

Legitimation, institutions and regional path creation: a cross-national study of offshore wind

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Abstract

This paper assesses legitimation as a crucial dimension of industry emergence, addressing the neglect of institutional and political aspects of path creation in economic geography. It investigates how the legitimacy of emerging industries is built up over time and examines differences in legitimation across space. The paper focuses on the evolution of legitimation narratives in the context of national and regional differences in institutions, actors and assets. Based on a cross-national study of the offshore wind industry, the paper argues that cost reduction and value creation have made important contributions to legitimation in addition to climate change and energy security.

Keywords

Legitimation, narratives, multi-scalar institutions, evolutionary economic geography, path creation

1. Introduction

The question of how new industries and technologies emerge and develop has attracted great interest in economic geography and sustainability transitions studies (Boschma *et al.* 2017; Truffer and Coenen 2012). Recent work in evolutionary economic geography (EEG) is concerned with processes of path creation and regional branching, referring to the emergence and development of new industries and economic activities in regions (MacKinnon *et al.* 2019a). This research emphasises the importance of pre-existing local assets and capabilities in shaping path creation and branching (Boschma 2016). Recently, evolutionary thinking has been extended to questions of environmental and societal transition to sustainability, focusing on varying regional conditions for the growth of green industries (Boschma *et al.* 2017; Hansen and Coenen 2015). Yet, in its pre-occupation with technological and knowledge-based aspects of innovation, EEG has neglected wider institutional and political dimensions of path creation (MacKinnon *et al.* 2019a).

These broader aspects of path creation are addressed by sustainability transition studies which is concerned with the emergence of new technologies that often struggle against the interests of incumbent actors and institutions (Markard *et al.* 2012). One key concept in this respect is legitimation, which is a pre-requisite for emerging industries to overcome their “liability of newness” (Geels and Verhees 2011: 911) and gain social acceptance and compliance with relevant institutions (Bergek *et al.* 2008). Studies of legitimation are concerned with the narratives and strategies developed by supporters of emerging technologies and industries (Smith and Raven 2012). They stress the temporality of narratives in offering both re-interpretations of the past and projections of future benefits to attract resources from key stakeholders (Garud *et al.* 2014). As such, the temporality of legitimation processes has been privileged over their geography in transition studies. Yet it is important to also consider

spatial differences in legitimation given national and regional differences in actor networks, institutional rules and political systems (Markard *et al.* 2016).

This paper aims to make two key contributions. First, informed by transitions research, it addresses the neglect of institutional and political aspects of path creation in EEG (Boschma 2016; MacKinnon *et al.* 2016), assessing legitimation as a crucial dimension of industry emergence. While legitimation is the subject of an extensive literature in transition studies (Bork *et al.* 2015; Markard *et al.* 2016), it has attracted only limited attention in EEG (Binz *et al.* 2016). Second, this paper contributes to transition studies by providing a spatialised analysis of legitimation processes (Rosenbloom *et al.* 2016), outlining the basis of an economic geography of legitimation that emphasises national and regional institutions, industrial evolution and regional growth paths. These contributions are advanced by addressing two research questions: how is the legitimacy of emerging industries built up over time; and how do legitimation processes differ across space? In addressing the first question, the paper focuses on the advancement of narratives by the advocates of an emerging industrial path, alongside the counter-narratives of opponents. In addressing the second question, it examines how legitimation narratives are articulated across space, focusing on national and regional actors and organisations (Rosenbloom *et al.* 2016).

Based on a cross-national study of the offshore wind (OFW) industry, the paper focuses on four legitimation narratives: combating climate change, promoting energy security, reducing costs and creating economic value. It argues that the successful legitimation of OFW reflects powerful actors' ability to align key narratives with broader socio-political agendas (Raven *et al.* 2016). More specifically, while the contributions of OFW to climate change, energy security and economic development are key underlying sources of legitimacy, cost reduction has played a crucial additional role in recent years. The analysis is grounded in the experiences of three Western European countries: Germany, the UK and Norway. While

previous studies of the OFW industry have addressed themes of path creation, industrial development and niche innovation (Dawley 2014; Kern *et al.* 2014a; MacKinnon *et al.* 2019b; Steen and Hansen 2018), this paper makes a distinctive contribution through its analysis of legitimation processes over time and across space.

The remainder of the paper is structured in five main sections. The next part discusses work on legitimation narratives, institutions and regional evolution, developing an analytical framework to inform the empirical analysis. Section 3 describes our methods. This is followed by an overview of the legitimation of the OFW industry that introduces the four key narratives. Section 5 examines the evolution of legitimation over four periods: experimentation and demonstration, 2000-2007; optimism and growth 2008-2010; affordability and uncertainty, 2011-2015; and acceptance and normalisation, 2016-. The final section concludes the paper.

2. Legitimation and regional path creation

Legitimacy can be defined as “the generalised perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs and definitions” (Suchman 1995: 573). As this definition indicates, legitimation is about making an entity consistent with the shared cultural beliefs, norms and values of actors within a broader community. It is a vital pre-requisite for the mobilisation of financial resources and support from investors and regulators (Geels and Verhees 2011; Markard *et al.* 2016). The demonstration of technology through product testing and experimentation is an important source of legitimation, particularly in the early stages of development (Bergek *et al.* 2008).

The process of legitimation is shaped by the actors engaged in promoting and opposing emerging technologies (Bergek *et al.* 2008; Smith and Raven 2012). Four areas of agency are

identified by Yap and Truffer (2019): societal discourses which articulate visions and expectations; government actors who formulate regulations and policies; industry networks or alliances involved in shaping standards; and, individual organisations seeking to develop their internal capabilities. From an EEG perspective, the term path advocates (MacKinnon *et al.* 2019a) encompasses the actors that support a new technology or innovation, incorporating technology developers, lobby groups, environmental organisations, policy makers and politicians and potential users (cf. Raven *et al.* 2016).

Narratives are a critical dimension of legitimation, referring to the arguments made by actors in public to promote new technologies to key audiences and stakeholders (Smith and Raven 2012). They can be defined as strategic devices that serve to “temporally order familiar and unfamiliar material and symbolic resources into one totalising account held together by a plot” (Garud *et al.* 2019: 189). This temporal ordering involves the contextualisation of past and potential future activities, based on both re-interpretations of the past and projections of the future that aim at plausibility and comprehensibility (Manning and Bejarno 2017). The transitions literature highlights the framing struggles that may erupt between the ‘pro-transition’ narratives of path advocates who attempt to align emerging technologies with broader socio-political agendas and the counter-narratives of incumbent actors who seek to defend established technologies and undermine the arguments of path advocates (Bork *et al.* 2015; Raven *et al.* 2016).

The setting of future expectations is central to legitimation narratives, involving the articulation of a “compelling chronological account that invites stakeholders to imagine future ... possibilities” (Garud *et al.* 2014: 1479). Over time, however, these efforts may be subject to the paradox of legitimacy if they are threatened or underlined by the failure of a venture or project to meet early expectations, often as a result of broader shifts in markets, technologies or regulations that are beyond the control of its founders (*ibid.*). Such failure can

draw the scrutiny of stakeholders, risking a loss of legitimacy. In response to such legitimacy jolts and challenges, path advocates engage in revised forms of storytelling in an effort to maintain or regain legitimacy.

Turning to the economic geography of legitimation, the first aspect is concerned with multi-scalar institutional frameworks (MacKinnon *et al.* 2019a). Here, our analysis is informed by a modified Varieties of Capitalism (VoC) approach that incorporates sub-national institutions in addition to national states (Peck and Theodore 2007). In particular, we draw upon Schmidt's (2005) distinction between 'simple' and 'compound' liberal market economies (LMEs) and co-ordinated market economies (CMEs). The state structure is concentrated in a single authority in 'simple' systems exemplified by unitary states, whereas 'compound' ones feature multiple authorities, such as in federal polities.

Second, geography is also implicated in legitimation through spatially uneven processes of industrial evolution. From an industry life cycle perspective, new industries generate a greater range of locational possibilities in their early stages of development, with a multiplicity of regions competing to become centres of investment (Storper and Walker 1989). These possibilities diminish over time as the industry is consolidated and becomes increasingly concentrated in a small number of locations. There is, however, scope for established centres to be challenged by potential 'latecomer' regions, underlining the non-deterministic nature of this process. Regions seek to break into emerging industries on the basis of their assets (MacKinnon *et al.* 2019a), with natural resource endowments and spatial proximity to these resources providing critical assets for green growth (Hansen and Coenen 2015). As this paper argues, regional value creation can represent an important source of legitimacy, providing visible benefits in terms of industrial development, capital investment and employment.

Regional actors seek to foster path creation by mobilising key assets (MacKinnon et al. 2019a). They engage in a range of legitimisation practices, including the articulation of visions and expectations of future regional development and the formulation of related policies to enrol other regional actors and create a sense of collective direction (Steen 2016). In addition, regional actors often seek to align their own narratives to broader political and economic agendas in order to attract resources and support from national and supra-national institutions (Raven *et al.* 2016).

Informed by these strands of literature, we construct an analytical framework to inform our analysis of the legitimisation of the OFW industry. First, our approach emphasises the temporality of the legitimisation process. Legitimation narratives unfold over time in changing institutional and political contexts, encountering environmental challenges and jolts that require narratives to be reformulated in order to maintain or regain legitimacy (Garud *et al.* 2014). Second, we adopt a multi-actor approach encompassing entrepreneurs, large firms, industry associations, government actors and research institutes. Third, addressing the neglect of space in legitimisation research, the framework identifies institutions, industrial evolution and regional growth paths as key aspects of an economic geography of legitimisation.

3 Methods

While legitimisation research is largely dependent on single region- and country-case studies (Markard *et al.* 2016; Rosenbloom *et al.* 2016), this paper provides a comparative analysis of legitimisation within the same industry across different national and regional contexts. The UK and Germany were selected as the two largest OFW markets in the world which have followed contrasting industry growth paths of market-led growth and industry-led development respectively (MacKinnon *et al.* 2019b). Norway provides an interesting counter-

case of legitimation based on the absence of a domestic electricity market transition imperative due to its abundant hydro-power resources. Accordingly, it has not yet established a domestic market for OFW. From a VoC perspective, the UK is a ‘simple’ LME, characterised by a limited state, competition and a centralised political structure. Germany is a ‘compound’ LME, defined by strategic coordination between firms and institutions and a federal structure. Norway represents a ‘simple’ CME based on a combination of strategic coordination and a unitary state.

Developing an evolutionary approach, we adopted a longitudinal research design as part of an ongoing programme of research on the OFW industry across the three countries (see Dawley 2014; Steen and Hansen 2018). This involved a coordinated mixed methods approach across the three cases, informed by over 100 semi-structured interviews (2010-2019) with regional and national government actors, industry associations and firm managers and directors. Our collective immersion in the OFW research for over a decade provided a rich set of contact networks, allowing the informed selection of key informants alongside forms of nonparticipant observation at industry and policy events (Karlsen 2018). Interviews covered key legitimation arguments and rationales, the role of industry associations and regional cluster initiatives, political support and lobbying, market support regimes and industrial development policies. The research also involved the analysis of policy documents, particularly key speeches, statements and press releases by politicians and industry leaders, and media sources including leading national newspapers (e.g. *Die Zeit*, *The Guardian*, *Financial Times*, *Dagens Næringsliv*), industry publication and websites (e.g. 4COffshore, WindEurope, Renewable Energy News etc).

The analysis of legitimization activities and narratives began with the extraction of key quotations and statements from source documents, principally interview transcripts, policy documents, press releases and media reports. The identification of the narratives was informed by our on-going research on the OFW industry and other studies of RETs (Kern *et al.* 2015; Rosenbloom *et al.* 2016). Key quotations and statements that expressed emergent narratives were carefully selected for each of the three country cases. The extracted passages were examined closely, and a set of legitimization activities, arguments, events and contextual factors distilled across the cases. From this, the principal narratives and counter-narratives were confirmed and elaborated (Table 1).

4. Legitimation of Offshore Wind Power: Key Narratives

The remainder of the paper focuses on the four legitimization narratives identified by the research, alongside three counter-narratives. These overlap with the narratives discussed by other published research on the legitimization of renewable energy technologies (RETs), resonating with the broader energy trilemma (see Kern *et al.* 2014; Raven *et al.* 2016; Rosenbloom *et al.* 2016). This refers to the three, potentially conflicting, goals of energy policy: addressing climate change through decarbonisation, securing the supply of energy, and limiting the costs of energy generation. In addition, Schmidt *et al.* (2019) identify a fourth objective of strengthening the economic competitiveness of energy industries.

RETs face particular legitimization challenges as they require subsidisation to render them price competitive with established energy technologies, raising the costs of energy generation for states and consumers since subsidies are publicly funded, often through consumer surcharges (Jacobsson and Lauber 2006). This challenge has been particularly pronounced for OFW as a high-cost RET (MacKinnon *et al.* 2019b).

Table 1 about here

The first narrative, *combating climate change*, is a critical underlying source of legitimacy (Kern *et al.* 2014a), supported by the broader societal discourse of climate change mitigation (Yap and Truffer 2019). OFW was identified as a scalable and proven technology (Table 1) (Kern *et al.* 2015) with leading national and regional politicians presenting it “as technology which has the scale to make a big difference” (Rudd 2015) and as “a decisive element in energy transition” (Schwesig quoted in Windmesse 2019). At the same time, the support of RETs has been opposed by incumbent actors associated with the coal and nuclear industries and some conservative and free market politicians and commentators (Butler 2013; Jacobsson and Lauder 2006). These critics question the appropriateness of wind power in addressing climate change (Rosenbloom *et al.* 2016), particularly on the grounds of intermittency, requiring back-up by other sources of non-renewable power (Heaton-Harris *et al.* 2012; Toke and Lauder 2007).

Second, the narrative of *promoting energy security* is also evident in the OFW sector in the context of the phasing out of coal-fired power stations, controversies over nuclear power and broader geopolitical concerns over imported energy in a climate of heightened ‘resource nationalism’ (Bradshaw 2014; Kern *et al.* 2014b). From this perspective, the growth of OFW is framed in terms of the exploitation of domestic energy resources and the need to reduce dependence on imported fossil fuels. For instance, the former British Prime Minister and German Chancellor both stressed the role of OFW in enhancing energy security as part of balanced electricity mixes (*Die Bundesregierung* 2019; Jowit 2012). Our analysis did not provide any evidence of a counter-narrative to energy security.

Third, a *cost reduction* narrative has emerged largely as a response to a prominent counter-narrative advanced by opponents of RETs (see above) which criticises OFW as high cost

technology, arguing against its subsidisation on the basis of consumer affordability and the transfer of resources to energy developers and utilities (Table 1) (Altmaier in *Frankfurter Allgemeine* 2013; Butler 2013). In response, the cost reduction narrative developed by the OFW industry and governments creates future expectations of lower costs and a diminished need for public subsidy (RenewableUK 2014; Rudd 2015).

Fourth, the narrative of *creating economic value* emphasises the contribution of OFW to national and regional economic development by fostering new growth paths (Table 1). This narrative has been promoted by national governments, industry associations and regional actors who construct expectations of large-scale job creation and investment (Crooks and Harvey 2009). The counter-narrative of opponents claims that OFW will reduce economic value by imposing additional costs on industry and encouraging firms to move production to other locations, thereby undermining national and regional economic competitiveness (Butler 2014; Geels *et al.* 2016). The remainder of the paper emphasises the high cost and unaffordability and reduced economic value counter-narratives over intermittency as they are the principal ones mobilised against OFW.

5. Processes of Offshore Wind Legitimation

Understanding legitimation as a temporal process (Bork *et al.* 2015), we divide our analysis into different periods (Markard *et al.* 2016). This periodisation is based upon the underlying legitimation dynamics of the OFW industry, incorporating the dominant narratives, institutions and policies. Our account of each period is presented thematically, covering the main industry-wide legitimating narratives, key actors and institutions and regional growth paths.

5.1 Experimentation and demonstration 2000-2007

5.1.1 Industry narratives

This first period of OFW legitimization covers a relatively lengthy process of small-scale experimentation and demonstration, framed largely by the combating climate change narrative. The high costs of OFW represented a key underlying legitimization challenge, fuelling a counter-narrative from incumbent actors of OFW as a subsidised, high cost technology (Jacobsson and Lauber 2006). This argument fed into the parallel counter-narrative of OFW as a technology that would undermine the competitiveness of energy-intensive industries and the broader economy. The limited growth of OFW capacity in this period shaped its legitimization, focusing advocates' narratives upon future expectations of feasibility and value creation in the absence of substantial material benefits such as investment and jobs.

5.1.2 Actors and institutions

Building on earlier institutional arrangements, more elaborate subsidy regimes were introduced in the early 2000s in Germany and the UK (Geels *et al.* 2016). Advancing the combating climate change narrative, the 'Red-Green' coalition in Germany introduced the Renewable Energy Sources Act (RESA) in 2000 which awarded priority grid access for RETs and set a new fixed tariff for renewable electricity (*ibid*). In addition to the governing coalition, RESA was supported by environmental organisations such as Greenpeace, renewable industry and engineering industry networks and some regional governments (*Lander*) (Jacobsson and Lauber 2006). Like its predecessor Feed-in-Act of 1991, RESA was opposed by incumbent electricity industry networks in the shape of the major utilities, along with the Federal Ministry of Economic Affairs and the Federation of German Industries, who advanced the counter-narratives of unaffordability and reduced national economic competitiveness (Geels *et al* 2016).

The Renewables Obligation (RO) was introduced by the UK government in 2002, framed by the combating climate change narrative. Reflecting the UK's neoliberal energy policy paradigm (Kern *et al.* 2014b), the RO was viewed as a cost-effective way of supporting ambitious renewable energy targets. Its technological neutrality favoured lower-cost technologies such as onshore wind and landfill gas (Toke and Lauber 2007). It was supported by government actors and industry networks, leaving small-scale producers and independents concerned about bias towards incumbent suppliers and more established technologies (Geels *et al.* 2016).

Despite Norway's lack of a domestic market for OFW, the combating climate change narrative led policymakers to encourage the electrification of offshore installations by replacing natural gas with wind energy. Consequently, a small number of OFW related concept studies emerged in the early 2000s (Steen and Hansen 2018).

The demonstration of OFW technology required the licensing and development of projects. In the UK, the Crown Estate (CE) awarded Round 1 and Round 2 sites, although only 6 OFW farms were operational by 2007 (Kern *et al.* 2014a). OFW farms were slower to develop in Germany as project costs turned out to be much higher than expected with grid connection emerging as a major problem (Reichardt *et al.* 2016). The first plans for an OFW farm in Norwegian waters were published in 2004 as several of the major energy companies started investing in R&D. Furthermore, Enova (a Norwegian public enterprise) provided financial support for Equinor (formerly Statoil) to develop a floating turbine demonstration off the Norwegian coast.

5.1.3 Regional growth paths

The growth of early OFW projects encouraged regional actors in proximate coastal regions to identify the industry as an economic development opportunity. While national actors largely

deployed the combating climate change narrative, regional actors emphasised the creation of economic value at the regional and national scales (Dawley 2014; Steen and Karlsen 2014).

In the UK, early OFW projects were concentrated in the shallow and sheltered waters off the North-west and East coasts of England, leading to the growth of small-scale support functions in adjacent regions such as Cumbria, the Humber and Kent. In addition, aspirant regions such as North East England targeted OFW, based on related maritime and fabrication-related assets (Dawley 2014).

The German interior regions of North-Rhine-Westphalia, Bavaria and Baden-Württemberg began to benefit from the growth of OFW activity in this period, based on related strengths in machine manufacturing. At the same time, coastal locations identified OFW as a new market opportunity, led by Bremerhaven which developed an OFW strategy from 2001 (MacKinnon *et al.* 2019b). This approach was echoed by Cuxhaven where local and regional actors developed a plan to attract future investment, challenging rival regions such as Bremerhaven and the Humber (Evans 2020).

5.2 Great Expectations: Optimism and Growth 2008-2010

5.2.1 Industry narratives

This period was one in which the pace of development accelerated, supported by optimistic expectations about the growth of the OFW wind market and the strengthening of subsidy regimes. The combating climate change narrative gathered additional momentum, alongside growing energy security concerns (Kern *et al.* 2014b). In addition, the potential of OFW to create economic value emerged as a key theme. In the UK, for instance, expectations were magnified greatly with industry actors “talking of forty gigawatt ... [over] the next few decades” (Government official, authors’ interview, May 2015). At the same time, the German government set an increased target of 10GW by 2020 (Geels *et al.* 2016). National

government and regional actors identified OFW as a large-scale economic opportunity with then UK Prime Minister, Gordon Brown, for instance, stating that this is “a new industry where Britain can be number one in the world”, with the potential to create “thousands of green jobs” in disadvantaged regions such as North East England (quoted in Dawley 2014: 3). These arguments were given additional impetus by the short-term legitimacy boost (Garud *et al.* 2014) provided by the financial and economic crisis of 2008-2009, which increased interest in green technologies as sources of future growth and employment (Hochfeld *et al.* 2010).

5.2.2 Actors and institutions

The combating climate change agenda in the UK was bolstered considerably by the Labour government’s passage of the Climate Change Act in 2008 which committed the UK to a 80% reduction in emissions by 2050 (Geels *et al.* 2016). At the same time, concerns about energy security grew after the UK become a net energy importer (Kern *et al.* 2014b). Leading industry actors, including electricity utilities, turbine manufacturers, energy companies and institutional investors, became increasingly active in supporting OFW development (Raven *et al.* 2016). Representing a break with the liberal market paradigm, the government raised OFW subsidies by introducing technology-specific banding to the RO in 2009-2010 (Kern *et al.* 2014a). In addition, the CE embarked on an ambitious Round 3 of licensing, based on the development of much larger zones (MacKinnon *et al.* 2019b).

Further institutional layering of RESA in Germany involved the increase of renewable energy targets from 20% to 30% by 2020 (*Bundesministeriums der Justiz* 2009). Speaking at the opening of the flagship Alpha Ventus project in 2010, the Christian Democratic Union (CDU) Minister of Environment stated that wind energy will “play a central role in the future energy mix” (*Die Zeit* 2010). Alpha Ventus provided an essential basis for national and sub-

national government actors, firms and certification bodies to gain experience from the field (Electricity utility representative, authors' interviews, September 2018). Such demonstration projects are an important source of legitimacy, allowing firms and government bodies to test technology and establish standards (Yap and Truffer 2019).

Influenced by concepts of value creation through industrial diversification and combating climate change through the notion of 'Norway as Europe's green battery', the Norwegian Government appointed an energy council (Energirådet 2008) that recommended a national strategy of exporting electricity to Europe as well as supplying national oil and gas (O&G) installations with OFW power. Consequently 12 different OFW farms were being planned by mid-2008, and expectations were high among industry actors for the development of a domestic market (Steen and Hansen 2018). The prevailing narrative in this period in Norway was value creation based on diversification from its world-leading petro-maritime sector, set within a societal discourse of 'life after oil'. This was magnified by the 2009-2010 downturn in the petro-maritime sector, prompting industry actors to ask the government to support industrial diversification and value creation through the establishment of OFW demonstration projects (Normann 2015). The state subsidies required to create a domestic OFW market failed to materialise, however, since the reliance on hydropower meant that the electricity market was already aligned with the climate change and energy security agendas.

5.2.3 Regional growth paths

Raised expectations of industry growth were reflected in ambitions for regional value creation. In the UK, Scotland emerged as an aspiring 'transition space' (Truffer and Coenen 2012) as the Scottish National Party government set some of the challenging renewables targets in Europe (Scottish Government 2012). Then First Minister, Alex Salmond, described the waters of Scotland as the "Saudi Arabia of marine power", claiming that a new round of

Scottish OFW sites could create “several thousand more jobs” (quoted in Bolger 2010). Supported by the anticipated growth of the UK market, Scotland signed Memoranda of Understandings with two turbine manufacturers, alongside a number of research and development initiatives and support schemes.

The efforts of regional actors to promote OFW in Germany have been assisted by its decentralised structure, providing them with greater authority, resources and political legitimacy compared to the UK outside of Scotland. At the opening of Baltic 1, the Chancellor highlighted the local value creation opportunities OFW provides: "I would like to thank all local politicians who always take care of emphasising the jobs effect and many other positive aspects that this development opens for local authorities" (Merkel 2011). In this period, Bremerhaven reinforced its role as a centre for OFW-related manufacturing and port activities while Hamburg emerged as the key hub for coordinating OFW activities (MacKinnon *et al.* 2019b).

5.3 Hard Times: Affordability and Uncertainty 2011-2015

5.3.1 Industry narratives

This period is marked by a protracted framing struggle between the pro-transition narratives of combating climate change and creating economic value and the counter-narratives of high costs/unaffordability and reducing economic value (Table 1). While the economic stimulus introduced in response to the 2008-2009 crisis provided a legitimacy boost to emerging green technologies, this was reversed from 2010, ushering in an era of austerity which placed acute political pressure on renewables subsidies as consumers faced depressed living standards and rising energy bills (Butler 2013). Austerity presented OFW and other RETs with a severe legitimacy jolt (Garud *et al.* 2014) with critics arguing that subsidies were no longer affordable, generating increased uncertainty for developers and investors (Butler 2013). The

high cost of OFW left it particularly exposed, based on a price of about £140 per megawatt hour in 2011, around three times the wholesale price of electricity (ORE Catapult 2015). In response, industry networks and government actors reframed their arguments through a new cost reduction narrative (Karlsen 2018). At the same time, energy security remained a major concern, acquiring additional importance as a source of legitimacy for RETs given increased conflict over climate change.

5.3.2 Actors and institutions

In the UK, framing struggles emerged within the Coalition Government between the Liberal Democrats commitment to RETs and the opposition of some Conservative politicians (Geels *et al.* 2016). Framed by the energy security and economic value narratives, the government's decision to fund a new nuclear power plant and support the fracking of shale gas, inspired by developments in the US, threatened to undermine the position of RETs in the energy mix (Geels *et al.* 2016). Political uncertainty was magnified by the protracted transition from the RO to a new auction-based subsidy regime, leading to the cancellation of several OFW projects in 2013-2014 (Dawley *et al.* 2015). Freed from coalition, the new Conservative government cut support for RETs in 2015, particularly onshore wind, and the Energy Secretary argued that OFW “needs to move quickly to cost competitiveness” (Rudd 2015).

A reframing of value creation took place in the UK, emphasising local industrial content alongside job creation. This sought to address a dependence on imported materials with over 80% of the value of some UK installations sourced from outside the UK (Macalister 2010). The lack of domestic value creation represented a key legitimisation challenge in the context of increased political conflict over subsidies. In response, the OFW industry had to build a domestic “industrial base in order to secure ... political support” (Industry representative,

authors' interviews, May 2015). Accordingly, industry networks and government actors set an aspiration of generating 50% of value from domestic content (HM Government 2013).

The Fukushima nuclear disaster revitalised the *Energiewende* in Germany, leading to the closure of nuclear power stations by 2022 (Merkel 2011). Yet a similar framing struggle to the UK emerged between combating climate change and mounting concerns about cost and consumer affordability. In the OFW sector, these concerns were magnified by the legitimisation challenge prompted by extra charges for electricity consumers stemming from losses incurred by the Transition System Operator, Tennet, as a result of uncoordinated offshore grid planning. In response, the energy minister suggested “an electricity price brake” for consumers by cutting the tariff, arguing that the *Energiewende* must be “economically viable and affordable” (quoted in *Frankfurter Allgemeine* 2013). Although his suggestion was dismissed by the *Bundestag*, the incident created uncertainty among investors. Cost reduction emerged as a narrative in Germany around 2013 in response to these affordability concerns and the ‘electricity price brake’ debate (Karlsen 2018; Reichardt *et al.* 2016).

The new CDU/Social Democratic Party (SDP) government adjusted the targets downwards from 10 to 6.5 GW by 2020 and from 25 to 15 GW by 2030, viewing these as more realistic in light of the modest growth in installed capacity. In addition, the so-called ‘acceleration initiative’ brought together actors from government and industry to resolve the grid connection problem.

The revitalisation of the O&G sector in Norway around 2011 reduced pressures for diversification into OFW. Furthermore, while a joint Swedish-Norwegian Green Certificate Scheme was introduced in 2012, its technological neutrality meant that it failed to provide sufficient levels of subsidy for higher-cost RETs such as OFW (Steen and Hansen 2018).

5.3.3 Regional growth paths

In the UK, reduced expectations of market size and increased political uncertainty constrained regional path creation ambitions. OFW activities were slow to develop in Scotland and North East England with efforts to attract turbine manufacturers proving unsuccessful (Dawley *et al.* 2015). In Germany, a lack of financial returns and failed grid connections pushed many pioneer firms out of the market and led to job losses in Bremerhaven, Cuxhaven and Emden in 2013-2014 (Fröhlingsdorf 2013). By contrast, the Humber region of England emerged as a key 'transition space', based on the confirmation of the Siemens blade manufacturing plant investment and growing operations and maintenance (O&M) activity (Dawley *et al.* 2019). Heralded by the UK's Energy Minister as "central to our world-leading offshore wind role", the Humber became pivotal to the national legitimisation process through the demonstration of economic value in this disadvantaged region (Hurd cited in Laister 2017).

5.4. Socio-political acceptance and normalisation 2016-

5.4.1 Industry narratives

This fourth period is characterised by radical price reduction, with the move towards zero subsidy providing OFW with worldwide legitimisation. Following the international breakthrough of the Borssele 1 and 2 projects in the Netherlands, subsidy prices fell sharply in both Germany and the UK with decreases of 54% in 2015-2018 and 65% in 2015-2019 respectively (Figures 1 and 2). The 2017 auctions in Germany involved subsidy-free bids, although the costs of grid connection are born by the state, unlike the UK. According to *Bundesnetzagentur* President Jochen Homann (2017) "the [German] auction has unlocked medium and long-term cost reduction potential, which will lead to a reduction in funding to an extent that had not been expected". However, the shift from fixed tariffs to competitive auctions has generated uncertainty for developers, with the subsequent reduction in the

volume of new installations in Germany prompting the industry to call for clear political signals to address this “expansion gap” (Offshore Wind Energy Foundation 2020). From an overall legitimisation perspective, the achievement of subsidy price reduction and the broader narrative of cost reduction has discredited the unaffordability and reducing economic value counter-narratives. This represents an important step towards the international normalisation and socio-political acceptance of OFW as a central component of the future energy mix, in contrast to the recurring political controversies affecting onshore wind (Kedzierski 2019).

Figures 1 and 2 about here

5.4.2 Actors and institutions

A convergence of national market support arrangements towards centralised auction regimes has taken place between EU member states (Fitch-Roy 2016). This model was initiated by Denmark, followed by the Netherlands, the UK and Germany, bringing national institutional arrangements in line with EU State Aid Guidelines.

Competitive bidding has stimulated subsidy price reduction, alongside the growing maturity of the OFW sector, fostering technological innovation, economies of scale and standardisation in line with life cycle models. Yet, the dramatic price reduction of recent years has outstripped the decrease in underlying costs with the levelised cost of energy for OFW falling by 32% between 2014 and 2018 (IRENA 2019). This accelerated price reduction seems to reflect leading developers’ drive to expand market share in a rapidly growing electricity generation sector (Afewerki 2019; OFW supplier, author’s interviews, April 2019).

As we have argued, value creation narratives create expectations of large-scale employment growth and investment. Overall OFW employment was 23,000 in Germany in 2018 and 7,200 in the UK in 2017 (Statista 2019; HM Government 2019), reflecting the strength of the

manufacturing value chain in Germany. OFW employs approximately 1600 in the much smaller economy of Norway, where it is limited to exports to European markets and small-scale domestic demonstration projects. In the UK, the inflated job numbers of 2008-2011 have given way to more realistic future employment projections (HM Government 2019), alongside the reporting of performance against the 50% domestic content aspiration. Overall UK content reached 48% in 2017, but was much higher for development (73%) and operational (75%) activities than for capital expenditure (29%) which covers manufacturing and equipment (RenewableUK 2017)

Falling oil prices and a surge in European OFW market growth from 2016 led to renewed support for OFW in Norway. Attracted by favourable subsidy arrangements, Equinor installed the Hywind floating OFW farm (pilot) in Scotland in 2017 (Afewerki *et al.* 2019). Subsequently, Equinor started to develop the first full scale floating project to supply two Norwegian O&G installations, supported by substantial funding from a Norwegian government body. Demonstrating the increasingly broad-based legitimization of the industry, OFW started being actively promoted by industry networks and trade unions, often in unison with environmental organisations. The main narratives these groups articulate are combating climate change (especially powering O&G platforms with OFW) and creating value through industrial development and diversification.

5.4.3 Regional growth paths

The shift towards zero subsidy facilitates OFW market expansion by reducing support costs for governments and consumers, encouraging regional growth strategies. Yet, while the development of new OFW farms provides further opportunities for adjacent coastal regions to provide services such as O&M, industry maturity and consolidation makes it more difficult for regions to break into the manufacturing value chain compared to earlier periods.

After a period of stagnation, Cuxhaven turned into a leading offshore wind port and hub for turbine provision with the opening of Siemens Gamesa's nacelle plant in 2018 (Evans 2020). Referring to the Norddeich O&M port, one respondent described the OFW industry as a "tremendous job engine in an economically weak region" (Developer representative, author's interviews, January 2019). Recently, latecomer regions in Eastern Germany have attracted investment as OFW expands in the Baltic Sea. In the UK, the Humber region has further consolidated its position, while proximity to new OFW farms is spurring growth in Scotland and the latecomer region of East Anglia.

Conclusions

This paper has shown how legitimacy for emerging industries is built up over time and across space, providing a comparative analysis across spatial contexts (Markard *et al.* 2016). The principal finding is that OFW technology has gained legitimacy over time. This reflects the ability of powerful government and industry actors to craft narratives that aligned OFW with the pressing energy policy agendas of decarbonisation, energy security and economic competitiveness (Raven *et al.* 2016). The legitimisation of OFW was subject to an intense framing struggle in the 2012-2015 period as rising energy bills and austerity created a severe legitimisation challenge. Industry and government actors responded by developing a concerted cost reduction narrative that addressed the unaffordability and reducing economic value counter-narratives. While the climate change and energy security narratives provide an underlying basis of legitimacy, cost reduction has made a crucial additional contribution to the legitimisation of OFW. As such, this paper adds novel insights to the literature on legitimisation by demonstrating the importance of path advocates' ability to adapt and reframe narratives in response to legitimacy jolts and challenges (Garud *et al.* 2014) which can strengthen the counter-narratives of opponents.

In addressing the question of how legitimation differs across space, the paper has outlined the basis of an economic geography of legitimation. This provides a fuller understanding of the legitimation of emerging industries by relating it to multi-scalar institutions, industry evolution and regional growth paths. The concern with multi-scalar institutions highlights the differences between Germany's 'compound' CME, the UK's 'singular' LME and Norway's 'singular' CME (Schmidt 2005). Greater political consensus on RETs has been evident in Germany, providing more comprehensive and stable support (Cetkovic and Buzogany 2016), although the current "expansion gap" is attributed to a lack of political ambition and clarity (Offshore Wind Energy Foundation 2020). Government policy has been more unstable in the UK, reflecting the neoliberal paradigm and political controversy over subsidies (Kern *et al.* 2014b). Yet OFW enjoys a privileged position in the UK's renewable energy mix, supported by powerful industry and state actors, abundant OFW resources and the curtailment of onshore wind subsidies. State support for OFW has been more limited in Norway, based on self-sufficiency in hydropower. The main form of OFW legitimation is as a diversification opportunity for the petro-maritime sector, addressing the challenge of 'life after oil' (Steen and Hansen 2018). National institutional frameworks have shaped how key actors have responded to country-specific legitimation challenges as illustrated by the German 'acceleration initiative' and UK domestic content policy. Such cooperation is based on an underlying pattern of industry-government coordination in Germany's CME, while the UK's rapid prioritisation of domestic content from 2013 demonstrates its capacity for "policy learning and strategic adjustment" as an LME (Cetkovic and Buzogany 2016: 649).

An important contribution of the paper concerns its identification of regional and national value creation as a key source of legitimacy, providing demonstrable material benefits in terms of green employment and investment (Hansen and Coenen 2015), in addition to expectations of future jobs. Here, path creation is bound up with the broader process of

industry evolution as particular countries and regions become specialised in particular types of activities, but may be challenged, at different times, by national and regional downturns in OFW development and the emergence of 'latecomer' regions. More specifically, this paper has argued that OFW's tendency to create employment in peripheral and maritime regions, which often lack alternative sources of growth and investment, enhances its legitimacy.

Distinct forms of regional and national path creation are apparent, reflecting the influence of national institutional frameworks. First, path creation in Germany has occurred largely through indigenous development and diversification from existing industry, compared to a reliance on external investment and imported equipment in the UK (MacKinnon *et al.* 2019b). In Norway, the promotion of OFW as a diversification opportunity for the petro-maritime sector is aimed at the renewal of existing regional paths as well as the potential creation of new ones (Steen and Hansen 2018). Second, regional political actors in the 'compound' CME of Germany have more powers to support OFW compared to the UK's and Norway's 'singular' economies, as demonstrated by the extensive industrial and infrastructural initiatives undertaken by regional and municipal governments in Germany (Evans 2020).

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