24(1), 64–81. <https://doi.org/10.5465/amr.1999.1580441>
- Kraffringens. (2012). *Lund Energy Group applies to build biogas plant in Dalby*. <http://www.mynewsdesk.com/se/kraffringens/pressreleases/lunds-energikoncernen-ansoeker-om-att-bygga-biogasverk-i-dalby-775567>
- Kuilman, J. G., & Li, J. (2009). Grades of membership and legitimacy spillovers: Foreign banks in Shanghai, 1847–1935. *Academy of Management Journal*, 52(2), 229–245. <https://doi.org/10.5465/amj.2009.37308018>
- Kwak, K., & Yoon, H. (2020). Unpacking transnational industry legitimacy dynamics, windows of opportunity, and latecomers' catch-up in complex product systems. *Research Policy*. <https://doi.org/10.1016/j.respol.2020.103954>
- Lee, D., & Hess, D. J. (2019). Incumbent resistance and the solar transition: Changing opportunity structures and framing strategies. *Environmental Innovation and Societal Transitions*, 33, 183–195. <https://doi.org/10.1016/j.eist.2019.05.005>
- MacKinnon, D., Dawley, S., Pike, A., & Cumbers, A. (2019). Rethinking path creation: A geographical political economy approach. *Economic Geography*, 95(2), 113–135. <https://doi.org/10.1080/00130095.2018.1498294>
- Magnusson, T., & Berggren, C. (2018). Competing innovation systems and the need for redeployment in sustainability transitions. *Technological Forecasting and Social Change*, 126, 217–230. <https://doi.org/10.1016/j.techfore.2017.08.014>
- Mäkitie, T., Andersen, A. D., Hanson, J., Normann, H. E., & Thune, T. M. (2018). Established sectors expediting clean technology industries? The Norwegian oil and gas sector's influence on offshore wind power. *Journal of Cleaner Production*, 177, 813–823. <https://doi.org/10.1016/j.jclepro.2017.12.209>
- Malerba, F. (2002). Sectoral systems of innovation and production. *Research Policy*, 31(2), 247–264. [https://doi.org/10.1016/S0048-7333\(01\)00139-1](https://doi.org/10.1016/S0048-7333(01)00139-1)
- Markard, J., Hekkert, M., & Jacobsson, S. (2015). The technological innovation systems framework: Response to six criticisms. *Environmental Innovation and Societal Transitions*, 16, 76–86. <https://doi.org/10.1016/j.eist.2015.07.006>
- Markard, J., & Hoffmann, V. H. (2016). Analysis of complementarities: Framework and examples from the energy transition. *Technological Forecasting and Social Change*, 111, 63–75. <https://doi.org/10.1016/j.techfore.2016.06.008>
- Markard, J., Wirth, S., & Truffer, B. (2016). Institutional dynamics and technology legitimacy – A framework and a case study on biogas technology. *Research Policy*, 45(1), 330–344. <https://doi.org/10.1016/j.respol.2015.10.009>
- Martin, H., & Coenen, L. (2015). Institutional context and cluster emergence: The biogas industry in Southern Sweden. *European Planning Studies*, 23(10), 2009–2027. <https://doi.org/10.1080/09654313.2014.960181>
- Martin, H., & Martin, R. (2017). Policy capacities for new regional industrial path development – The case of new media and biogas in southern Sweden. *Environment and Planning C: Politics and Space*, 35(3), 518–536. <https://doi.org/10.1177/0263774X16665845>
- Martin, R., & Sunley, P. (2006). Path dependence and regional economic evolution. *Journal of Economic Geography*, 6(4), 395–437. <https://doi.org/10.1093/jeg/lbl012>
- Martin, R., & Sunley, P. (2015). Towards a developmental turn in evolutionary economic geography? *Regional Studies*, 49(5), 712–732. <https://doi.org/10.1080/00343404.2014.899431>
- Maskell, P., & Malmberg, A. (2007). Myopia, knowledge development and cluster evolution. *Journal of Economic Geography*, 7(5), 603–618. <https://doi.org/10.1093/jeg/lbm020>
- Murphy, J. T. (2015). Human geography and socio-technical transition studies: Promising intersections. *Environmental Innovation and Societal Transitions*, 17, 73–91. <https://doi.org/10.1016/j.eist.2015.03.002>
- Mutter, A. (2019). Obduracy and change in urban transport – Understanding competition between sustainable fuels in Swedish municipalities. *Sustainability*, 11(21), 6092. <https://doi.org/10.3390/su11216092>
- Neffke, F., Henning, M., & Boschma, R. (2011). How do regions diversify over time? Industry relatedness and the development of new growth paths in regions. *Economic Geography*, 87(3), 237–265. <https://doi.org/10.1111/j.1944-8287.2011.01121.x>
- Njøs, R., Sjøtun, S. G., Jakobsen, S. E., & Fløysand, A. (2020). Expanding analyses of path creation: Interconnections between territory and technology. *Economic Geography*, 96(3), 266–288. <https://doi.org/10.1080/00130095.2020.1756768>
- Normann, H. E. (2015). The role of politics in sustainable transitions: The rise and decline of offshore wind in Norway. *Environmental Innovation and Societal Transitions*, 15, 180–193. <https://doi.org/10.1016/j.eist.2014.11.002>
- Olsson, L., & Falde, M. (2015). Waste(d) potential: A socio-technical analysis of biogas production and use in Sweden. *Journal of Cleaner Production*, 98, 107–115. <https://doi.org/10.1016/j.jclepro.2014.02.015>
- Phelps, N., Atienza, M., & Arias, M. (2018). An invitation to the dark side of economic geography. *Environment and Planning A: Economy and Space*, 50(1), 236–244. <https://doi.org/10.1177/0308518X17739007>
- Quitrow, R. (2015). Dynamics of a policy-driven market: The co-evolution of technological innovation systems for solar photovoltaics in China and Germany. *Environmental Innovation and Societal Transitions*, 17, 126–148. <https://doi.org/10.1016/j.eist.2014.12.002>

- Rao, H. (2004). Institutional activism in the early American automobile industry. *Journal of Business Venturing*, 19(3), 359–384. [https://doi.org/10.1016/S0883-9026\(03\)00036-3](https://doi.org/10.1016/S0883-9026(03)00036-3)
- Region Skåne. (2011). *Skåne—den ledande biogas regionen 2020, Färdplanen* [Skåne – The leading biogas region 2020, the roadmap].
- Rodríguez-Pose, A. (2018). Commentary: The revenge of places that don't matter (and what to do about it). *Cambridge Journal of Regions, Economy and Society*, 11(1), 189–209. <https://doi.org/10.1093/cjres/rsx024>
- Sandén, B. A., & Hillman, K. M. (2011). A framework for analysis of multi-mode interaction among technologies with examples from the history of alternative transport fuels in Sweden. *Research Policy*, 40(3), 403–414. <https://doi.org/10.1016/j.respol.2010.12.005>
- Schmidt, V. K., dos Santos, D. A. G., Zen, A. C., Bittencourt, B. A., & Belussi, F. (2020). Trajectory dependence, lock-in effect, and cluster decline: A case study of the footwear cluster in Sinos-Paranhana Valley. *Latin American Business Review*. <https://doi.org/10.1080/10978526.2020.1770607>
- Smink, M., Negro, S. O., Niesten, E., & Hekkert, M. P. (2015). How mismatching institutional logics hinder niche–regime interaction and how boundary spanners intervene. *Technological Forecasting and Social Change*, 100, 225–237. <https://doi.org/10.1016/j.techfore.2015.07.004>
- Smith, K. S. (2017). *Interpellation 2017/18: 235 Biogas*. riksdagen.se/sv/webb-tv/video/interpellation/biogas_H510235.
- Soublière, J. F., & Gehman J. (2020). The legitimacy threshold revisited: How successes and failures spill over to new ideas and products on Kickstarter. *Academy of Management Journal*. <https://doi.org/10.5465/amj.2017.1103>.
- Steen, M. (2016). Reconsidering path creation in economic geography: Aspects of agency, temporality and methods. *European Planning Studies*, 24(9), 1605–1622. <https://doi.org/10.1080/09654313.2016.1204427>
- Suchman, M. C. (1995). Managing legitimacy: Strategic and institutional approaches. *Academy of Management Review*, 20(3), 571–610. <https://doi.org/10.5465/amr.1995.9508080331>
- Suddaby, R., Bitektine, A., & Haack, P. (2017). Legitimacy. *Academy of Management Annals*, 11(1), 451–478. <https://doi.org/10.5465/annals.2015.0101>
- Sutherland, L. A., Peter, S., & Zagata, L. (2015). Conceptualising multi-regime interactions: The role of the agriculture sector in renewable energy transitions. *Research Policy*, 44(8), 1543–1554. <https://doi.org/10.1016/j.respol.2015.05.013>
- Suurs, R. A. A. (2009). *Motors of sustainable innovation: Towards a theory on the dynamics of technological innovation systems* [Doctoral dissertation]. Utrecht University. <http://dspace.library.uu.nl/handle/1874/33346>
- Sydsvenskan Tematidningar*. (2013, December 22). Biogasanvändningen ökar i Skåne. *Sydsvenskan Tematidningar*. <http://emedialub.lu.se/db/info/499>
- Tamm, D., & Fransson, M. (2011). *Biogasproduktion för miljö och ekonomi – Resultat och erfarenheter av biogasätgårderna inom Klimatinvesteringsprogrammen (Klimp)*. Naturvårdsverket.
- Trippl, M., & Otto, A. (2009). How to turn the fate of old industrial areas: A comparison of cluster-based renewal processes in Styria and the Saarland. *Environment and Planning A: Economy and Space*, 41(5), 1217–1233. <https://doi.org/10.1068/a4129>
- Yin, R. K. (2013). *Case study research: Design and methods*. Sage.
- Zhao, E. Y., Fisher, G., Lounsbury, M., & Miller, D. (2017). Optimal distinctiveness: Broadening the interface between institutional theory and strategic management. *Strategic Management Journal*, 38(1), 93–113. <https://doi.org/10.1002/smj.2589>