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Empowering sustainable niches: Comparing UK and Dutch offshore wind developments

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ABSTRACT

Offshore wind has been positioned as a promising technology that could play a major role in moving towards more sustainable energy systems, but deployment varies significantly across countries. This article aims to explain the contrast between the boom in the UK versus stagnation in The Netherlands, by analysing the niche empowerment dynamics building on Smith and Raven's (2012) distinction between 'fit and conform' and 'stretch and transform' strategies. Analysis focuses on the actor networks and the narratives they use to enrol support for the deployment of the technology. We conclude that because the narratives mobilised are quite similar in both cases, an explanation must lie with the actors. We argue that the UK's relative success is partly the result of the presence of a proactive 'system builder' in the form of the Crown Estate which plays a central role in powerful public–private actor networks around offshore wind. We also conclude that the Smith and Raven 'protected space' framework fails to capture how different national institutional settings shape the possibilities for empowering work of technology advocates as our analysis shows that despite the highly international nature of the offshore wind sector, attempts by multi-national companies result in different outcomes in different countries.

1. Introduction

The development and deployment of renewable energy technologies are key to tackling climate change (IEA, 2011; IPCC, 2011). Since many renewable energy technologies are not (yet) competitive with incumbent fossil fuel technologies in most contexts, public sector investment in research, development and demonstration (RD&D) as well as incentives for deployment continue to play a major role worldwide (Klaassen et al., 2005; Sagar and van der Zwaan, 2006; McDowall et al., 2013). One technology attracting this kind of support is offshore wind (OSW). Historically, the deployment of wind turbines has focused on onshore developments, but several countries now pin significant expectations on moving offshore to exploit even greater wind resources (Esteban et al., 2011).

Especially in various countries bordering the North Sea, offshore wind power has been positioned as a promising renewable energy resource that could play a major role in moving towards more sustainable energy systems. For example the European Wind Energy Association (EWEA) argues that 150 GW of offshore wind capacity could be realized by 2030, potentially providing 14% of the EU's 2030 electricity demand (EWEA, 2011). By the end of 2012, total installed capacity by European countries represented over 95% of the worldwide installed capacity and by mid-2013 well over 5,500 MW was operational (mostly in the North Sea), compared to just under 100 MW in 2001 (www.lorc.dk).

However, there are sharp differences in deployment in wind resourceful countries bordering the North Sea. The UK has become the leading country in absolute numbers. As of mid-2013, the UK had 3,300 MW of installed capacity representing almost 60% of the global installed capacity (www.lorc.dk). This UK dominance is likely to continue in the near future, with some 1,300 MW currently under construction, 400 MW contracted, and a further 1,900 MW consented. This is in sharp contrast with the Netherlands, whose governments have also touted the importance of offshore wind energy over the years. Initially, relative deployment numbers of offshore wind energy in the Netherlands were similar to those in the UK. Recently, however, deployment rates have levelled off (see Figs. 1 and 2).

This empirical observation, the stark contrast between the unparalleled deployment rate in the UK versus a stagnation in The Netherlands leads us to our research question: *What explains the difference in recent offshore wind deployment rates between the UK and The Netherlands?*

Explaining this contrast is particularly interesting given the fact that both countries have substantial offshore wind resource potential; that both countries' governments have publicly emphasized the importance

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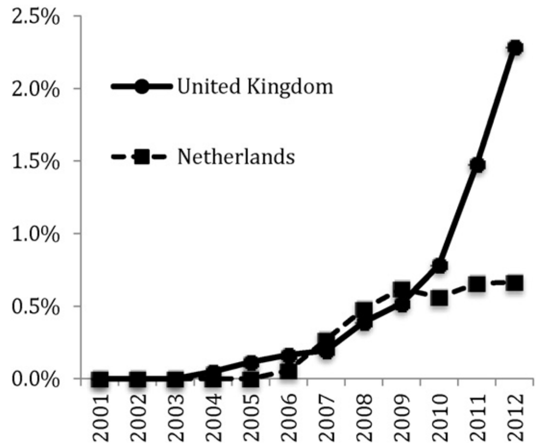

Fig. 1. Offshore wind electricity production relative to total electricity consumption over time.
Sources: Centraal Bureau voor de Statistiek (NL)/Department of Energy and Climate Change & Crown Estate (UK).

of offshore wind for their future energy supply (Ministerie van Economische Zaken, 2002; BIS and DECC, 2009); and that some of the large and powerful industrial players involved in both countries' OSW deployment are identical (e.g., Shell, Siemens, Vestas, Fluor or Nuon). At the same time these two countries provide different institutional contexts (see Kern, 2011) which might influence the developments (discussed in more detail in Section 4.4).

We position our analysis in the academic field of sustainability transitions research (Markard et al., 2012; Elzen and Wieczorek, 2005; Geels, 2005; Verbong and Geels, 2010). This literature is a relevant starting point, because it has been demonstrated to be useful in explaining similarities and differences in the emergence of transformational technologies in national energy systems in the past (cf. Bergek and Jacobsson, 2003; Raven and Geels, 2010; Verhees et al., 2013; Smith et al., 2014). In focussing on explaining the difference between offshore wind deployment rates in the UK and The Netherlands we make three contributions to the literature concerned with the role of niches in socio-technical transitions towards sustainability (e.g., see Schot and Geels, 2008; Nykvist and Whitmarsh, 2008). First, we contribute two case studies of niche developments of a technology which has received little attention so far (Wieczorek et al., 2015; Markard and Petersen, 2009). Second, we explore the explanatory power of the

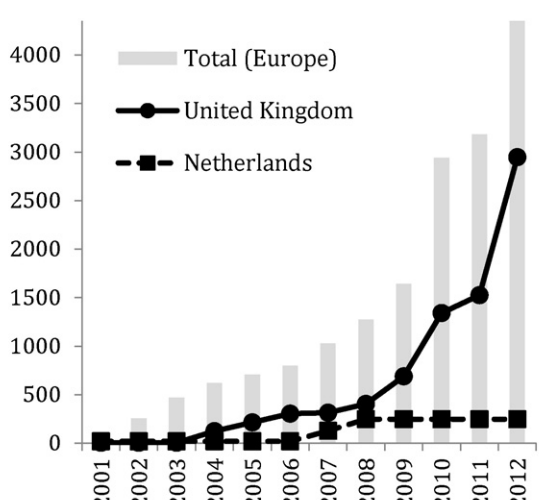

Fig. 2. Total installed offshore wind generating capacity in MW over time.
Source: LORC Offshore Wind Farms List (http://www.lorc.dk/offshore-wind-farms-map/list).

concept of niche empowerment recently proposed by Smith and Raven (2012). Third, we engage with the debate about the national focus of many transition studies (Raven et al., 2012), arguing that despite the highly international nature of the offshore wind sector, attempts by multi-national companies active across different jurisdictions encounter important national features which influence transnational activity and outcomes.

The remainder of the paper is structured as follows: Section 2 reviews the existing sustainability transitions literature relevant for addressing our question. Section 3 introduces our analytical framework and methodology. Section 4 provides a timetable of key events in offshore wind developments in the UK and the Netherlands in the past decade and presents and discusses the results of a cross-national analysis of these developments based on our analytical framework Section 5 concludes.

2. Literature review

In the sustainability transitions literature (and innovation studies literatures more generally), *onshore* wind power has been extensively analysed (e.g., Jorgensen and Karnoe, 1995; Gross, 2004; Kamp et al., 2004; Klaassen et al., 2005; Agterbosch et al., 2007; Breukers and Wolsink, 2007; Bergek et al., 2008; Kamp, 2008). Its offshore counterpart has so far received less attention. A few authors have focussed on the *consequences* of the 'move offshore', e.g., for ownership and organisational structures in the wind power sector (Markard and Petersen, 2009). Others adopted a European perspective on offshore wind development (e.g., Jacobsson and Karltorp, 2012; Wieczorek, Negro et al., 2013). This European level of analysis is typically (and justifiably) legitimised by pointing to the internationally interconnected nature of the offshore wind sector. Luo et al. (2012) assess the current state of the offshore wind innovation system and argue that, on a European level, the innovation system functions reasonably well at the moment: system functions that are lacking in one nation state are 'compensated' by others.

Yet this functional diagnosis provides only a partial answer: it does not explain how differences on these arguably important dimensions *came to be*. Our own empirical studies support the existence of differences between national jurisdictions on these dimensions. But such observations are snapshots in time: the differences have histories. Simply pointing to policy instruments as an explanation in our view obscures the processes through which such instruments came to be (i.e., their politics), and how these instruments shape the social and technological activities of offshore wind actors in both countries.

Even though installed capacity has increased dramatically over the past decade, offshore wind is one of the more technologically challenging and expensive renewable energy alternatives. The technical challenges are varied and include manufacturing reliable turbines for (and installing them in) harsh offshore environments, creating foundations for increasingly deep waters, and developing high voltage direct current transmission systems to connect large offshore wind parks to electricity grids. These challenges render offshore wind relatively expensive: the International Energy Agency (IEA) estimates the costs for offshore wind to be between 140–300 USD/MWh (compared to 50–140 USD/MWh for onshore wind and 40–90 USD/MWh for new coal (IEA, 2012)). Offshore wind currently receives major public financial support and other forms of 'protections' while there is also evidence of policy making significant changes to the selection environment to further accommodate offshore wind.

In the sustainability transitions literature, a conceptual perspective has been developed which specifically analyses such protections and the resulting spaces for sustainable technologies, which it refers to as niches. Strategic niche management (SNM) focuses analytical attention on the organisation of learning processes, the articulation of expectations, and the formation of supportive networks of actors (Kemp et al., 1998; Verbong et al., 2008; Quitzau et al., 2012). So, from an SNM