AUTHOR(S): COWELL, R., ELLIS, G., SHERRY-BRENNAN, F., STRACHAN, P.A. and TOKE, D.

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Energy transitions, sub-national government and regime flexibility: how has devolution in the United Kingdom affected renewable energy development?

Richard Cowell[1], Geraint Ellis[2], Fionnguala Sherry-Brennan[3], Peter A. Strachan[4] and David Toke[5]

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Richard Cowell is the corresponding author.

1 School of Geography and Planning
Cardiff University
Glamorgan Building
King Edward VII Avenue
Cardiff, CF10 3WA
United Kingdom
Tel.: +44 (0)29 20876684
Email: cowellrj@cardiff.ac.uk

2 School of Planning, Architecture & Civil Engineering
Queen's University Belfast
David Keir Building
Stranmillis Road
Belfast, BT9 5AG
United Kingdom
Tel: +44 (0) 2890974370
Email: g.ellis@qub.ac.uk

3Welsh School of Architecture,
Cardiff University
King Edward VII Avenue
Cardiff, CF10 3NB
Tel: +44 (0) 2920 879314
Email: sherry-brennanf@cardiff.ac.uk

4 Aberdeen Business School
Robert Gordon University
Garthdee Road
ABERDEEN, AB10 7QE
Scotland
United Kingdom
Tel: (+44) (0)1224 263426
Email: p.a.strachan@rgu.ac.uk

5 Department of Politics and International Relations
University of Aberdeen,
Edward Wright Building
King's College Regents Walk
Aberdeen, AB24 3FX,
United Kingdom
Tel: +44 (0) 1224 272558
Email: d.toke@abdn.ac.uk

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Abstract

Amidst growing analytical interest in the spatial dimensions of sustainable energy transitions, relatively little attention has been given to the role of sub-national government, or the ways in which dominant socio-technical regimes for energy navigate diverse contexts. This paper addresses these two concerns by assessing the impacts of devolution within the UK on renewable energy development. It draws principally on policy networks analysis as the basis of a comparative assessment, examining how far the governments of Northern Ireland, Scotland and Wales have translated their formal powers in the energy sphere into renewable energy outcomes. Scotland's relative success in facilitating rapid expansion of on-shore wind is attributed to a more enduring and cohesive policy community around renewable energy growth than in Northern Ireland and Wales, but this success has been adversely affected by fragmenting policy networks around renewables at national (UK) level. The analysis highlights especially the role of planning and consenting, as mechanisms by which devolved governments have worked to contain the potentially disruptive effects of opposition to major infrastructure investments, thereby enhancing regime reproduction.

Key Words

Renewable energy, devolution, policy networks, transition, United Kingdom

1 Introduction

Forging more sustainable patterns of development is an intrinsically spatial task, in that broader patterns of change are shaped by actions at multiple sites and scales (Cowell and Owens 1998). This is evidently true for the promotion of more sustainable forms of energy. Thus for example, the ability of the European Union to deliver on its targets of supplying 20% of energy from renewable sources by 2020 (2009/28/EC) and 27% by 2030 is shaped by the actions of member states and governments at other levels.

Since 2012, researchers have begun to engage more closely with the spatial dimensions of sustainability transitions (Hansen and Coenen 2015), including in the energy context (Bridge et al 2013). The 'methodological nationalism' of much transitions literature, in which the nation state was adopted, uncritically as the main analytical unit, has been challenged (Coenen et al 2012; Truffer and Coenen; 2012; Späth and Rohracher, 2013) with researchers exploring the interface between energy, transitions, space and scale (Hansen and Coenen 2015; Murphy 2015). Nevertheless, there remain deficits in our understanding. Firstly, while there is burgeoning research focused on some arenas of action such as the interface between energy and cities, others have pointed to the dearth of critical attention to sustainability transitions at regional and sub-national government levels (Bruyninckx et al 2012; Royles and MacEwen 2015), with few analysts tracing causal relations between energy outcomes and the complex panoply of actions undertaken by these governmental tiers (though see Smith 2007; Essletzbichler 2012; Hodson and Marvin 2013). Secondly, there is a need to consider whether actions in different places and arenas become constitutive of wider shifts in production or consumption (Hansen and Coenen 2015; see also Essletzbichler 2012); an agenda which requires more critical thinking about the spatial constitution of dominant regimes of energy provision – typically referred to as 'socio-technical regimes' – and the way in which these are organised across space, and become contextually embedded. These issues are connected, in that identifying how sub-national governments have engaged with energy – to refine, amplify, resist, or forge alternatives to wider, national norms – may illuminate how pathways towards more sustainable forms of energy provision might emerge, as well as how less sustainable forms persist.

In response to these concerns, this paper assesses the effects of devolution within the UK on the delivery of renewable electricity: wind, solar, biomass, hydro, wave and tidal power. It focuses primarily on the period from 1998, and compares renewable energy outcomes in Northern Ireland, Scotland and Wales, as well as England. The focus of the research is on renewable electricity generation, and emphasis is given to larger-scale facilities rather than micro-renewables, as this has been the dominant form of renewable energy investment in the UK through this period. The UK case is apposite for exploring the spatial dynamics of sustainability and energy transitions, in that 1998 saw the instigation of a major wave of political devolution that recast the spatial reach of 'national' energy policies promulgated by Westminster. While the UK situation has its own distinctive qualities (such as the persistence of relatively centralised government), the findings have relevance to other states with multi-level government structures like Germany (Schmid et al 2016) and Australia (Mey et al 2016), where sub-national government have a potentially important role in fostering energy transitions;.

Patterns of renewable energy development unfolding across the UK have been spatially uneven, suggesting that explanations of such outcomes can offer wider insights into how governance arrangements influence the differential prospects of energy transition (Kuzemko et al 2016). Figure

1 shows that for much of the first decade of the 21st century, Scotland could be considered a 'leader' in renewable energy in the UK, built mainly on rapid expansion of onshore wind power from 308MW installed in 2003 to 5216MW by 2013[1]. Renewable energy capacity in England only surpassed Scotland from 2011, relying more heavily on offshore wind, biomass co-firing in existing power plants and solar PV. Onshore wind has been the main technology deployed in Northern Ireland and Wales. When viewed in terms of capacity installed per capita of population or unit of GVA (Gross Value Added), then Scotland is again in the lead with all devolved territories display higher development rates than England (which has approximately 85% of the UK population; DECC 2013).

[Insert Figure 1 near here]

Clearly then, the level of renewable energy developed in the territories of the devolved governments makes them critical to overall UK transition trajectories. However, given the complex arrangements of powers across the different tiers of government, one cannot infer that energy development *within* any particular sub-national government area can be attributed neatly and solely to action *by* that government. For causal explanations, one needs to consider the processes by which patterns of energy development are constructed and held together. Moreover, the expansion of renewable energy in quantitative terms does not tell us everything we may wish to know about transition. After all, renewable energy technologies can be deployed in diverse transition pathways, which may challenge prevailing social and economic arrangements or serve to reproduce dominant socio-technical regimes (Lawhon and Murphy 2011; Hodson and Marvin 2013).

To underpin our conception of agency, and provide a framework for four-way comparison, we utilise network-based explanations of policy formulation and implementation, especially policy network analysis (Marsh and Rhodes 1992). This helps address a thematic concern for our analysis, to relate the formal powers notionally held by subnational governments (power *in potentia*) to their propensity and capacity to use them (power *in actu*, after Latour 1986). Recognition of the constructed nature of governance spatialities is provided by supportive insights from relational perspectives on space and scale.

The methodology for identifying policy networks and tracing causal effects draws on qualitative research, using two data sources, documents and semi-structured interviews. The documents analysed embrace government policy statements for energy and energy aspects of planning from across the four government territories, including correspondence between ministers as well as party manifestos, from the period 1998-2014. 80 interviews were conducted, with senior figures in government (at all scales, politicians and officers), energy companies and trade associations, but also non-governmental organisations and local planning authorities, between 2011 and 2013.[2] All the textual data was subjected to thematic coding (after Flick 2002). In the analysis below, we present the causal effects and actor relationships revealed by the coding exercise, such that the quotations provided are both constitutive and illustrative of the arguments being made (Mason 2002).

[1] DUKES 2015 Regional spreadsheet 2003-2014 installed capacity MW, September 2015, accessed 27th May 2016.

[2] To preserve interviewee anonymity, we use a code system to identify specific interviews. 'Scot' means interviewee was based in Scotland, 'NI', Northern Ireland, 'Wales', Wales and 'Eng' in England or UK level. 'Gov' indicates that the interviewee works for the government (officer or politicians), 'Adv' = advisor, 'LPA' = local planning authority; 'NGO' = non-governmental environmental group; 'Com' = company, 'Tra' = trade association; 'Aca' = Academic. The number at the end differentiates interviewees within the same category of respondent.

In sum, the aim of this paper is to explain the effects of devolved governments within the UK on renewable energy development. An important dimension of this is to evaluate why Scotland has been relatively successful, and reflect on the wider significance of this. In so doing, it responds to calls by Hansen and Coenen (2015) for greater use of comparative analysis to understand better the causal factors driving sustainability transitions, including the need to understand how 'embedded norms and power affect policy choices, rules, regulations and outcomes' (Kuzemko et al 2016, p 98), and to throw light on the types of political and institutional conditions that make a shift to renewables more likely. The analysis also avoids an unthinking elision of 'transition' with 'technological innovation', to consider the role of subnational government in infrastructure implementation, which is an under-examined dimension of regime persistence or change. The theoretical position adopted is discussed in more detail in the next section, followed by an account of the intersections between devolution in the UK and energy governance. The way that the devolved governments have utilised two key policy instruments – financial support for renewable and land use planning - is then outlined and the development impacts assessed. Following this, policy networks analysis is used to explain the policy formulation and energy governance approaches of the devolved governments. The paper concludes by summarising key findings.

2 Understanding energy transitions

2.1 Spatial dimensions in the multi-level perspective

We take as our start point the 'multi-level perspective' (MLP) (Geels 2002) on socio-technical transitions, though there is little need to elaborate its precepts here. A central concept is that of 'socio-technical regimes' which – as in the case of energy – characterise particular systems of provision and are embedded in economic processes, consumption practices, regulatory arrangements and infrastructure. These regimes are seen as 'dynamically stable' (Geels 2011), sustaining and sustained by incumbent actors. Change may be triggered by 'niche' innovations, where they can coalesce and challenge the socio-technical regime. Opportunities for such challenges can arise from exogenous shifts in society, economy or politics – termed the 'landscape' level – to the extent that they destabilise the existing regime, precipitating a range of potential transition pathways (Geels et al 2016).

Analysts have started considering how the MLP might be 'spatialized', especially in terms of the multi-scalar nature of transition processes and their contextually embedded nature. A number of debates are pertinent to our analysis here. The first is the frequently-made warning that the 'levels' in the multi-level perspective ought not be conflated with specific, territorial scales arranged hierarchically, but by degrees of stability (Geels 2011). Thus 'niches' - notionally relatively 'protective spaces' in which there is more scope for novelties to emerge - have been recognised as composed of multiple elements, some locally embedded but others, like financing, arising from actions in other arenas such as national government (see Raven et al 2012). Less frequently examined – but highly pertinent to a consideration of the role of sub-national government – is the spatial constitution and reach of the socio-technical regimes. Truffer and Coenen (2012) have proposed that such regimes should not be seen as (spatially) monolithic, or nationally bounded, but as cutting across and connecting different territories and scales that, as they are orchestrated across space, unevenly distribute opportunities for actions that may stabilise or destabilise them. These insightful observations have been under-exploited to date.

However, understanding the contextual embeddedness of socio-technical regimes in regions and places (Lawhon and Murphy 2011) would benefit from questioning the tacit inference in some transitions thinking that regimes are inherently less exposed to the diverse exigencies of context than niches. Research from science and technology studies and techno-politics (Barry 2001), proposes that the elements that constitute regimes (markets, infrastructure, regulatory rules) are always a potentially fragile abstraction from the multiplicity of elements, forms and processes beyond the system, which they interact with, and with which they are in 'contingent, uneasy and unstable interrelationships' (Ong and Collier 2005, 12). Careful attention is required to how contextual conditions impinge on them if they are to be reproduced. Indeed, aspects of regime reproduction and development may also require 'protective spaces' that insulate them from disruption or political critique. Furthermore, it may be problematic to treat socio-technical regimes as if homogeneous configuration across space was always a defining quality (Hansen and Coenen 2015). For regimes to be durable across space and time, it may be desirable that key elements are open to contextual adaptation so that they work in diverse settings (after Laet 2000). Spatial flexibility may therefore serve persistence as well as transformation.

This leads us to a second set of debates, concerning the emphasis within much transition thinking on technological innovation as the main driver of change (Hansen and Coenen 2015; Geels 2011).The spatial dynamics of implementation – the rolling out of technologies, at scale, both those that are newer and those that are more mature - has been less well considered despite being equally critical to transition dynamics (Cowell 2016). Understanding adoption and implementation requires transitions analysts to give greater attention to infrastructure siting and planning processes, which brings into view the wider social and political conditions in which technologies and infrastructures are deployed: issues captured by Wüsthagen et al (2007) as dimensions of 'social acceptability'. Infrastructure planning and consenting, by dint of their potential openness to heterogeneous and competing interests (concerned publics, impacted environments) are key spheres in which contextual embeddedness has to be negotiated.

These perspectives provide ways of interpreting the potential effects of sub-national government on energy transition pathways. Greater contextual attunement has long been held as a virtue of more localised action. Indeed, the positive normative claims that are widely made for local action on sustainability, that it facilities better links with actors, and leads to policies better adapted to local conditions, have also been made in arguments for political devolution and have relevance to energy issues. Sub-national governments may indeed facilitate innovative technological or social practices that are responsive to local contexts and constituencies. However, they may also act to facilitate the reproduction of dominant socio-technical regimes as much as radical alternatives. .

2.2 Actors and networks

From this discussion one can see how government at any level may pursue a diversity of actions and agendas in shaping energy pathways. However to conceptualise agency and the links to outcomes one needs to move beyond the multi-level perspective (MLP) on transitions. As Geels (2011) suggests, the MLP is a middle range theory that can benefit from the insights of 'auxiliary theories' drawn from other perspectives.

There is an overlapping consensus that to understand transitions it is important to understand networks of actors – their composition, configuration (sectoral and spatial), strategies and

interactions (e.g. Verbong and Loorbach 2010; Kern et al 2014). In many cases, researchers are less specific on how precisely networks of actors should be analysed, and with what causal theories in mind. The requirement for a clear theoretical framework increases where comparative research is to be conducted. Moreover, any such framework should look beyond those sets of actors working to 'create' new artefacts or pathways (Lawhon and Murphy 2011), and be sensitive to the likelihood that the governance of energy is the subject of struggle, entailing competing conceptions of sustainability and alternative pathways. Relations between actors may be conflictual as well as consensual (Szarka 2007; Geels et al 2016), and how conflicts are managed may have a significant bearing upon outcomes.

The theoretical framework adopted here is 'policy networks analysis', representing the constellations of regime actors that encourage or resist energy transition at any particular scale. In the Marsh-Rhodes formulation (Marsh and Rhodes 1992), policy networks analysis identifies 'policy communities' where a relatively small, restricted number of key actors negotiate with government to decide policy in a particular specialist field. The actors share core policy goals, enjoying stable relationships based on high levels of interdependence, which encourages policy stability and continuity. This interdependence means that actors 'share' resources in order to devise and enact policies that are mutually beneficial. The category of 'interdependencies' that shape network form is often characterised in terms of resources that can be pooled and exchanged. Such resources, suggests Rhodes (1999) can be constitutional-legal, hierarchical (concerned with control and supervision), financial, political (e.g. legitimacy) and informational, though Rhodes did not set out to be exhaustive. These are resources that may be possessed by the interest groups and the government actors in the network. In general the biggest example of policy communities is how the government, in wishing to deliver its preferred policies, needs the cooperation of the dominant interests in that field which, in exchange, acquire a big influence over the shape of at least the details of that policy. Indeed, in modern complex societies no one actor can address issues single-handedly. Policy fields with networks characterised by policy communities are contrasted with fields shaped by 'issues networks', where a larger, more fluid set of actors, of limited interdependence, are concerned with an issue but contestation of core goals remains more omnipresent. Influence on policy is more dispersed and policy turbulence can be a result. In the context of issues networks, policies may fail to emerge, or may have to be imposed with little give and take (that is resource interdependency and exchange) between members.

Using this framework, one might expect actor network coherence to affect patterns of policy change and development, though the significance of this may vary whether one is concerned with opening up energy pathway choices or with implementation. On the latter, one might hypothesise that renewable energy expansion is likely to be most effective where a policy community can sustain consistent support over time, to underpin what are often large and long-term investments, and to struggle where issues networks prevail (see for example Lauber 2012).

Policy network analysis offers potential but, like transition theories, needs interpretation in a manner sensitive to the spatial constitution of agency and governance. As Haughton et al (2010) suggest, shifting the scale of government structures can affect the constellation of actors that participate in policy and the policies that emerge. Moreover, a focus on *internal* network configurations between actors *within* a territory risks neglecting the ways in which agency is jointly produced by the interactions of actors centred upon a particular arena with others beyond their territorial space (Carter and Smith 2009). Transition researchers have followed economic geographers in advocating the adoption of strategic-relational perspectives on regional space

(Raven et al 2012; Murphy 2015). Such perspectives can alert us to the ways in which some institutions – notably those of the state, but also perhaps major businesses – can greatly affect the operation of those trying to construct effective policy communities at sub-national scale (MacLeod and Goodwin 1999), which in turn can influence the objectives, instruments, rules, practices and outcomes of energy transitions (Kuzemko et al 2016).

Political scientists have developed concepts that help to link actor configurations with the evolving, constructed nature of governance territoriality. One might expect to see devolved governments forming the focus of 'territorial policy communities' (Bomberg 1994), characterised by a relatively small number of actors, with close, informal linkages, working in an integrated fashion across different policy instruments. Arguably one should be interested in the extent to which policy communities become progressively territorialised; sometimes becoming more embedded over time in the space of sub-national government (Carter and Smith 2009), yet also needing to negotiate dependence on national state actions to achieve particular goals (Dawley et al 2015). Viewed in this way, understanding the power of sub-national governments to act is not merely a matter of identifying the formal powers at their disposal, but also of tracing whether other actors become aligned around them, or choose to prioritise sub-national policy arenas for achieving their objectives.

If policy network analysis provides a simple, formal structure for comparative causal analysis, there are also some deficiencies that ought to be recognised. 'Resource interdependencies' is a broad, open-ended set of entities and this breadth is both a weakness and a strength, on the one hand placing pressure on analysts' judgement about the relative 'size' of particular interdependencies constituted by dissimilar resource elements, yet on the other offering heuristic value (Toke 2010) and giving the framework the flexibility to embrace a diverse set of factors. Recognition also needs to be given to how non-human elements can exert agency in shaping change. Thus for example, the availability of indigenous energy sources, or 'materially obdurate infrastructures' like grid systems (Hodson and Marvin 2013) can help reproduce the dominance and spatial reach of major incumbent actors (e.g. grid operators, market regulators). Potential development sites are also an important dimension of systems of energy provision, with material as well as affective and institutional dimensions.

The analysis proceeds by charting how the devolved governments in the UK have sought to affect renewable energy development, beginning by considering how devolution created new actors and re-distributed formal powers within the energy sphere.

3 UK devolution and the governance of the electricity sector

3.1 New actors, legacies and distributions of power

The prime effect of devolution in the UK from 1998 has been to create a set of new political and government actors for the territories of Northern Ireland, Scotland and Wales. In each of the territories new assemblies and executives have been given the powers formerly exercised directly by central government ministers. In terms of policy network analysis, devolution brings with it a reallocation of resources between Westminster and the devolved governments - constitutional-legal, hierarchical, financial and political – but the reallocation is asymmetric and complex. Scotland received a Parliament with primary legislative and tax-varying powers, Northern Ireland received primary legislative responsibilities but no powers over tax while the Wales' Assembly initially received only secondary legislative powers. Complexity arises from the fact that the

creation of new, sub-national government actors did not create a neat division of powers and responsibilities between Westminster and the devolved governments, with energy and electricity being a particularly grey 'grey area' (Keating 2005), as Table 1 summarises.

[Insert Table 1 near here]

Central government in Westminster remains a pivotal actor, retaining control of key constitutional-legal, hierarchical and financial resources in the energy sphere. The main centres of governing capability are still located in UK government departments - the Department of Energy and Climate Change [3](DECC) - with financial support for renewable energy subject to the budgetary control of the Treasury (Toke 2010). Arms-length regulators also exercise significant authority in managing Great Britain-wide energy markets, as does the National Grid Company in its role as operator of the grid network across England, Scotland and Wales. Security of supply, markets and competitiveness thus remain central government concerns.

Of the devolved governments, Northern Ireland possesses the widest suite of formal energy-related powers[4], including powers to design and operate systems of market support. This reflects the fact that electricity networks in Northern Ireland have historically been functionally detached from the rest of the UK, exhibiting greater cross-border integration with the Republic of Ireland. In Scotland, key aspects of energy policy are 'executively devolved', including control over major energy consents and planning, and operational control over aspects of market support. The Welsh Government has the fewest energy-related powers, of which the most pertinent are in planning policy. All of the devolved governments received responsibility for discretionary economic development funding which can be spent, *inter alia*, on energy-related projects.

So, devolution has to some degree dispersed formal UK government capacities to steer the socio-technical regime for electricity beyond Westminster, but 'formal competencies are only an indicator of the potential power of an organization' (Coulson and Ferrario 2007, p.607). Policy network analysis alerts us to how far the devolved governments interact with other actors, and thus where and how power is actually exerted – issues we return to below. Before this, however, it is necessary to assess how the devolved governments have utilised the powers available to them to affect renewable energy development and the outcomes. The account focuses on market support for renewable energy and land use planning, both instruments being critical in shaping renewable energy deployment.

3.2 Market support

In most countries, renewable energy technologies receive some form of financial support to enable them to compete with conventional power generation. In the UK, central government actors – DECC and the Treasury – have the prime role in designing market support systems: in policy network analysis terms, they possess the key financial and hierarchical resources. Furthermore, market supports systems have operated in a broadly consistent fashion across the nation. Thus, the switch from financial support issued through the Non-Fossil Fuel Obligation, which was rather unsuccessful (Mitchell 1996), to the Renewables Obligation (RO) in 2002 (2005 in Northern

[3] The central government department with responsibility for energy has changed names frequently since 1998. We refer to it as DECC throughout, for simplicity, even though this name and arrangement strictly only applied from 2008. DECC was abolished in 2016 and its functions passed to other departments.

[4] Apart from nuclear energy, of which it has none.

Ireland) stimulated an upturn in renewable energy investment observable in all parts of the UK (see Figure 1).[5] A key question then, is whether the devolved governments have been able to use their more limited powers to shape market support and, in turn, whether this has affected the delivery of renewable energy in their territories.

The RO is essentially a quota/tradable certificate system of support which sets electricity suppliers an obligation to achieve increasing targets of renewable energy. 'Renewables Obligation Certificates' (ROCs) are issued to renewable generators in respect of the units of electricity they produce, which suppliers must then purchase or suffer financial penalties for every unit of energy they fail to supply towards their target. The RO was formally broken up into three separate mechanisms for England and Wales (Wales having no autonomy here), Scotland and Northern Ireland (see Table 1). However, the ROCs can be transferred between operators and thus between the different territories, so creating a single UK market. The costs of complying with the RO are paid ultimately by all UK citizens through their electricity bills.

The devolved governments have used their powers to emphasise different technologies. In Northern Ireland the NIRO has a special banding for small-scale renewables (<500kW), including farm-scale anaerobic digestion. The Scottish Government led the UK in using its operational powers to set higher ROC levels for particular technologies, notably newer, emerging wave and tidal stream power, allocating them 5 and 3 ROCs/megawatt hour (MWh) respectively (Winskel 2007). This differential support only operated from 2008 to 2011, until the UK government extended the higher bandings to England and Wales, but interviewees in Wales and Northern Ireland suggest that this 'first mover' action contributed to the greater growth of commercialisation and testing facilities for these technologies in Scotland, whereas elsewhere in the UK local companies were perceived as losing out..

However, although Scotland and Northern Ireland have altered the RO for emergent technologies, this power has not been very important to date in shaping the overall volumes of renewable energy installed in these territories. More significant is the fact that both benefit from being part of an integrated, UK-wide pool of market support. The rapid growth of established technologies, especially onshore wind in Scotland, has been supported by the way that the RO channels resources to projects from all UK electricity consumers. Northern Ireland elected to be part of the UK-wide RO system for financial reasons, despite having the constitutional legal resources to pursue its own support arrangements. If it operated its own financial support scheme in isolation, or in collaboration with the Republic of Ireland, the smaller pool of electricity consumers would mean less money available for projects in Northern Ireland.

The fact that the Scottish Government has been seen as delivering a rapid expansion of renewable energy has given it important hierarchical and political resources for negotiation in UK-centred networks with Westminster, especially given interdependencies created by the UK's requirement to deliver on EU renewable energy targets. We discuss this further below. However, this has not led to the devolved governments being able to influence the development of market support in any fundamental way. So, from 2010 deepening UK government concerns about the cost-effectiveness of the RO led to its replacement by a new system of support - Contracts for Difference (CfD) (DECC, 2011). The Scottish Government had good reason to object: CfD was designed, in part, to

[5]Feed-in Tariffs (FIT) are operated in a consistent way across England, Scotland and Wales, in a process managed by Ofgem, but do not operate in Northern Ireland. FITs only kicked in in 2010 and only fund projects up to 5MW installed capacity. For these reasons they have not received detailed consideration in this paper.

support new nuclear capacity to which the Scottish Government was opposed, and was also to be more firmly centralised in its operation, thus extinguishing the executive powers that Scotland enjoyed under the RO. Although the Scottish Government did raise objections[6] they were not sustained; a further recognition of the importance of the financial resource benefits arising from access to a UK-wide pool of resources if Scotland is to drive a major renewable energy expansion within their territory..

3.3 Planning and consents onshore

Renewable energy companies often decry planning as a key 'barrier' to development. Whatever the veracity of this claim (Cowell 2007), there is no doubt that planning processes shape the engagement of different actors, mediate the contextual factors admissible in making decisions, and thereby affect the availability of development sites. Moreover, land use planning and energy consenting are almost entirely devolved (see Table 1), giving much scope for autonomous policy development. Table 2 captures how planning arrangements for renewable energy have been adjusted since devolution, showing that a key axis of variation is the extent to which devolved governments have sought to determine consents centrally, and steer local government decision-making. In policy network analysis terms, planning embodies important hierarchical resources i.e. the authority to direct and supervise decision-making.

[Insert Tables 2 and Table 3 near here]

A distinctive quality of the planning system for renewable energy in Northern Ireland is that local authorities have not had major planning powers. Until April 2015, all planning applications for renewable energy in Northern Ireland were determined centrally by the Department of the Environment. Decisions were underpinned by policy guidance for renewable energy, but this adopted more flexible, criteria-based approaches to siting issues than seen elsewhere in the UK. Centralised consenting and flexible guidance help explain why Northern Ireland has exhibited the highest consent rate for renewable energy applications of any part of the UK (see Table 3), but one also needs to consider the limited significance of potentially disruptive actors, as discussed below.

In England and Wales, an enduring facet of the planning system that structures the distribution of hierarchical resources is that onshore energy projects over 50MW are determined by Westminster while those below are determined by local government. In both territories, however, planning arrangements altered significantly after 1998 as governments sought to respond to growing public opposition to onshore wind in particular. In order to underpin the delivery of renewable energy and navigate environmental concerns, the Welsh Government used its policy-making powers to introduce a national zoning framework to give a supportive policy context for large-scale on-shore wind energy development in seven demarcated areas of upland Wales (WAG 2005; Cowell 2007). This guidance was interpreted by the wind energy sector as stabilising the conditions for investment, with the zones attracting applications totalling over 2000MW in capacity – twice initial expectations. This level of interest exceeds anything achieved onshore in comparable regions of England (DECC 2013). However, the resulting spatial concentration of large-scale windfarm applications and attendant requirement for major new grid connections fomented vociferous public protest, leading to refusals of projects within the seven zones despite the notionally supportive

[6] Correspondence, Alex Salmond to Chris Huhne, 12th July 2011.

policy. As a result the installation of new wind capacity has been slower and patchier than anticipated.

Westminster planning policy for renewable energy in England can be characterised into two phases. From 1998 until 2010, successive Labour Governments sought to create a more supportive policy framework, with pro-development planning guidance issued to local planning authorities. Beyond a tepid interest in regional spatial zoning and sub-national targets, these governments largely ignored NGO pressure for more strategic spatial guidance. However, as part of wider moves to streamline and accelerate major infrastructure consenting, energy projects over 50MW (including renewables) were subjected to new 'fast track' procedures. The 2010 election saw the creation of a coalition government, with a dominant Conservative Party contingent seeking to act on public disquiet about wind energy in particular, leading to successive steps to give local planning authorities more control over renewable energy applications (see Table 2). These steps made local configurations of actors more important in decision-making (DCLG 2012; Harvey and Walker 2013), which has been perceived by the industry as adversely affecting consent rates (indeed, see Table 3).

Interviewees were clear in perceiving that when it came to planning regimes for onshore wind, 'the process in Scotland is better' (ScotCom1; also ScotGov1, EngGov1) than England or Wales. Interestingly, however, devolution triggered only relatively incremental changes. The Scottish Government has continued to determine 'major' energy projects centrally (those over 50MW) but without the major streamlining reforms undertaken by Westminster. The significance of these arrangements is magnified by the fact that Scotland has more large sites for wind farms, thus many more projects weigh in over 50MW and are determined centrally. Of the 27 consented wind farms over 50MW in the UK in operation by the start of 2016, 20 are in Scotland.[7] With renewable energy proposals below 50MW, the Scottish Government has worked actively with local planning authorities (LPAs) to help them take a facilitative approach to development. Although successive policy guidance has encouraged LPAs to identify preferred areas for wind energy and areas where it would be less acceptable, the Scottish Government has intervened to challenge authorities that pursue policies it regards as too spatially restrictive[8].

No government – national/UK or devolved - has found an effective way to expedite new high voltage grid capacity. Such schemes are usually conflictual and slow to come to fruition, a reflection of disruptive landscape and environmental effects of threading highly visible infrastructure through rural environments and the resulting opposition. The 220km Beauly-Denny line, designed to enhance the grid's capacity to export renewable energy from the Scottish Highlands, took nine years from application to the issuing of consent. However, if the devolved governments have not been able to manage or reduce public opposition to such schemes, the Scottish Government did at least convey security of outcome. Grid enhancement schemes were identified in its National Planning Frameworks as of 'national interest', to which Governmental support was attached, thus underpinning business confidence.

3.4 The view offshore

[7] REUK database, accessed 26th April 2016.

[8] See also letters from Derek Mackay, Minister for Local Government and Planning of the Scottish Government, to Moray Council and Fife Council, 6th August 2013.

For the period up to 2009 the development of new renewable energy capacity in the UK was largely a story of the uneven development of on-shore wind. However, since then, offshore wind has become a bigger fraction of overall UK renewable energy capacity, reaching 5100MW by 2015[9]. Moreover, examining the offshore realm casts a different light on the effects of devolved government.

Given that the devolved governments have all expressed strong interest in expanding marine renewables, it is noteworthy that Kern et al's explanation (2014) of the rise of offshore wind does not identify them as significant actors. Our research concurs that key resources are held by the UK Government, which was central in increasing market support for offshore wind (to 2 ROCs/MWh), and the Crown Estate, a UK-wide public agency that has acted 'entrepreneurially' (Kern et al 2014, 640) in organising the licensing of areas of sea to prospective energy developers. The emphasis on large-scale investments has also reinforced the role of major construction and energy companies, most of them multi-national. English regional development agencies are also seen as important (Dawley et al 2015). Does this mean that devolved governments have had little effect on outcomes in this sector?

Devolved governments have been active in spheres where they have relevant powers, such as planning and consenting (see Table 3). The Scottish Government created a dedicated in-house agency, Marine Scotland, to provide a 'one stop shop' consenting/licensing agency for marine projects – exploiting its greater scope to pull together a more integrated set of arrangements than can readily be achieved for England or Wales. However, while some offshore wind farms have attracted public opposition (Ellis et al 2007; BBC News 2014), only rarely has this actually thwarted projects compared to onshore wind, with planning issues offshore being more concerned with mediating the interests of organisational actors in fishing, navigation and conservation (Kidd et al 2012). In all parts of the UK consenting is centralised i.e. the role of local government is limited. These factors make differences in planning procedures between devolved governments less relevant to development outcomes.

The promotion of emergent wave and tidal stream technologies has been given great attention by the devolved governments. We noted above how Scotland had varied RO support to attain a competitive advantage for research and development, but the devolved governments have also used their discretionary economic development spending. Scotland successfully pulled in UK-government funded development facilities like the Catapult centre for Offshore Renewable Energy, showing its status within cross-UK strategies for industrial development. It has also provided the biggest share of funding for the European Marine Energy Centre, based in Orkney, and issued leases for several commercial sized schemes in its Pentland Firth marine renewable development zone (see also Dawley et al 2015). The devolved governments of Northern Ireland and Wales have also supported demonstration and utility-scale facilities around their coasts (e.g. the SeaGen project in Northern Ireland and DeltaStream in Wales). In addition, the Scottish and Northern Ireland governments have projected themselves as leading advocates for marine renewables, and been active in raising the profile of marine renewables within the European Union. They have been leading partners in EU-funded projects to promote marine energy grids that would better capture potential energy development (Scottish Government et al 2012).

What is questionable is whether actions by the devolved governments have markedly affected deployment to date. Patterns of offshore wind development reflect mainly the intersection of

[9] Digest of UK Energy Statistics 2016, Chapter 6

economics, shaped by national-level policy networks around market support centred on Westminster, and physical geography. Most turbines have been installed in the English North Sea and Liverpool Bay (bridging England and Wales), where the shallow seas reduce development costs, and criticism from publics and landscape groups has been limited in its effect (Cowell et al 2012). Scottish and Northern Irish licensed areas tend to be in deeper water, which raises costs; a critical factor shaping project realisation as UK policy agendas came increasingly to emphasise cost reduction. Consequently, offshore wind energy development remains concentrated in the English North Sea; wave and tidal energy technologies remain at early stages of commercialisation, with progress highly vulnerable to UK-wide turbulence in funding (ENDS 2015a).

4 Results and discussion – explaining policy choices and outcomes

The analysis above assesses how policy choices by the devolved governments have affected renewable energy outcomes. How then, might these choices be explained? The patterns of renewable energy development are not a simplistic path-dependent extrapolation of pre-devolution trends. Scotland already had significant hydro capacity by 1998 but this has not been the technological basis of expansion since devolution. Wales had 150MW of on-shore wind installed by 1998, then a major part of the UK total, 'however after a good start things started to splutter' (WalesTRA1). Proximity between key actors is widely seen as helping to facilitate network formation (Hansen and Coenen 2015), so one might expect the smaller size of sub-national governments to facilitate solidaristic, territorial policy communities (Bomberg 1994). Our interviewees attested to the small size and much greater accessibility of policy-relevant actors in all three devolved governments, describing them as 'a bit of a village' (ScotNGO1), but the difference in renewable energy outcomes between them indicates that actor proximity should not be viewed in simplistic, spatial terms. Further application of policy network analysis can however, enhance our explanation of the events observed.

4.1 Policy networks and Scottish 'success'?

Policy network analysis seems to explain why it is in Scotland that conditions have been most conducive to the large-scale delivery of renewable energy, with many interviews identifying 'Scotland as being the leader' (NITRA1). This is attributed partly to the political resources deployed by the Scottish National Party and its leadership, which has long regarded energy development as central to the economic future of an independent Scotland (Hamilton 2002), and is seen as having 'gone gung-ho for renewables' since forming their first government in 2007 (ScotGov4). Importantly, however, the expansion of renewable energy has attracted support in Scotland across the main three political parties - SNP, Labour and the Liberal Democrats - from the first days of devolved government (SNP 1999; Scottish Government 2001). Thus, 'in Scotland right from day one there was this impression that everything was going to be the future of renewables (which) meant, in a nutshell, "come to Scotland"' (WalesGOV4). This temporal continuity in political resources created the time for governing capacity to be developed, agendas to be refined and interdependencies between actors to emerge.

Integral to this is the existence within Scotland of a series of actors with relevant resources that could then be pulled into close alignment. This includes major energy businesses such as

ScottishPower[10] and Scottish and Southern Energy, long-standing national and regional development agencies (Scottish Enterprise and Highlands and Islands Enterprise); as well as a trade association for renewable energy (Scottish Renewables), formed in 1996 and autonomous from trade associations elsewhere in the UK. These actors are all supportive of the Scottish Government's expansionist aspirations for renewable energy, and possess financial and other resources for delivery. The territorial connections of these actors to Scotland are relatively strong, but they have also been cultivated actively by the Scottish Government, which brought them into the energy policy-making process, notably in the Energy Advisory Board (seen by some interviewees as a more important arena for discussion than the Scottish Parliament) and the Forum for Renewable Energy Development in Scotland. Underpinning this collaboration, 'it's about convergence of interest and capability and opportunity, to be frank' (ScotAdv1); a recognition of the powerful interdependencies between renewable energy targets, the financial resources of business actors and the hierarchical and political resources that the Scottish Government possessed. Scottish Governments have thus been able to mobilise a strong and relatively territorialized policy community.

The policy community surrounding energy development in Scotland in turn helps legitimise and rationalise the Scottish Government's full and assertive use of the powers made available to it by the devolution settlement. As one former minister put it, 'we took energy on and worked with that almost as if it was an unspoken claim of right' (ScotGov4), while the industry feels that 'civil servants are empowered to get on and address barriers' (ScotCom2). This is very clear in the preparedness of Scottish Government officers and ministers to encourage local planning authorities to take a facilitative approach to projects.

One can see how the interdependencies characteristic of policy communities (Marsh and Rhodes 1992) have built up over time. Integral to this temporal dynamic is that Scottish Governments have not just set successively higher domestic renewable energy targets but *have met them*; a 'relational asset' (Murphy 2015, 84) reinforcing Scottish Government credibility with the industry players. The Scottish Government's reputation for helping deliver on UK-wide renewable energy targets also secured it sympathetic relations within Westminster-based networks. Thus interviewees in England recall 'I've heard DECC officials frequently say "we need the Scots" in order to deliver those targets' (EngCom1). In terms of outcomes, the Scottish Government had long argued for reforms to transmission charges which would enable Scottish renewable generators to pay lower rates for sending their power south to England. DECC ministers report 'that was one of the big issues that [the Scottish First Minister] was continually raising with me in my time as Secretary of State and I was continually reassuring him that I was completely onside' (ENGGOv8). In 2012, OFGEM announced proposals which partly met the Scottish Government's demands (Toke et al 2013).

Analysts of sustainability transitions have been criticised for giving undue attention to elite alignment around technological change, neglecting how orchestrating cohesion can marginalise alternative voices (Lawhon and Murphy 2011; Späth and Rohracher 2012), yet marginalisation of critical voices may be central to explaining how certain development pathways persist and expand. Again, policy network analysis can be insightful. Scotland's renewable energy expansion has certainly encountered conflicts, especially over on-shore wind and major electricity grid reinforcements, with sections of the public and landscape NGOs among the major actors. However, such groups have found it harder to exercise influence in Scotland than in Wales or

[10] Sold to Iberdrola in 2006.

England, such that renewable energy expansion has scarcely been environmentally constrained. This is partly because larger swathes of Scotland's prospective windfarm sites lie outside nationally protected landscapes or symbolically important 'wild lands', diminishing the policy resources of actors arguing for their protection. NGOs concerned with more 'domesticated' rural landscapes are far smaller than their English equivalents, and there is a perception that the Scottish Government has deployed its hierarchical resources to discipline local authorities and statutory conservation bodies, which have been 'completely under the cosh' (ScotNGO3). Such factors have made it difficult to challenge a sustained, Scottish economic narrative around renewable energy expansion which enjoys consistent high-level support:

> 'There's these phrases about world leadership in renewable technology and "the Saudi Arabia of renewable energy", and so we keep hearing these phrases all the time and they have almost become unchallengeable' (ScotNGO1).

Indeed, alignment of government and industry actors has been facilitated by the policy framing of renewable energy. Successive Scottish Governments have positioned renewable energy expansion as central to Scotland's national economic and environmental future; with a sustained emphasis on green jobs, growth and international competitive advantage (see SNP 1999, 2003, 2007, 2011). As cause and effect of this, party politicisation of renewable energy expansion has been negligible.

4.2 Northern Ireland and Wales as counterfactual cases?

The form of policy network seems to matter to renewable energy outcomes, and this deduction is reinforced when we turn to explain why renewable energy development in the other devolved government territories has proven slower than in Scotland. In short, our research found less evidence of sustained, territorial policy communities forming around renewable energy expansion.

In Northern Ireland, renewable energy displays qualities of an issues network (Marsh and Rhodes 1992), but limited cohesion *within* government is a more conspicuous element, reflecting the enduring sectarian nature of politics in this territory. As a result, the devolved Assembly only emerged fully from suspension in 2007. Moreover, the power-sharing arrangements that allocate ministerial postings to all the main parties leave responsibilities for renewable energy fragmented between a number of departments, characterised in their operation as 'we get on with our business and you get on with yours' (NIGOV2). Potential resource interdependencies go un-exploited. This makes it hard to find clear champions to drive the agenda, deploying political resources, or to forge policy communities around renewables expansion. Political manifestos have tended to frame renewable energy in terms of helping the rural economy, reflecting the importance of agriculture sector actors in Northern Ireland politics, for which banding the NIRO to support anaerobic digestion is one policy outcome. All this helps to explain why renewable energy has been slower to take-off in Northern Ireland compared to Scotland, despite a wider set of formal powers. Offsetting the effects of these fragmentary policy networks, however, has been the configuration of actors around planning. Political involvement in renewable energy projects has been low in Northern Ireland, as have levels of local opposition (Barry and Doran, 2009), allowing development interests to maintain the case for a liberal planning policies that maximise siting flexibility. Despite its late starting position, on-shore wind in Northern Ireland has seen very rapid expansion rates compared to other parts of the UK.

In Wales the Welsh Government's more limited financial and hierarchical powers, and the more limited territorial congruity between government and business interests than in Scotland,, problematises the creation of territorial policy communities. Few major energy businesses have headquarters in Wales, and the staffing capacity of UK-wide renewable energy trade associations in Wales was minimal (consisting of one officer until 2012). Within the structure of the Welsh Government, energy had spent periods until 2011 closely tied to climate change policy, creating a 'disconnection from the core economic development thinking' (WalesNGO2), leading to industry perceptions that the sector itself was required to lead on delivery. Elite consensus has also been more difficult to maintain. The National Assembly Sustainable Energy Group, which aimed at being cross-party, failed to attract consistent ministerial buy-in and folded in 2010. The Welsh Government hoped to forge a stable, territorial policy community around wind energy expansion by engaging key actors from the industry, environment and local government sectors in the creation of new, spatial planning guidance (Stevenson 2009). Consensus did not materialise. Although industry actors came to back the strategy with investment, and it has been supported by major conservation bodies, local community groups and landscape NGOs like the Campaign for the Protection of Rural Wales were never fully supportive. As the impacts of major onshore wind and grid expansion became clearer, so opponents successfully politicised the issues, with pro-renewable energy politicians losing seats in local, general (UK) and Assembly elections to Conservative Party representatives with more oppositional stances. As a result, local planning authorities in mid-Wales have been difficult to bring into alignment with the Welsh Government policy.

4.3 Fragmenting policy communities in England

Although policy networks around renewable energy in Westminster were always more diffuse because of the bigger size of the UK government, since 2010 is has been possible to observe a significant fragmentation of renewable energy policy communities and their evolution into a more conflictual issues network. Mounting local public opposition to on-shore wind (and field-scale solar), in parts of England attained greater national political salience with the election of the 2010 Coalition Government, with the Conservative contingent more electorally sensitive to rural opposition and sceptical of key tenets of previous, Labour environmental agendas (ENDS 2011). Because Conservative Party ministers controlled the planning ministry, one policy outcome was the legitimising of more restrictive local planning approaches to on-shore wind (see Table 2), with actors that previously found it difficult to influence the pro-renewables regimes becoming more influential. As one countryside NGO officer said, 'we got rather more policy change than we expected'.[11]

However, whereas changes to planning apply only to England, pressure from Conservative Party MPs[12] also informed government actions with a wider spatial reach, such as moves swiftly to scale back market support for on-shore wind. The Coalition government also pressed for the EU to adopt decarbonisation targets rather than national renewable energy targets post-2020. Both moves were

[11] Pers comm.. 30th January 2013.

[12] The call by 100 MPs for reduced financial support for on-shore wind was mostly Conservative Party members, but did include two Liberal Democrats which, perhaps unsurprisingly, represented constituencies in rural Wales facing large-scale wind farm development and grid reinforcement.

designed *inter alia* to allow greater flexibility in energy pathway choice (ENDS 2015b), allowing nuclear power to play a major role.

This recalibration of policy objectives and technology choices marginalised renewable energy actors within Westminster policy networks, as the resources they possessed – be they hierarchical, financial or political - became less relevant to a government looking to other technological pathways. This included devolved governments like Scotland who, whatever interdependencies they may have developed with pro-renewable energy actors in DECC, are shown to be less influential in key Westminster policy networks shaping future UK energy development than the Treasury and 'insider' industrial and energy organisations pushing for energy market reform and nuclear expansion (Toke and Nielsen 2015). As one Northern Ireland energy company put it "'Westminster doesn't give a tootle about what happens in Belfast… they just ignore it as they have bigger fish to fry…" (NICom2). The spatial geometries of financial resources, with market support controlled by the Treasury in the UK government, are a clear illustration of strategic-relational perspectives on regional space (Raven et al 2012), insofar as they further highlight the external resource dependencies underpinning territorial policy networks.

4.4 Sub-national government, scale and sustainability transitions

Devolution in the UK and, with it, the reallocation of certain energy-related powers to the new sub-national governments has certainly impacted the evolution of renewable energy development, but the fact that the role of sub-national government has previously been rather under-recognised can be seen as reflective of blind spots in transition theory, stemming from the emphasis on technological innovation. While the devolved governments have all given support and 'protection' to newer, innovative technologies, the main material effects of devolved government on renewable energy outcomes to date have been faster deployment of mature technologies, especially onshore wind. The 'innovations' – if this is the right word – that have most affected development outcomes are thus more in the fields of land use planning and consenting; measures that help to align investors with the availability of sites and contain the scope for local government or civil society to delay or de-rail project approvals.

A key illustration of this – as summarised in Table 2 - is the various ways that the devolved governments have exhibited greater centralisation of renewable energy project decision-making than in England/Westminster. Indeed, the contrasts have increased since 2015, with central government passing planning decisions for windfarms in England over 50MW to local planning authorities, while the Welsh Government has taken some consenting powers away from the local level. This was an outcome very much pushed for by the industry (Cowell 2016), and can be seen as a reflection of a more sustained lobbying presence in Wales since 2011; a belated response to evident interdependencies. Far from sub-national government being automatically more open to local civil society actors, outcomes in the energy sector show a propensity of territorial policy communities to depoliticise policy arenas and marginalise disruptive views (Bomberg 1994).

These findings show how the concept of a 'protective space' for development can be useful not just for thinking about niche developments but for understanding how the infrastructures of socio-technical regimes negotiate contextual conditions. As outlined above, maintaining the infrastructural and financial systems required to reproduce regimes is always *potentially* vulnerable to elements outside the system and requires a degree of protection such that stable conditions for

operation and investment can be maintained. The Scottish Government has done a more effective job than in England or Wales of constructing arrangements for renewable energy expansion, forming a coherent policy community and containing localised environmental challenges or politicisation that might bring these agendas into contingency, especially for on-shore wind. Many of the relevant actions have been in the sphere of planning, but the Scottish Government has also sought to use its more limited powers in respect of market support to foster investment stability e.g. using its executive powers over 'grandfathering' (the guaranteeing of subsidies into the future for recipient projects) to maintain support for sub-5MW solar projects (ENDS 2015, 13-14) and the early announcement of ROC levels. By such means the Scottish Government has offered supportive 'flanking conditions' (Szarka 2007), in terms of how regulations and procedures governing the operation of a policy are organised and carried out; and it has done so at a time when Westminster was gaining a reputation in the renewable energy sector for policy disruption.

Governments in England, Wales and Scotland have also sought to act on potential host communities for renewable energy infrastructure, by promoting greater levels of community benefit payments from renewable energy projects to local communities and encouraging community-owned energy schemes. The Scottish Government is the most advanced in this agenda (Strachan et al 2015), and has linked financial support to a specific target of obtaining 500MW of community- and locally-owned renewables by 2020. However, despite rhetoric of 'a community energy revolution' (Davey 2013), nowhere in the UK have community renewables become more than a supplemental strategy to dominant, large-scale commercial forms of electricity provision. Communitarian alternatives have not dislodged the dominant framing of renewable energy in the devolved governments, as a sector to be expanded at industrial scale, supplying energy above 'domestic' demand, as the basis of export-related economic development. Policy networks analysis helps to explain this situation. Only to a minor extent has devolution created spaces in government for new voices pressing for a greater local control over (renewable) energy provision (Strachan et al 2015). Although community renewables actors evidently have links to devolved and UK governments, they tend not to populate the most significant policy networks (Bomberg and McEwen 2012).

5.0 Conclusions

Our analysis has shown how the actions of sub-national government can shape wider dynamics of energy transition. Within the UK, the devolved governments have not been passive recipients of renewable energy investment in their territories, but have sought to encourage its development using the powers available to them. This is clearest in Scotland, but both the Northern Ireland Executive and Welsh Government have also sought to steer development, adopting policy approaches that depart from Westminster norms. The analysis also offers useful wider insights into the spatial constitution of energy transitions. It shows how 'national' transitions are constituted by actions at other governmental levels. More fundamentally, our research shows how focusing on sub-national government can reveal wider causal processes in energy transitions, beyond the dynamics of technological innovation. With electricity generation in the UK, it has been the steering of deployment of existing technologies (notably on-shore wind) in which sub-national government has had greatest effect on renewable energy capacity to date, notably in the way that planning processes have been used to orchestrate the delivery of new generation facilities.

Policy network analysis has aided explanation of renewable energy outcomes and the renewable energy case shows how network form can matter. Scottish Governments have forged a sustained coherent policy community around renewable energy expansion, that is relatively territorially rooted in Scotland, and this helps explain why Scotland has seen a larger level of development than Northern Ireland (or England in some respects) despite having fewer formal powers at their disposal. Indeed, only for Scotland were interviewees clear that devolution per se had made a difference to renewable energy outcomes, based on its territorial alliance-forming potential:

> 'It's allowed us to have that debate here, and to have that focus and talk about sustainable economic development … every community, every sector in Scotland can align and play that role, so I think that's been utterly fundamental' (ScotGov4).

The predominance of issues networks explains why Northern Ireland, England and Wales have, at various times (and for particular technologies) not matched Scotland's achievements. The policy community in Scotland generates power *in actu,* in that it galvanises and is galvanised by the use of the available governance powers in an assertive manner, bringing diverse actors into alignment. That devolved governments remain dependent on how the UK government organises market support is also readily apparent, such that Scotland's wind energy expansion 'may have been facilitated by the [Scottish] planning system but it's really been driven by the subsidy' (ScotNGO1). In Northern Ireland we saw how constitutional-legal resources (to pursue their own forms of market support) were traded against the greater financial resources attained by maintaining interdependencies with the UK. Yet national state policy developments are also amenable to explanation through policy networks, notably the minimal influence of devolved governments on debates about market support as policy communities around renewable energy expansion in Westminster fragmented into a more volatile issues network.

However, while the effects of sub-national governments and policy networks on energy transitions has been demonstrated, the results are not easily converted into straightforward instrumental recommendations for institutional design, as our comparative analysis revealed. Although absolute levels of renewable energy development are lower in Northern Ireland (perhaps because it is the smallest territory), it has still achieved rapid renewable energy expansion, especially of on-shore wind, and without such a coherent policy community. Relative absence of effective opposition, compared to other parts of the UK, has relevance here. This suggests that forging policy communities around energy development may matter more where there are potentially effective opposing actors (see also Cheon and Urpelainen 2013), and this in turn, may be particularly relevant to certain combinations of technological pathways and contexts. Seen in this light, Scotland has best displayed the kind of actor networks conducive to facilitating renewable energy expansion based on the bulk provision of controversial technologies like on-shore wind, where sustained elite cohesion around policy and implementation is important for investment. The rolling out of decentralised electricity systems based on micro-renewables, in which the navigation of land use planning constraints may be less critical than the coordination of diverse local actors, may depend on different policy networks with a different set of roles for sub-national governments.

This returns us to wider questions about the spatial constitution and embeddedness of socio-technical regimes and the qualitatively different energy transition pathways that could be pursued. Our results suggest that although devolution in the UK may be seen as fostering energy transition

in that it has enhanced the quantitative expansion of renewable energy capacity, sub-national government has still largely served to maintain dominant systems of energy provision based on large facilities supplying electricity into a centralised and organisationally unchanged grid. The UK case shows how sub-national action can facilitate the spatial adaptability and temporal persistence of dominant socio-technical regimes, especially in planning and consenting, where the three devolved governments pursued arrangements that created more facilitative 'protected spaces' for infrastructure expansion than was observable in England, which has benefited onshore wind particularly. One could conclude that devolution in the UK is an illustration of 'stabilizing landscape trends' (Geels 2011, 36) - i.e. a set of wider processes that helps to reproduce existing regimes, but does so by facilitating contextual adaptation. Perhaps one should not be surprised at this, given that devolution in the UK is itself part of ongoing statecraft designed very largely to manage tensions within this union state. It shows why analysts of energy transitions ought to give greater attention to the politics of state re-scaling (Hodson and Marvin 2013), and recognise how this may serve agendas, that maintain key elements of the status quo as well as offer opportunities for radical change.

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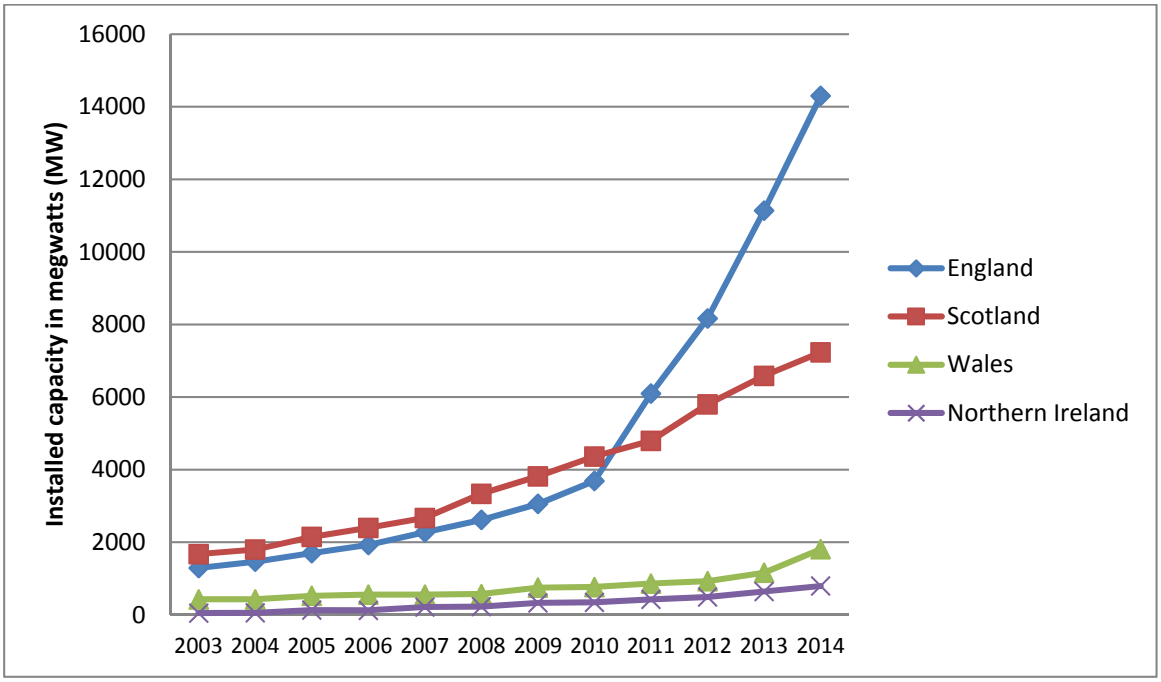
Figure 1: Installed renewable energy capacity in the UK, 2003-2014



Sources: RESTATS historic regions data, UK Government regional energy statistics, https://www.gov.uk/government/statistics/regional-renewable-statistics accessed 27th May 2016

Table 1: Devolution, government actors and energy-related powers (until 2015)

Instrument (and resources)	UK and England	Northern Ireland	Scotland	Wales
Devolved institutions (constitutional-legal resources)	Limited decentralisation of roles to regional bodies, until 2011	Assembly and Executive; primary legislative powers; no powers over tax	Parliament and Government; primary legislative powers; tax-varying powers	National Assembly and Government; secondary legislative powers; spending only responsibilities [1]
Energy policy (constitutional-legal resources)	Full competence	Fully devolved	Executively devolved	Not formally devolved
Market support for renewable energy (financial resources)	Full competence	Fully devolved	Executive devolution of some support schemes	No powers
Planning and consents (onshore) (hierarchical resources)	Full policy competence for England, partial for Wales; full competence over major projects (50MW plus)	Fully devolved	Fully devolved	Partial powers over planning policy and consent for smaller schemes (below 50MW)
Planning and consents (offshore) [2] (hierarchical resources)	Full competence for English and Welsh Waters (subject to Welsh exceptions)	Fully devolved	Fully devolved	Power to determine applications up to 1MW (exception under Transport and Works Act 1992)
Economic development spending (financial resources)	Full competence; decentralised delivery by English regional bodies until 2011; some programmes are UK wide.	Fully devolved; can receive UK-wide programme funding	Fully devolved; can receive UK-wide programme funding	Fully devolved; can receive UK-wide programme funding

[1] Noting that the Government of Wales Act 2006 gave the National Assembly the power to initiate primary legislation, and the 2011 referendum enabled the Assembly to pass primary legislation in those areas devolved to it without the consent of Westminster.

[2] We do not include marine licensing powers and consenting for onshore connections for simplicity. The offshore regime applies mainly to applications in UK territorial waters (i.e. up to 12 nautical miles and designated Renewable Energy Zones).

Table 2: Planning policy and renewable energy in the UK, post-devolution

Territory	Position at 1998	Significant Changes, 1998 to 2013	Changes, 2013 onwards
Northern Ireland	All applications determined by central government (Department of the Environment). Above 10MW, consent also needed from Department of Enterprise, Trade and Investment.	Planning policy guidance introduced (Planning Policy Statement 18 [DoENI 2009]), with criteria-based approach to decisions, and supplementary best practice guidelines	From April 2015 most planning functions were transferred to local planning authorities, but central government (DoE) retains control over renewable energy consents.
Scotland	Applications of 50MWor over and major grid network proposals determined centrally, by UK Government Ministers (Secretary of State for Scotland), managed by central Scottish consents unit, under Sections 36 and 37 of the Electricity Act 1989. Applications below 50MW determined by local planning authorities under town and country planning (Scotland) legislation. Planning policy guidance issued in 1994 gave criteria-based advice, and advised local authorities to demarcate in their local plans areas that would be suitable and unsuitable for wind farms (Scottish Office 1994).	Applications of 50MWor over and major grid network proposals determined by Scottish Ministers, managed by central Scottish consents unit (powers acquired under Scotland Act 1998 (Transfer of Functions to the Scottish Ministers etc) Order (SI1999/1750). Nine month time target for determining applications introduced, post-2007. Applications below 50MW determined by local planning authorities under town and country planning (Scotland) legislation. Planning policy guidance issued in 2006revised and updated guidance, continuing advising local authorities to demarcate in their local plans areas that would be suitable and unsuitable for wind farms. Planning Advice Note 45 issues good practice guidance. National Planning Frameworks identify particular infrastructural schemes as 'national developments' for which there is government support.	No significant changes.
Wales	Applications of 50MW or over and major grid network proposals determined centrally, by UK Government Ministers, process managed by central government consents team, under Sections 36 and 37 of the Electricity Act 1989. Applications below 50MW determined by local planning authorities under town and country planning legislation for England and Wales.	Applications of 50MW or over and major grid network proposals determined centrally, by the Infrastructure Planning Commission (under Planning Act 2008), then transferred back to UK Government Ministers (Localism Act 2011), with consents issued under fast track procedures. Decisions guided by National Policy Statements. Applications below 50MW determined by local planning authorities under town and country planning legislation for England and Wales.	Applications over 50 up to 350MW to be determined by Welsh Government under Wales Bill 2016; applications over 350MW still determined centrally by UK government ministers under Localism Act 2011. Applications from10-50MW to be determined by Welsh Government, under the Developments of National Significance (Wales) Regulations 2016.

	Planning policy guidance (PG22) provided criteria-based guidance (Department of Environment and Welsh Office1993)	2005 planning guidance (Technical Advice Note 8) institutes spatial zoning for wind farms over 25MW, giving presumption in favour of development within seven 'Strategic Search Areas'.	Applications below 10MW determined by local planning authorities [under town and country planning legislation for England and Wales] and Planning [Wales] Act 2015.
England	Applications of 50MW or over and major grid network proposals determined centrally, by UK Government Ministers, process managed by central government consents team, under Sections 36 and 37 of the Electricity Act 1989. Applications below 50MW determined by local planning authorities under town and country planning legislation for England and Wales. Planning policy guidance (PG22) provided criteria-based guidance (Department of Environment and Welsh Office1993)	Applications of 50MW or over and major grid network proposals determined centrally, by the Infrastructure Planning Commission (under Planning Act 2008), then transferred back to UK Government Ministers (Localism Act 2011), with consents issued under fast track procedures. Decisions guided by National Policy Statements. Applications below 50MW determined by local planning authorities under town and country planning legislation for England and Wales. Planning policy promoted criteria-based guidance (PPS22, ODPM 2004) and regional-scale mapping and target-setting (Power and Cowell 2012). Superseded by National Planning Policy Framework (2012) which endorsed local planning authorities instituting preferred areas for wind energy development in their local plans.	From 2015, on-shore wind over 50MW to be determined by local planning authorities (under the Onshore Wind Generating Stations (Exemption) (England and Wales) Order 2016 (11th March 2016) and Infrastructure Planning (Onshore Wind Generating Stations) Order 2016 New guidance, June 2015, that local planning authorities should only grant permission for onshore wind farms where the site is in an area identified as suitable for wind energy development in a local or neighbourhood plan and, following consultation, it can be shown that impacts identified by local communities have been fully addressed and that the proposal has their backing (Ministerial Statement to LPAs, 2015). From 2016, applies to all windfarms, including those of 50MW and over.

Table 3 On-shore wind project consent rates, 2011-2014

	England	*Northern Ireland*	*Scotland*	*Wales*
2011-2012	58%	88%	70%	50%
2012-2013	59%	78%	76%	46%
2013-2014	31%	89%	62%	52%

Data taken from Wind Energy in the UK 2014, State of the Industry Report 2013, State of the Industry Report 2012, produced by Renewables UK. Data is for projects under 50MW.