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Historical institutionalism and the politics of sustainable energy transitions: A research agenda

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1. Introduction

An increasing amount of attention is being given to sustainable energy transitions or transformations¹ (Araújo 2014). Within this literature, socio-technical systems (STS) analysis has been particularly dominant (Smith et al 2010, Markard et al 2012). However, while it is now increasingly recognised that sustainable energy transitions are profoundly political in nature because of the degree to which policy and wider societal choice are involved (Smith et al 2005, Meadowcroft 2005), it is also clear that the STS approach has lacked a good account of politics (Shove and Walker 2007, Meadowcroft 2009, 2011, Scrase and Smith 2009). As a result, improving our understanding of the politics of sustainable energy transitions has become a major focus for research (Raven et al 2016, Kuzemko et al 2016).

The aim of this paper is to contribute to this endeavour, by considering in particular what an historical institutionalist approach can offer the study of sustainable energy transitions. As Andrews-Speed (2016) notes, there is an increasing interest in the role of institutional design and change in this area, although in many cases the treatment of institutions is very general or has drawn mainly on organizational and sociological institutionalism. Both Andrews-Speed and Kuzemko et al (2016) argue for the value of the opening up of the study of transitions to a wider range of theoretical strands within institutionalism.

Here we build on this approach, by focusing in some depth on how key concepts and empirical analyses from the historical institutionalist tradition can be used to map out a research agenda for the politics of sustainable energy transitions. Historical institutionalism (HI) has played an important role in the study of politics since the 1980s. At its core it is concerned with the way that institutions shape attempts by groups of actors to pursue their interests (Thelen 2002) We argue that HI is a valuable complement to STS approaches to sustainable energy transitions because it offers tools for the explicit analysis of institutional dynamics that are present but implicit in the latter framework, opens up new questions and provides some useful empirical material particularly relevant for the study of the wider political contexts within which transitions are emerging.

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At the same time, the historical institutionalist approach has certain limits. Unlike STS it does not engage with the materiality of technologies. Also while HI does not neglect ideas,² it has also been subject to critiques which argue that it has paid insufficient attention to analysing the independent effect of ideas on outcomes and institutions (Blyth 1997, Campbell 1998, Schmidt 2010). While it does not negate the HI approach this critique is important, but full consideration of it is beyond the scope of this paper.

In mapping out an agenda the paper draws on existing studies, as well as suggestive evidence that indicates the value of further research. Throughout, a central point of reference is the UK, although we make comparisons with a number of other countries, especially Germany, Denmark and the US. This is because the paper arises out of a project on innovation and the governance of energy institutions in the UK that makes comparisons with the countries mentioned. However, we also argue that there is a case for limiting the focus here to advanced democracies. While HI can equally be applied to energy transitions in developing countries, the institutional configurations of politics will often be radically different from those in OECD countries (Kitschelt 2000, Leftwich 2000). Within the confines of a single paper, it is possible to investigate the historical institutionalist agenda for the study of sustainable energy transitions in any depth only by focusing on countries with some underlying structural similarities.

Section 2 outlines HI and justifies the focus on this particular approach. We then lay out a research agenda for sustainable energy transitions in two parts. The first, in Section 3, relates to understanding diversity in transition outcomes in terms of the effects of different institutional arrangements. The second part (Section 4) considers transitions in terms of institutional development and change. The paper concludes with some observations on the potential and limitations of HI, and briefly considers the question of whether there may be specific institutional configurations that would facilitate more rapid sustainable energy transitions.

2. Historical institutionalism

Following Hall and Taylor's (1996) classification it has now become commonplace to distinguish between rational choice, sociological and historical variants of institutionalism, with discursive institutionalism making up a fourth strand (Peters 2012, Lowndes and Roberts 2013). Recent accounts of institutionalism in the context of energy transitions have described the differences between these schools (Andrews-Speed 2016), so here we focus on the distinctive characteristics of HI.

According to Steinmo and Thelen (1992: 2), "At its broadest, historical institutionalism represents an attempt to illuminate how political struggles 'are mediated by the institutional setting which [they] take place'". It can thus be seen fundamentally as a *theory of action within institutional constraints* (Campbell 1998). However, HI is also concerned with *how institutions are formed and evolve*; according to Thelen (2002: 92) most historical institutionalists "would wish to stress that institutions are important not just in how they constrain individual choice or affect individual strategies, but also in how they affect the articulation of interests, and particularly the articulation of *collective* interests."

Because HI has a central concern with the way institutional processes unfold over time (Pierson 2004), it emphasises *path dependence* and, unlike rational choice institutionalism, the *unintended consequences* of institutional design (Steinmo and Thelen 1992, Hall and

Taylor 1996). Historical institutionalists also see institutions as the outcomes of struggles that ultimately reflect *inequalities of power*. The analysis of power is of course not restricted to HI (e.g. Avelino and Rotmans 2009), but it has paid special attention to how institutions “shape political outcomes by facilitating the organization of certain groups while actively disarticulating others”, not just through the mechanics of coalition formation but also “how they influence the capacities of groups to recognize shared interests in the first place” (Thelen 2002: 92).

We argue that a focus on HI is productive for the study of energy transitions for a number of reasons. First, while there are some important distinctive elements to HI, it is the approach within the broad institutionalist field that draws most widely on concepts from across that field (Peters 2012, Thelen 2002, Lowndes and Roberts 2013), retaining coherence while not being unrealistically narrow.

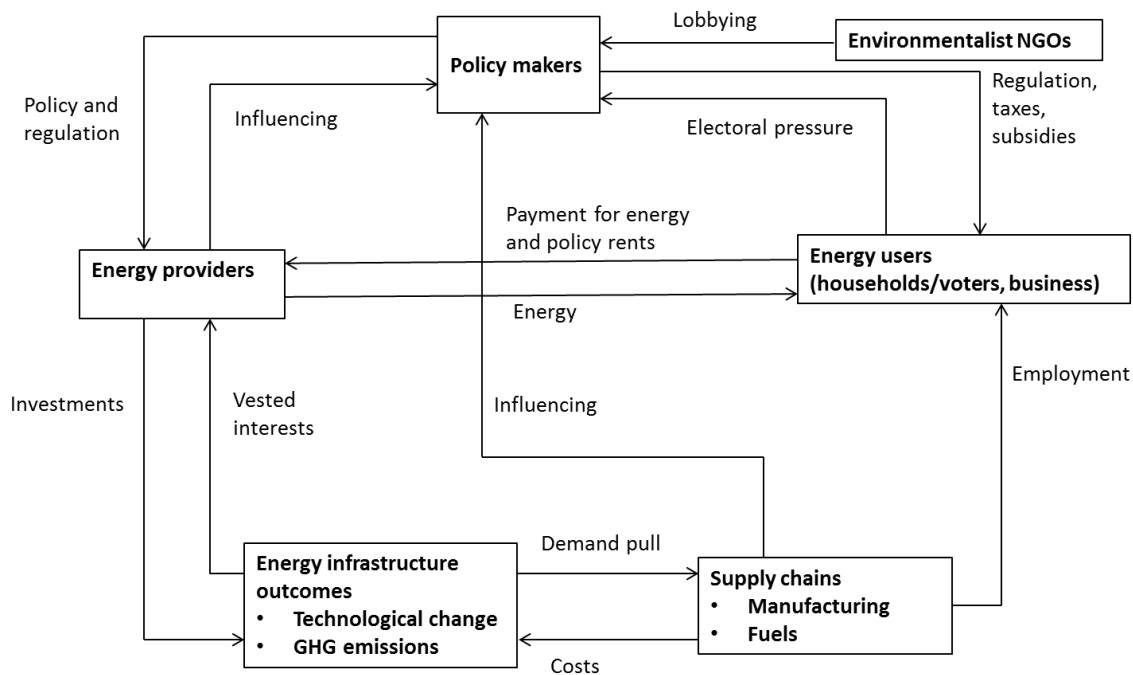
Second, as Andrews-Speed (2016) notes, institutionalism is a useful complement to socio-technical systems (STS) analyses, which have historically tended to draw almost exclusively on sociological or organizational institutionalism. This is partly because their focus on organisational fields and diffusion (Lowndes and Roberts 2013) makes them a good fit for the study of details of regimes and niches. However, as Meadowcroft (2009: 335) observes, the politics of sustainable energy transitions is played out on a much wider arena: “at the point of committing large scale public resources to particular technologies or tilting policy to favour particular approaches it is to be expected that issues will be thrashed out through broader societal debate”. Because historical institutionalists have taken as their central themes the relationships between states and societies (Steinmo and Thelen 1992, Hall 1997, Morgan et al 2010), HI is particularly useful here.

Third, HI can offer new methodological directions for the study of sustainable energy transitions. There is a broad range of highly heterogeneous elements encompassed in regime and landscape concepts (Geels 2002, Geels and Schot 2007). In one sense, this inclusiveness is desirable because of the multi-dimensional nature of transitions, but it also means that the approach inherently emphasises the uniqueness of every socio-technical transition; ‘each transition is historically contingent’, as Smith et al (2010: 443) put it. This conceptual framing has driven the case study as the characteristic methodological tool of the STS school.³ By contrast, historical institutionalists aim to provide ‘mid-range’ theories that provide generalizable explanations of patterns of diversity and change and frequently use a small-N comparative methodology (Steinmo and Thelen 1992). In principle, such an approach makes it possible to identify institutional arrangements that are more or less supportive of rapid sustainable energy transitions.

3 Explaining energy transition outcomes in terms of institutions

At the core of institutionalism is the claim that ‘institutions matter’ (Lowndes and Roberts 2013). For sustainable energy transitions, the issue then is what kinds of institutions matter, and how. The political nature of energy transitions implies the need to consider the full range of actors across the energy system and the relationships between them, including energy providers, supply chain actors, policy makers and users of energy (Figure 1; see also Parag and Darby 2009 and Hughes et al 2012).

Figure 1
Actors and relationships in the energy system



3.1 Aggregation of values and interests through political institutions

We start with the relationship between policy makers and households, on the right hand side of Figure 1. Households are simultaneously energy users and voters, so concerns amongst the public about both climate change and energy costs are therefore likely to be important in shaping policy. STS studies have started to pay some attention to trends in public opinion (e.g. Geels 2013). However, in addition to the values and interests of voters, an HI approach suggests that *political institutions governing how those interests and values are aggregated* may also have a key role. Underlying this issue, and appearing in different forms below, is the concept of *veto players*. Tsebelis (2002), who has done the most to develop the concept, defines veto players as ‘individual or collective actors whose agreement is necessary for a change in the status quo’ (ibid: 19).

An important argument in the literature on comparative political institutions is that countries with proportional representation (PR) electoral systems are more likely to adopt environmental policy measures than those with majoritarian (‘first-past-the-post’) systems. Several reasons for this have been put forward. One is that systems with majoritarian rules create an incentive for politicians to focus narrowly on the concerns of a relatively small group of swing voters in marginal constituencies, while PR incentivises parties to seek support from a broader spectrum of voters by providing public goods (Lizzeri and Persico 2001). A second argument is that PR systems also tend to produce a more centre-left governments (Iversen and Soskice 2006), which are arguably more likely to be active in pursuing sustainable energy transitions. A third is that because PR systems are more likely to have smaller parties represented in parliaments (Lijphart 1990, Strom 1990) and are also more likely to involve coalition government (Bawn and Rosenbluth 2003), this gives smaller

parties, including environmentalist parties, disproportionate leverage where they are effectively veto players and can extract specific demands in return for general support. By contrast, in countries with majoritarian systems such parties are marginalised,⁴ placing a much greater onus on environmentalist NGOs as vehicles for change.

Quantitative comparative studies lend some support to these arguments (Frederiksson and Millimet 2004, Dolšak 2001, Lachapelle 2011, Schaffer and Bernauer 2014). However, there is much scope for more detailed qualitative research in unpicking the exact relationships between factors potentially linking PR and sustainable energy policy outcomes. In one of the few case studies, Jacobsson and Lauber (2006) show how German Green Party Members of Parliament in the early 1990s and the Green Party in governing coalitions in Germany from 1998 to 2005 were instrumental in the expansion of solar power.

The arguments above relate to what Tsebelis (2002) terms ‘partisan’ veto players. A different set of issues arise with ‘institutional’ veto players, i.e. those that arise from *constitutional arrangements*, i.e. presidential vs parliamentary and federalist vs centralised systems. Since presidential and federalist systems involve more diffused political authority and more veto players, one view is that such countries with systems will find it harder to embark on rapid sustainable energy systems than parliamentary and centralised polities (see e.g. Dolšak 2001). However, as Harrison and Sundstrom (2010) argue for climate policy, what is important here is not only the position and number of veto players, but also what is salient for them, so the effects of such institutional veto points could go either way. In a parliamentary system concentrating power in the hands of a leader who faces few if any institutional veto players, both inaction and radical action are possible depending on the views of the prime minister, electoral incentives or effective lobbying by powerful interests (Jacobs 2011). Equally, federalism may mean the obstruction of action by lower level states or regions, or alternatively allow regional experimentation that is politically impossible at the national level.⁵

Germany provides an example of this point. In 1994, the major energy utilities began pressing for the abolition of the feed-in tariff for renewable energy, leading to a series of court battles and ultimately an appeal to the European Commission. The Finance Ministry at the federal levels was supportive of the utilities. However, the lower house of parliament (Bundesrat) representing the Länder regions defended the feed-in tariff (Jacobsson and Lauber 2006). The latter group won out in part because parliament had sufficient veto power to block the power of the Finance Minister, a product of the federalist design of post-war German institutions in which power is widely dispersed.

3.2 Delegation, regulatory inertia and regulatory activism

Another area in which the concept of veto players in institutional arrangements may also be important concerns the different institutional arrangements for the delegation of decision-making in the energy sphere (Kuzemko 2016). This expands the focus within Figure 1 to encompass the relationships between policy makers, households and energy providers.

States have increasingly turned to the delegation of regulatory decision-making in a number of spheres, from monetary policy to finance, utilities and general competition policy (Thatcher 2002, Flinders 2008). Powers have been delegated for a range of reasons, but one of the most important has been the desire to insulate decision-making from political

interference as a way of reducing risk and increasing the long-term credibility of policy in potentially controversial areas (Newbery 2000).

Delegation matters for sustainable energy transitions because it is effectively a strategy of introducing new veto players. If such actors have interests that would be threatened by energy transition, or are wedded to ideas that are not consistent with transition, then delegation could slow the pace of change. An historical institutionalist perspective on this issue would focus on how *different institutional arrangements for regulatory delegation* in different countries have led to different outcomes (Thatcher 2007). Where the remits of regulatory agencies are not consistent with policy innovation and energy system transformation, where agencies have in practice a high degree of independence and where they have a wide scope of powers, then we could expect a higher risk of what Faure-Grimaud and Martimort (2003) call ‘regulatory inertia’.

In Britain, energy regulation was established at privatisation with a clear remit of ensuring competition and economic efficiency. When decarbonisation rose up the political agenda during the 2000s, successive governments made multiple attempts to signal that the Office of Gas and Electricity Markets (Ofgem) should give a greater weight to sustainability, but with only limited success. The difficulties governments faced in steering Ofgem originated in the considerable degree of regulatory independence granted in the late 1980s (Moran 2003: 105–06). Ofgem’s powers have also grown in scope over time, it decides on the design of the regulatory regimes it implements,⁶ and it has become the *de facto* lead organisation in some areas of energy policy. Overall, Ofgem has considerable veto powers. As a result, while the regulator has made some attempts to make the British energy system more sustainable, it has done so on its own terms, at a pace that it has set and within an ideational framework that is heavily constrained (Lockwood 2016).

By contrast, in continental European countries have “a long history...of direct parliamentary and sub-national involvement in utility services, and legal and political doctrines that they are ‘public services’” (Thatcher 2011: 137-138), meaning that regulators remain more under direct parliamentary control. Independent energy regulators in Europe are a more recent institutional development, and tend to have a more limited role, with energy ministries retaining more control over regulatory levers. More direct political control over regulators, especially through appointments to regulatory boards, has also been the norm in US states. However, the US experience suggests that this type of institutional arrangement has led to two very different types of outcomes. In some states, appointments reflect cronyism, and regulation constrains change. But in others, appointments of progressive regulators by legislatures committed to energy transitions have opened up the possibility of reform. This is most evident in New York State, where the Public Service Commission has led the development of a radical vision for the transformation of utilities and networks, aimed at providing an efficient system with deeper penetration of renewables and widespread use of distributed energy resources (NYS DPS 2014).

3.3 Credible commitment and political institutions

Delegation is also relevant to debates about *how to accelerate sustainable energy transitions through creating ‘credible commitment’*. Because transforming energy systems often involves additional up-front financial costs for energy consumers or taxpayers, such transformation can be challenging for elected politicians. If investors fear that cost or other concerns may in the future lead to the suspension or reversal of support policies, they may

hold back from investing in new infrastructure. This is not a theoretical concern as such reversals have been seen in countries such as Spain and the Czech Republic recent years, with consequent collapse in investor confidence (Fouquet and Nysten 2015).

Comparison across countries with different political institutions suggests that there are broadly two types of situation. In one, credible commitment arises organically from the tendency for proportional representation electoral systems to lead to coalition government (see above). In such systems, policy making tends to be more inclusive because even major parties know that they will need to rely on other parties to rule. These processes typically involve a strong committee system in which all parties, interests and ideologies are represented (Powell 2000). An example would be Denmark's Energy Agreement of 2011-12, which was negotiated and backed not only by parties within governing coalition, but across all but one of the parties in the parliament (see also Toke and Nielsen 2015). Once agreement is reached, political support for policies tends to be very stable.⁷

In countries with majoritarian electoral systems, there tend to be fewer parties in parliaments and politics is more confrontational. Agreement across parties is possible, but rarely reflects true consensus. For example, near unanimous parliamentary support for the 2008 Climate Change Act in the UK arguably reflected a tactical repositioning by one of the main parties as much as a political consensus (Carter 2010, Lockwood 2013). In such contexts, policy can switch significantly with changes of government or even changes in which group is dominant within a ruling party.⁸ A common approach to trying to establish credible commitment in these contexts is then, as with independent regulators, to delegate decision-making to technical, politically-insulated bodies (e.g. Helm et al 2003). This kind of approach is quite common in the UK; its logic underlies the creation of the Committee on Climate Change and the National Infrastructure Commission, for example.

Rather than producing policy stability through political consensus reached between partisan veto players, this strategy seeks to create stability by creating new institutional veto players. However, the limits of the depoliticisation strategy are revealed in moments of crisis, when issues tend to become *repoliticised*. For example, the recommendation of the Committee on Climate Change for the fourth carbon budget was overshadowed in 2011 by political interventions on grounds of cost (Lockwood 2013).

Within these two broad routes, there is considerable variation in experience, and a potentially rich research agenda in understanding the effectiveness of different arrangements in underpinning transitions.

3.4 Power, incumbency and capture

A different set of issues arise from the analysis of *power* and institutions. A central concern in the study of transitions is the power of incumbents to block change, formulated as 'regime resistance' in STS terms (Geels 2014). However, as Smith et al (2005) point out, regimes are neither monolithic nor identical. An historical institutionalist perspective focuses attention on the ways in which institutional differences create variation in three dimensions: *the power of incumbents, the interests of incumbents and the openness of policy and regulatory processes to capture*.

Energy providers may be thought of as deriving power vis-à-vis policy makers from a number of sources, including tax revenue, employment generation and the threat of

‘investment strikes’ in a globalised world (Gill and Law 1989, Jessop 1990), but also the strategic role of energy as part of the core of the economy (Newell and Patterson 1998) and in providing national security (Kuzemko 2014).⁹ However, such power accrues to energy incumbents unevenly, and the analysis of variations of incumbent power in different contexts is an important field for more research.

One potentially important variable is size, with variation reflecting different institutional histories. In the UK the electricity system was centralised after the Second World War, mirroring relatively centralised political and administrative systems. This arrangement survived privatisation and the UK now has a small number of large utility and network incumbents. This contrasts with many continental European countries, where much smaller local municipal or cooperative network and supply companies are still widespread. The wielding of power by smaller incumbents is not impossible, but it does require a greater degree of coordination for collective action, what Offe and Wiesenthal (1980: 72) call ‘power through organization’. This suggests that the effective power of incumbents may be greater in more centralised systems, where the sheer size of firms means that they cannot be ignored by policy makers.

Related points apply to the *interests* of incumbents, where HI again emphasises the influence of institutions. As indicated above there is a range of different ownership and corporate governance arrangements across incumbents. Many cooperatives and municipally-owned firms are not-for-profit and have other explicit objectives, including social and environmental goals. Even within the category of shareholder-owned firms there can be significant variation across countries in the way that interests are constructed across different legal systems and institutional traditions of corporate governance (Hall and Soskice 2001, Allen and Gale 2000).

This variability potentially has implications for the stance of incumbents towards sustainable energy policies. Municipally or cooperatively-owned actors may be more innovative because they have explicit social and environmental objectives or are closer to local sustainable energy initiatives. This appears to be the case for some city utilities in Germany, for example (Blanchet 2015); even in the UK there has been a wave of interest amongst municipalities in setting up local utilities with social and environmental goals (Hannon and Bolton 2015). Local ownership of heat companies in Denmark seems to have driven energy efficiency improvements through innovation. Conversely, smaller actors may also be much more risk averse, and since they are often not-for-profit they do not have a major commercial incentive for innovation. For example, the long tail of very small network companies in some European countries may be a barrier in the development of smarter electricity distribution networks.

Also relevant here is how specific the assets of incumbents are to aspects of the regime (Pierson 2004), and thus how vulnerable they are to change. A common assumption is that because electricity generating incumbents own fossil fuel plants they will therefore be opposed to investment in renewable generation. However, considerations of asset specificity include not only physical assets but also the human assets of companies and the networks they have with other companies. The response of incumbent actors may depend on their core competencies and how these affect the capability to respond dynamically to policy changes. Stenzel and Frenzel (2008) argue persuasively that the response of incumbents in different countries to policies supporting wind power depended on these factors, with those in Spain particularly well placed to seize opportunities rather than resist change.

A final issue that may be important for explaining variation in ‘regime resistance’ lies not with incumbent actors but rather in the design of policy making institutions, as some ways of making policy will be more open to capture than others. In most countries, energy sectors are now at least partially privatised, so the form and extent of that privatisation is particularly relevant since it frequently involves what Kuzemko (2016: 110-112) calls the ‘marketised’ delegation of decision making and therefore veto power to private sector actors.

One dimension of this is technical capacity and access to information in government, important for assessing technology costs, making strategic choices about networks, and any form of long-term direction setting. In the UK most technical energy expertise in the public sector was lost to the newly created private companies (Rutledge 2010). Government has become dependent on these companies for technical capacity, through secondments. They also have quite limited access to data held by companies. This contrasts with Germany and Denmark, where investors in renewable technologies receiving public subsidy are required to provide full financial and operational data to government. In Germany the government also benefits from an extensive network of independent technical institutes. As energy systems become more decentralised and as there is more information and communication technology connected to energy networks, data is likely to become even more important, along with the ability of policy makers (and potential new entrants) to access and understand that data.¹⁰

Another issue is whether effective incentive structures for the complex, multiple changes required for sustainable energy transitions can be designed. In many countries electricity system operators (SOs) have been retained in the public domain, but in the UK privatisation was very ‘deep’, and the SO function was privatised along with transmission operation. This institutional arrangement creates particular challenges, since it means that any changes in policy that require SO action have to be implemented through incentives via the regulator, an approach that has been proved difficult in practice (Strbac et al 2014). This is not to say that the relationship between policy makers and a not-for-profit SO in the public domain is entirely straightforward, but the experience of countries like Denmark suggests that it can work successfully.

3.5 Comparative institutional systems and varieties of capitalism

An important strand within HI has gone beyond the analysis of specific institutions and has attempted to explain how the entire political economy of different countries is determined by *systems of interlocking institutions*. In a particularly influential contribution, Hall and Soskice (2001) argued for a distinction between ‘coordinated market economies (CMEs) in north-western Continental Europe (with Germany as the paradigmatic case) and the ‘liberal market economies’ (LMEs) of the Anglo-phone world (with the US as the paradigmatic case and the UK as the representative within Europe). LMEs are characterised by arm’s-length exchange between firms, involving competition and formal contracting. By contrast, firms in CMEs rely more heavily on non-market relationships, which entail “more extensive relational or incomplete contracting, network monitoring based on the exchange of private information inside networks, and more reliance on collaborative, as opposed to competitive relationships” (ibid: 8-9).

There is mixed evidence on whether this ‘varieties of capitalism’ framework can satisfactorily explain diversity in outcomes related to environmental sustainability (Neumayer 2003, Scruggs 2004, Poloni-Staudinger 2008, Lachapelle and Paterson 2013). The implications of the CME/LME distinction for sustainable energy transitions are also

complicated by the fact that CMEs tend to have proportional representation electoral systems (Cusack et al 2007), which as discussed in section 3.1 above may produce more conducive conditions. Others have noted that many CMEs have in any case become more like LMEs over time under the pressures of neo-liberal globalisation (Streeck 2009).

One important argument why CMEs might be expected to produce more sustainable economies than LMEs is a form of ecological modernisation, i.e. the ability of governments in CMEs to better coordinate with firms in their manufacturing sectors towards new low-carbon opportunities. Mikler and Harrison (2011) deploy this approach in arguing that automobile manufacturers in Germany are more likely to develop electric vehicles than those in America, for example. However, as Crouch (2005) notes, institutional systems and policy paradigms do not necessarily have the same degree of coherence in every sector within a country. While this argument may apply to the manufacturing sector (the model for the CME concept), it is less clear that it applies to others, including energy. Indeed, large German energy firms have if anything been more resistant to the development of renewable energy than their counterparts (and in two cases, subsidiaries) in the LME UK (Jacobsson and Lauber 2007). And in some cases LMEs can appear to produce instances of coordinated action, for example offshore wind in the UK (Kern et al 2014).

Overall, critics such as Crouch (2005) and Hancké (2009) suggest that rather than directly equating institutional systems with actual countries, it is preferable to treat them as ideal types which will often be combined in any particular case. For the comparative institutional study of sustainable energy transitions the lesson is not to simply infer a relationship between particular types of institutional system and particular pathways of energy transitions, but rather to seek to establish what Radaelli et al (2012) call ‘foundational mechanisms’ at work between the two.

4. Explaining institutional change

A second part of the historical institutionalist project has been to investigate why and how institutions arise, persist and change. In this section we consider the agenda for research into sustainable energy transitions generated by analytical insights from this literature.

4.1 Positive feedback effects as a source of institutional stability

Much of the literature on transitions dwells on resistance to change in high-carbon regimes (Geels 2014), or at the extreme, ‘carbon lock-in’ (Unruh 2000). In this literature, the concept of path-dependence is now widely-used, especially drawing on the economics literature on increasing returns in the emergence of new technologies (David 1985, Arthur 1989).

Pierson (2000, 2004) importantly extends the analysis of *increasing returns, via positive feedback effects, into politics*. He argues that increasing returns tend to be even more powerful in politics than in economics, for a number of reasons. One arises from the need for collective action in politics, meaning that there is a high entry cost (for example, setting up new political parties) to challenging the status quo. Since positive feedback effects tend to apply to collective action (winning coalitions attract followers), getting a self-reinforcing political movement going requires considerable input of material and cultural resources. A second reason is that politics is institutionally ‘dense’, while at the same time, institutions induce self-reinforcing processes that make reversals increasingly unattractive, because actors make investments, and form relationships and identities based on these institutions.

Institutional arrangements can also be made stable by the deliberate introduction of veto points that make them difficult to remove. Third, actors who have political power can use that power to change the rules of the game to enhance (or maintain) their power. Finally, Pierson argues that because politics is complex and opaque (far more than markets), it is difficult to determine whether or not they are performing well and therefore should be reformed. There are often multiple metrics of performance and the links between actions and outcomes are loose, indirect and diffuse. This makes effective challenge more difficult.

Positive feedback effects in the politics of energy regimes are important because they can both arise from and reinforce the economic power of incumbents (see above section 3.4). For example, in the UK the arrangements governing electricity and gas codes – rules specifying technical and commercial relationships between industry participants and which underpin high-level policy – are a form of self-governance by companies (Lockwood et al 2015). This kind of institutional arrangement is highly vulnerable to capture, and indeed code governance in Britain has been effectively dominated by larger incumbents. As was suggested by Stigler (1971), incumbents have managed the code system in such a way that it makes effectively entry by potential competitors more costly and difficult. To change the existing governance arrangements that disadvantage them, new entrants would have to put in considerable time and effort, and believe that enough of their fellow new entrants would join them. At the same time, many actors, from government to regulator to code administrators to incumbents have all invested time, skills, personnel and political capital in the existing system. Finally, the system is so complex and opaque that few actors fully understand it, let alone are in a position to critique it from within.

However, economic incumbents do not always succeed in converting economic power into political power. This is clear from the example of Germany, where large incumbent energy utilities were excluded from support policies for wind and solar (Jacobsson and Lauber 2006) and despite efforts to challenge these policies, were ultimately unsuccessful. Thus the relationship between the two types of power needs to be problematized rather than assumed. Such counter-examples also point to the need for Pierson's general arguments to be tested in specific settings.

4.2 The role of unanticipated consequences

At the same time, focusing purely on sources of stability is not sufficient, because the widely ranging experience of different countries across elements of sustainable energy transition suggests that lock-in is not inevitable. Indeed the wider literature suggests that it is in practice relatively rare (Mahoney and Thelen 2010: 3). This literature suggests institutions can change in ways which, while path-*contingent* on existing arrangements, are not completely bound by them and which can also accommodate path-creation (Garud and Karnøe 2001, Lovio et al 2011).

Early institutionalist theorising did emphasise stability, and thinking about causes of change was dominated by exogenous shocks or crises leading to 'critical junctures' and consequent radical institutional reconfigurations that are then stable in the changed circumstances. In the long term, this creates a pattern of 'punctuated equilibrium' (Kingston and Caballero 2009). In energy policy, examples of such patterns do clearly exist, including the extreme effects of the 1970s oil shocks on Denmark leading to the expansion of district heating, energy efficiency and wind power; the thorough-going privatisation of energy in Britain from 1986

onwards that brought in a new paradigm in energy with effects still visible, and the power sector crisis in California in 2000-01 which led to a reversal of liberalisation.

However, more recent research in HI has focused on more gradual change, arising from endogenous sources of instability. While rational choice institutionalism frames institutions as efficient, equilibrium arrangements, HI emphasises the limits to optimal institutional design. These arise from several sources including the facts that institutions have multiple effects and that actors have limited time horizons and information, and lead to the possibility, indeed likelihood, that institutions will have *unanticipated and unintended consequences* (Clemens and Cook 1999, Pierson 2004: 115-119).

One important example that has emerged since the late 2000s in countries such as Spain and Germany is the unexpected vulnerability of fossil fuel incumbents via wholesale electricity markets. This arises from the ‘merit order effect’ whereby renewable generation displaces generation using fossil fuels (e.g. Cludius et al 2014). This effect arises because prices in wholesale power markets reflect short-run marginal costs of generation. The intention of this design was to maximise efficiency, but the consequence with the rise of renewables has been the reduction of peak pricing, with major effects on utility profitability and investment in new fossil fuel plant, leading to corporate restructuring in many cases (Mitchell 2016).

Unanticipated consequences can also be observed differentially across contrasting institutional regimes. An unanticipated consequence of the UK’s relatively highly centralised electricity system (section 3.4), mirroring and possibly partly explained by, the UK’s high degree of political and administrative centralisation, has been that, with the rise of smaller scale renewable technologies and ambitions for a decentralised electricity system with local storage and balancing, the UK (especially England and Wales) lacks many of the institutions and capabilities for the realisation of such a system. While there has been a recent surge of interest in community- and municipal-scale energy, the absence of a supportive environment and existing institutional models means that converting interest into action has been difficult. By contrast, in Denmark, a long history of local electricity and heat production (van Vleuten and Raven 2008) means that elements of an intelligent decentralised system, for example with small-scale combined heat and power involved in balancing wind, already exist.

In the US, regulators have retained a greater degree of control over the investment decisions of utilities compared with the UK, where the privatisations of the 1980s were very thorough-going (see above section 3.4). As a result, American regulators have been able to direct utilities to take measures to avoid or defer investment in new generating capacity through demand side flexibility and energy efficiency measures. An unanticipated consequence of this is that some US markets now have a much more advanced base from which to build the kind of flexible electricity system needed for high proportions of variable renewable generation.

4.3 Feedback effects in path creation

Once opportunities for the creation of new pathways have been opened up, the dynamics of such pathways become of interest. Here there have been attempts to make use of the same feedback effects concepts that underpin accounts of lock-in. However, these approaches recognise that that new policies or institutions can create *negative as well as positive political feedback effects*, making them potentially self-limiting (Pierson 1993, Béland 2010). This is particularly important for understanding the political dynamics of elements of sustainable energy transitions, since they often involve additional financial costs and challenges to vested

interests. This perspective suggests that whether and how quickly elements of transition occur depends on the balance of positive and negative effects, with diversity in this balance leading to a ‘snakes and ladders’ pattern where what appear to be similar policies can diverge according to which feedback effect dominates (Weaver, 2010).

Such an approach may be highly productive in the study of aspects of sustainable energy transitions, precisely because progress is so uneven and variable. Jordan and Elah (2014), for example, examine both positive and negative feedback effects in a study of European agreements on carbon dioxide emissions from new cars. Lockwood (2015) compares positive and negative political feedback effects in producing divergent pathways in renewable energy support programmes in Germany and the UK. He argues that this contrast may be due to the presence of positive feedback effects in the former that are absent in the latter, including a wider distribution of financial benefits and more employment in supply chains due to a stronger link to industrial policy. In both cases, the presence or absence of positive feedback mechanisms is linked to policy design and the role of wider institutions, including financial institutions (see also Hall et al 2016).

Other comparative studies of renewables development also use arguments based on positive and negative feedback effects, albeit more implicitly (Toke 2002, Lauber 2012, Laird and Stefes 2009, Szarka 2007, Michalena and Hills 2013). This approach could be usefully extended to other countries, such Spain and Portugal, in which the policy benefits of support for wind appear to have mainly been captured by large energy corporates, much like the UK, but which have nevertheless been more successful, at least until recently. The contrast may lie in different institutional arrangements for financing the costs of support policies (less is passed through to consumers) and in the relationships between energy corporates and local communities (more benefits are passed through) (Dinica 2010).

4.4 Types of institutional change

As interest has increased in gradual, endogenous change in institutions, greater attention has been given to categorising and explaining that change. Streeck and Thelen (2005) developed a four-fold characterisation of types of gradual change. ‘Displacement’ is the most straightforward, in that it involves the removal of old institutional rules and their replacement by new ones. ‘Layering’ also involves the introduction of new rules, but in ways that do not displace but rather places them alongside or on top of existing ones. ‘Drift’ occurs where there is no formal rule change but where the impact of existing rules changes because of changes in the wider environment. Finally, ‘conversion’ refers to situations where rules formally remain the same but are interpreted and enacted in new ways.

This framework was further developed by Mahoney and Thelen (2010), who attempt to provide an explanation for *why particular types of change tend to happen in specific political contexts and in institutions with particular characteristics*. They argue that while both displacement and layering involve the introduction of new formal rules, it is the presence or absence of veto possibilities that determines which occurs. While reformers may be able to introduce new rules, if there are actors in existing institutions with strong veto possibilities, they are more likely to resist displacement, leading to layering

The existence of strong veto possibilities through delegation to external agencies or through privatisation suggests that layering may be a particularly common form of gradual change in the energy sector. Kern and Howlett (2009) argue that this was the case in attempts to

manage an energy transition in the Netherlands. In the UK, despite the characterisation of the energy institutions as having undergone ‘paradigm’ change over the 2000s (Helm 2005), implying displacement of one regime by another, the pattern of change is also arguably better seen as a layering of policies for the support of decarbonisation and energy security on top of a basic market approach, leading to the inconsistencies that so exercise some observers (Keay et al 2012, Bird 2015).

Drift and conversion, by contrast, involve the neglect or reinterpretation of existing rules rather than the introduction of new ones. In the energy sector, because of the criticality of systems, and because so many institutional rules involve commercial relationships, actors tend to have a low level of discretion in the interpretation or enforcement of rules, so these forms of change are less common. However, one form of drift that does sometimes arise is where parameters in rules are not updated, so that rules lose efficacy as the environment evolves. Such cases can be seen in UK policy making, for example where the fuel duty accelerator introduced in 1993 was frozen in 2000 following fuel price protests and has effectively been abandoned since.

The value of Mahoney and Thelen’s approach is that it provides testable hypotheses about how the nature of context and actor discretion relate to types of change, and it provides a potentially valuable framework for a more fine-grained understanding of the change processes within energy transitions.

5. Discussion

This paper has explored the potential of historical institutionalism (HI) for exploring the politics of sustainable energy transitions. Deploying a number of core concepts including veto players, power, unintended consequences, and positive and negative feedback in a variety of ways, we have pointed to two themes – seeing contrasts in energy transition outcomes as related to differences in institutional context, and explanations of energy transition processes in terms of institutional change – where this analytical approach generates a rich research agenda

The historical institutionalist approach, with its broad scope, can interrogate the relationship between energy policy outcomes and questions of how societal values and interests are aggregated through political institutions, bringing in the large and mature literature on comparative politics. HI points to the potential importance for energy transitions of variations in the institutional arrangements for delegating energy regulation, and the closely related issue of different institutional routes to making expressed political commitments to sustainable energy transitions more credible with investors. The longstanding concern with political power in HI highlights the issue of how different institutional arrangements may work for or against capture of energy sector governance by incumbents. The approach also directs attention to the concept of institutional systems, including the possibility that the major body of work on varieties of capitalism may be relevant for understanding energy transitions.

HI also provides specific tools for the understanding of energy transition as a process of institutional change, including positive feedback in politics and unintended consequences, which may be useful in understanding both inertia and transition. Recent work on types of gradual change, and their relationship to political context and scope for actors to reinterpret rules, also provides an important agenda for further research on the details of transitions.

An historical institutionalist perspective also raises the question of whether there are specific institutional arrangements that are particularly conducive to rapid sustainable energy transitions. Mitchell (2008, 2014), for example, argues that the key criterion is whether governance arrangements support innovation, and places great emphasis on the importance of institutions that allow inclusivity in which kinds of actors can participate in energy production. She also argues for arrangements that provide clarity about responsibilities for decision making and transparency of process in decision making, both on grounds of legitimacy. Institutions should provide the capabilities for flexibility as technology costs and behaviour changes, and the discursive context should make possible whole system and social costings of particular policy decisions. Finally, institutional arrangements for rapid transition, she argues, need to be able to neutralise losers and minimise disruption.

Another approach builds on Hall's (1986) observation that what governments do in any particular situation depends on two broad but fundamental conditions: what governments are pressed to do by different groups in society, and what they can do. This approach implies that institutional arrangements that give a stronger voice for those in favour of change, and that give governments a greater capability to bring about change, will tend to favour more rapid transitions. This paper has aimed at sketching out a research agenda rather than providing a set of definitive institutional determinants of change. However, the discussion above implies that some of the factors that might favour the realisation of these two conditions include: proportional representation in electoral institutions; the involvement of municipal or local institutions in energy production and supply; the retention of a degree of control over regulators by democratic institutions; incumbent energy actors that do not have narrow short term profit objectives; the retention of some expertise of the energy sector, and rules for keeping some energy data in the public domain; a degree of positive feedback through a relatively wide distribution of the benefits of sustainable energy support policy through dispersed ownership and supportive industrial and innovation policy in the supply chain, and finally, fewer and weaker veto opportunities for incumbents opposed to change.

Notes

¹ Stirling (2011) makes the case for using the language of 'transformation' rather than the conventionally used 'transition'.

² Probably the most well-known example is Peter Hall's (1993) study of changing policy 'paradigms' in economic policy in 1970s Britain. This concept has been taken up within the energy sphere, especially in relation to the UK (e.g. Helm 2005, Kern et al 2014), which is perhaps not surprising given the strength of ideas about the efficacy of market mechanisms there, including in areas such as renewable support mechanisms (Mitchell and Connor 2011, Gross and Heptonstall 2010).

³ See for example Turnheim and Geels (2012) on coal in the UK, Geels (2002) on steam ships, Verbong and Geels (2007) on the Dutch electricity system, Raven and Verbong (2007) on combined heat and power in Holland, and the case studies in *Research Policy* 39, 4

⁴ The UK provides a good example where the Green Party had no MP at all until 2010, and in the 2015 General Election won only one seat despite attracting over a million votes.

⁵ The US provides consecutive examples of both situations: under George W Bush who strongly opposed climate policies, states such as California and Massachusetts experimented with carbon trading and renewable energy support, while Barack Obama as President was frustrated in his attempts to introduce a national carbon pricing scheme by veto players in Congress.

⁶ See for example, the major review of network regulation, RPI-X@20, which Ofgem led with minimal input from government.

⁷ One of Tsebelis (2002) analytical findings is that an increase in the number of veto players usually increases policy stability. This finding is related to, but as he points out, slightly different from the comparative argument that more veto players in one context than another means greater policy stability.

⁸ Aklın and Urpelainen (2013) argue that governments in such systems can deliberately over or under-invest in areas such as renewable energy because they are aware that successive governments may try to undo their policies.

⁹ Johnstone and Stirling (2015) also argue that incumbent power may also reside in strategic cross-sectoral links, such as the close networks between nuclear power and the military.

¹⁰ An interesting contrast here is UK's approach in which smart meter data is to be managed by a private company which will charge for access, and Denmark's, where data is managed by the state-owned system operator and where access is free.

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