

The Political Dynamics of Green Transformations: Feedback Effects and Institutional Context¹

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Introduction

Why do green transformations in some countries appear to have more momentum than in others? As other contributions in this book make clear, there are multiple interpretations of what transformations to more sustainable economies and societies might look like. However, even with relatively limited and mainstream conceptualizations, such as decarbonization of the economy or the growth of renewable energy, there are large variations between countries in how far they have progressed over the last two decades.

Whatever form green transformations take, some basic features of their political dynamics will be common to all. There are some fairly obvious factors that help determine where such transformations are more likely to start – for example the absence of a powerful coal lobby (Steves and Teytelboym, 2013) or a more green-minded population (Harrison and Sundstrom, 2010). However, sustainable transformations are likely to take some time, for example at least two or three decades for decarbonizing energy systems and economies. A key corollary of this is that successful transformations not only require instigation, but also have to be politically sustained for long periods. Coalitions need to be created around a number of

different objectives (see Schmitz, chapter 11 and Newell, chapter 5), but they also have to be kept together and expanded over time. Eventually, as the costs of more sustainable technologies and processes come down, green transformations should become economically self-sustaining, led effectively by a new green demand paradigm (Perez, 2013). But until that stage is reached, public policy is needed to lead the transformation. Such policy will tend to be highly political because it effectively involves a process of creating and managing rents to pay for the development of greener products and processes (Schmitz et al, 2013).

In this paper I argue that the sustainability of green transformations depends heavily on the *political effects of policies* aimed at bringing about transformation. These effects in turn either strengthen or weaken support for such policies, causing positive or negative feedback effects and divergent policy paths. In the political science literature such knock-on effects are known as ‘policy feedback’. My focus here is on public policy-making, since this will inevitably be needed for large-scale transformations of economies, but I would argue that the same set of issues also apply to campaigns and other actions by social movements or civil society organizations. Unless they create some form of positive feedback through their actions or ideas, such movements and organizations will not be able to lead significant transformations. Especially for transformations relating to global sustainability problems (including most ‘planetary boundaries’), this dynamic is crucial, since such problems in themselves are not seen by the majority of people as sufficiently urgent to prioritise action, or pose severe collective action challenges that block change.

The political effects of policies depend in part on how policies are designed. However, both policy design and their political consequences will also be affected by the nature of *underlying institutions and dominant ideas*, which vary between countries (Morgan et al,

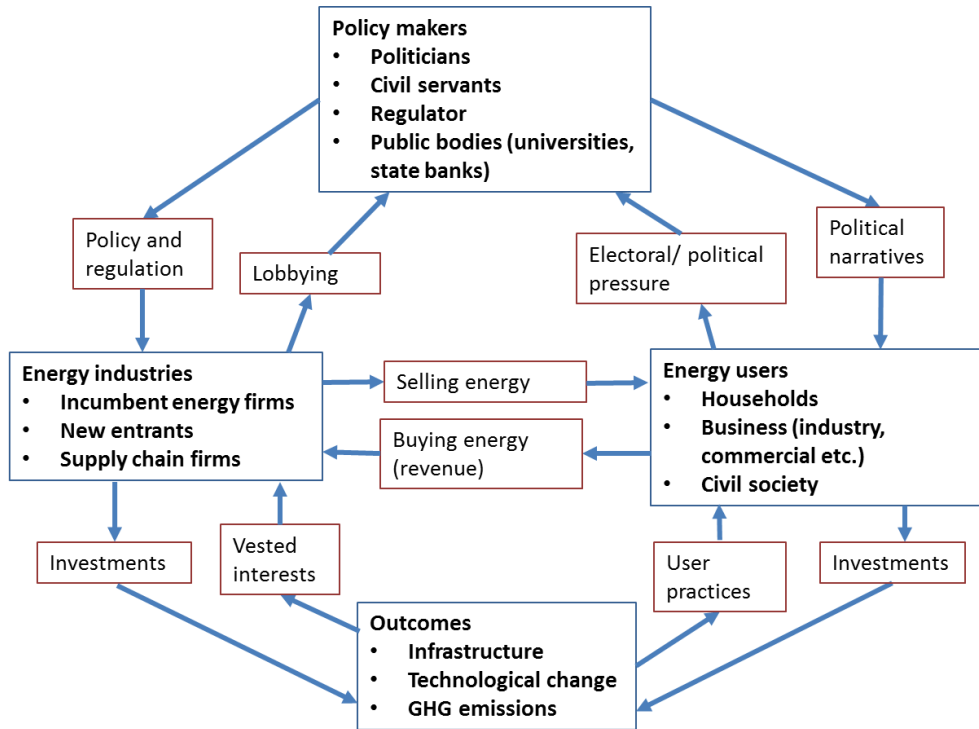
2010). The factors of policy feedback and underlying institutions are likely to play a major role in shaping the speed and likely success or failure of transformations, since they help determine the political dynamics of transformation. They also point to the possibility of trying to accelerate transformations.

Below, I explore these issues through a number of comparative examples, a particularly useful approach, since it allows the examination of divergent pathways. I focus on renewable energy policy, so it is useful first to briefly consider the political forces and relationships at work in the energy sector (section 2). Section 3 then examines the concept of policy feedback, and how it can be a useful analytical tool for understanding the dynamics of renewable energy policy in Germany, the UK, India and China. Section 4 brings in the role of institutional context and revisits the case studies. The chapter concludes with some reflections on the approach, its relation to the issue of social justice, and implications for accelerating green transformations.

The politics of energy

In modern energy sectors there are broadly three groups of actors that are important for political dynamics: *energy providers*, *policy-makers* and *users of energy* (e.g. Scrase and Smith, 2009, p710). The relationships between these groups of actors ultimately determine investment, technological change and outcomes such as greenhouse gas emissions, all of which will have further feedback effects on actors (Figure 6.1).

Figure 6.1
Political and economic dynamics in the energy system



Source: Lockwood et al (2013)

Energy providers can in principle be of any size, from individuals to multinational corporations, and privately or state owned, although in most contexts the politically important incumbent actors are large companies. Their investment decisions, especially for new technologies, will be shaped heavily by incentives, risks and regulations set by policy-makers. Once made, these decisions create vested interests that shape the subsequent actions of incumbents in energy markets. This is particularly so in the energy sector because infrastructures are so long-lived, and so give a heavily path-dependent nature to regimes and transitions. However, large energy firms are rarely passive and usually seek to influence policy actively through a range of means, including direct lobbying, secondments to government, and sitting on technical committees that shape markets, all backed up with the threat of investment strikes (Jessop, 1990) or divestment leading to the lights going out. In

privatized and liberalized markets, a key objective for incumbents in influencing regulation and policy will often be to maintain high costs of and barriers to entry in markets (e.g. Stigler, 1971), meaning that new and potentially innovative new companies will find it harder to enter the energy sector.

However, in addition to being lobbied by energy providers, politicians will also pay attention to the relationships they have with energy users, which encompasses both the general public and businesses outside of the energy sector. Political elites may also be concerned about climate change and want to see change towards low-carbon energy, either because that is what the public want, or because of personal conviction. Amongst businesses, large energy-intensive users tend to lobby strongly against policies that increase energy costs, while other businesses may support transitions because they see opportunities for revenue in low-carbon products and services and in owning renewable energy assets. This split in views can even run within a single company, for example Siemens, which manufactures both wind turbines and conventional turbines for coal and gas power plants.

Overall, much of the process by which policy-makers shape the institutions that govern the energy system is effectively a balancing act between the perceived interests of energy users with those of energy provider incumbents (Peltzman, 1976). This is what makes a sustainable energy transition so challenging, because policy-makers have to find some way of managing this balance through a process of profound change.

This framework is very general. The actors and relationships in any actual case will depend on the institutional context. For example, in many OECD countries, the energy sector has been liberalized, and incumbents are large (often multinational) private corporations. In

countries like China and India, most energy companies remain state-owned, giving their relationships with policy-makers a different quality. There will also be differences in the relationship between policy-makers and energy users, determined especially by differences in the nature of politics between countries. This can apply even between countries with apparently very similar polities. For example, Germany and the UK are both mature European democracies, but Germany's proportional representation electoral system means that environmentally-minded voters have enjoyed much stronger political representation through its Green Party, whereas in the UK the first-past-the-post system prevents this, and the route to influencing policy goes via environmental campaign organizations. In non-democratic systems, such as China's, the relationship between political elites and mass publics is obviously different again, as political pressure comes not through voting but through different kinds of demands from a range of actors, from urban communities protesting about pollution, to local governments seeking to maximise economic growth (Lampton, 2014). However, even in authoritarian China, ensuring that energy is available at an affordable cost will still be a major concern of political elites (e.g. Yuan and Zuo, 2011).

Feedback effects and renewable energy policies

Policy feedback effects

The idea that policies can have political effects is now a well-established idea in political science, with a number of applications in areas such as welfare and pensions policy (e.g. Béland, 2010). As Skocpol puts it, 'Policies not only flow from prior institutions and politics; they also reshape institutions and politics, making some future developments more likely, and hindering the possibilities for others' (quoted in Patashnik and Zelizer, 2009, p1).

In a classic essay on such effects, Pierson (1993) distinguishes a number of potential routes for such effects. One is that policies distribute resources and create material incentives, which can work to create or strengthen particular *social interest groups*: ‘Public policies often create “spoils” that provide a strong motivation for beneficiaries to mobilize in favor of programmatic maintenance or expansion’ (Pierson, 1993, p599). Secondly, policies can also transform *state capacities and institutions*, changing the administrative possibilities for government initiatives in the future and affecting later prospects for policy implementation. For example, policies that involve the collection or generation of new types of information then make possible other kinds of policies dependent on that information.

Most importantly, feedback effects can work via what Pierson calls the ‘mass public’, transforming the interests, identity and political participation of large groups of people. For example, the introduction of social security in the US created the conditions for the invention of a new social category (‘retired people’) and the formation of the politically powerful American Association of Retired Persons (AARP). Another important mass public policy feedback effect can occur where a policy induces large numbers of people to make commitments or investments that it subsequently becomes ‘both expensive and politically perilous’ (Béland, 2010, p575) to reverse, thereby ‘locking in’ the policy decision (see also Pierson, 1993, p610).

As well as the allocation of material or political resources, there are also what Pierson calls ‘interpretive effects’ (1993, p611), where policies may produce ‘cues’ for parts of the electorate that ‘help them develop political identities, goals, and strategies’ (ibid, p619). Particular policies can become iconic of particular political approaches, and help mobilize

support for or opposition to that approach, above and beyond any material effect. Given the complexity of modern life, policies can generate ‘focusing events’ or cues for social actors, but in that process also ‘heighten the visibility of some social and political connections while obscuring others.’

Much of the policy feedback literature has tended to focus on cases of *positive* feedback, not least because it is in these cases that policies become successfully entrenched. As Pierson (2000, p259) notes, positive policy feedback is one of the drivers of *increasing returns* in politics, which by analogy from economics (e.g. Arthur, 1989) creates the lock-in noted above. Increasing returns also makes political processes path-dependent, in the sense that small details of policy design or institutional context will lead to rapidly diverging paths if one involves positive feedback and the other does not. By contrast, *negative* political feedback effects undermine policies and limit their transformative reach (Pierson, 1993, p600; Béland, 2010, p575). This is particularly important for understanding the political dynamics of attempted green transformations, since such transformations often involve additional financial costs and challenges to vested interests, which can quickly create opposition.

Overall, whether and how quickly transformation occurs depends on the balance of positive and negative effects, whether policies can be amended to improve that balance, or indeed whether new and more transformative policies are feasible (Weaver, 2010, p138). Where policies have strongly positive feedback effects they become successfully locked in, but where there are both potential negative and positive feedbacks there can be a ‘snakes and ladders’ pattern whereby what appear to be similar policies can diverge according to which feedback effect dominates (Weaver, 2010).

These considerations clearly apply to the example of renewable energy raised above. Most countries have some kind of support policies for renewable energy, yet in some countries these have not gone very far whereas in others they have taken off. It might be argued that contrasts are simply due to the extent or generosity of subsidy, but this in itself begs the question of how higher levels of subsidy (which are clearly seen in countries like Denmark and Germany) are politically sustained.

One factor which might be expected to have an influence on the knock-on effects of policies is *policy design* (Pierson, 1993, Patashnik and Zelizer, 2009). Apparently small differences in policy design may lead to quite big differences in who can access the benefits from the policy, how those benefits are distributed, what the cost is and who bears that cost. Different policy approaches can also have varying interpretive effects, resonating strongly or falling flat with existing or new constituencies, and leading to large divergences in political sustainability. In the case of renewable energy policy design, a key issue is how different designs affect the political dynamics of the energy sector discussed in section 2 above and in particular the balance between producers and users.

Germany and the UK

Germany and the UK provide contrasting examples of how policy feedback has produced different pathways in the growth of renewable energy. At the start of the 1990s, neither Germany nor the UK generated significant amounts of electricity from renewable sources. In Germany, policies adopted from 1990 onwards led to rapid sustained growth in renewable electricity capacity which actually accelerated after 2000. In the UK, renewable electricity

was also eligible for support from around the same time, but growth has been much slower. By 2012, total renewable generation in the UK was around 11 per cent of total demand, less than half the share in Germany. The growth of renewables has generated negative feedback effects in both countries, especially opposition on grounds of cost. But a key difference is that Germany's policy approach created considerable positive feedback effects which are largely absent in the UK, leaving the policy there far more politically exposed, and currently in some trouble.

The growth of renewables in Germany has undoubtedly benefitted from higher levels of environmental awareness and stronger opposition to nuclear power than in the UK. However, the nature of the policies adopted in the two countries has also been distinctively different. Germany's policies have offered stable, technology-specific prices to renewable generators (fixed prices from 2000), and a guaranteed market. By providing attractive returns with low risk and ensuring grid connection (Mitchell et al, 2006), a key aspect of the feed-in tariff was that its benefits could be accessed by a range of groups, including farmers, households, cooperatives, schools, small businesses and municipalities, rather than large energy companies, which were in fact excluded from the policy. The policy supported a range of technologies, not only wind but also solar photovoltaics (PV), biomass and anaerobic digestion. The fact that conservative farmers in areas such as Bavaria benefitted from the policy was particularly important for the keeping Germany's centre-right political party on board.

A coalition of political support for renewable energy rapidly grew through the 1990s (Jacobsson and Lauber, 2000, p266), created partly by the development of vested interests, with 340,000 Germans having invested around €12 billion in renewable energy projects by

the early 2000s (Sawin, 2004, p25). There were also political effects that worked via the strengthening of interest groups , with an increasing professionalization of renewable energy associations, amidst strong support from the Green Party and the Ministry of the Environment (Laird and Stefes, 2009). In addition, because renewables policy was linked to industrial policy, especially from the late 1990s onwards, employment in factories producing wind turbines and solar PV panels created a new constituency in favour of a strong renewables policy, especially in the former East Germany.

This wide coalition helped to maintain and strengthen renewables policy; for example, it was the involvement of municipalities in the 1990s that prevented the collapse of solar PV (Jacobsson and Lauber, 2006, p266). When the first renewable energy law was threatened by legal action by the large utilities in the late 1990s and the Government proposed a reduction in feed-in rates, the Green Party mobilized a wide coalition of environmental groups, solar industry associations and companies, trades unions and regional politicians to successfully oppose the changes (ibid, p265).

Germany's renewable policy has not been without negative feedback effects. It provoked strong opposition from the incumbent energy companies and over time the overall cost to energy consumers has grown, despite sharp falls in the prices of wind turbines and solar panels. At the same time, some of the employment benefits have evaporated as solar PV producers have been undercut by Chinese imports. Nevertheless, despite current debates about cost, the growth of renewable energy in Germany looks set to continue to enjoy broad support. The main political party opposed to further expansion lost all its seats in the 2013 Parliamentary elections, and the German government pressed strongly for a national renewables target to be part of the European 2030 package in early 2014. The new

government has introduced reforms to reduce some subsidies and spread their costs more widely, but planned growth in renewables remains unchanged.²

In the UK, policy took a different course. From 1989, renewable energy was in theory eligible for support through an auctioning policy, although in practice very little capacity was built (Mitchell and Connor, 2004). In 2003, a Renewables Obligation (RO) was introduced, which placed an obligation on large energy companies to source a certain proportion of generation each year from renewables. This created a market for renewables, but with a price that was not certain, and one which basically rewarded the cheapest technology (on-shore wind). As a result, almost all investment in new renewable energy under the RO was by large companies able to bear the price risk, and was concentrated in wind only (Mitchell et al, 2006). In terms of Figure 6.1 above, while German policies had begun to transform the structure of relationships in the sector, breaking down the distinction between providers and consumers, UK policy reinforced those structural divisions. A small and badly run grants programme supported a trickle of investment in solar PV by households, but this was at a tiny level compared with Germany. Eventually, in 2010, a feed-in tariff for small scale renewables was introduced, but following explosive growth in solar PV, tariff rates were quickly scaled back. Only in 2013 has the desire to reduce risk for larger investors led the UK to finally embrace a version of feed-in tariffs more widely.

The policy design of the Renewables Obligation has created weak positive feedback effects, and left the growth of renewables in the UK exposed to considerable negative feedback effects. Large energy companies have made the largest investment in renewables, but they also have existing high-carbon assets, and the companies have been half-hearted advocates for renewables at best. Their ambivalence has also affected interest group formation, with one

organization (RenewableUK) representing larger companies and another (the Renewable Energy Association) the small-scale renewables lobby. During the debate about the introduction of a feed-in tariff in the UK, these two groups were unable to agree. The UK has also so far failed to develop a strong industrial policy and supply chain for renewable energy, meaning that employment effects are nowhere near as politically important as they have been in Germany, and that a narrative about the importance of 'green jobs' is not yet taken for granted.

At the same time, the dominance of large corporate interests in renewables has produced stronger negative feedback effects. One issue is planning. Whereas in Germany around half of onshore wind turbines were owned by farmers or local cooperatives in the late 1990s, in the UK 98 per cent were owned by large energy companies or developers, which have no link to or stake in the local society and economy (Pollitt, 2010, p36). Szarka (2006, p3046) argues that 'It is clear from fieldwork contacts with anti-wind protesters in Britain... that one cause of rejection is the feeling of injustice engendered by outside firms who exploit a local resource and impose burdens, but offer no community benefit or compensation'. Moreover, and again in contrast with Germany where tariffs were adjusted to help investors in less windy sites, the RO has incentivized developers to seek out the windiest sites, which often tend to be in ecologically and visually sensitive areas.

The fact that much of the financial benefit from renewables policy has been captured by large energy firms, which have become extremely unpopular since the mid-2000s due to price rises, suspected profiteering and high executive salaries, also leaves UK policy particularly exposed to the negative feedback effects of cost. Germany's renewable electricity support programme has so far cost about four times what the UK has spent, as a share of national

income (OECD, 2013, p48). Despite this, rifts on the future of renewable power in the political elite and the media are stronger in the UK – with, for example, proposals to halt and even reverse on-shore wind expansion – creating considerable political uncertainty and a chilling effect on investment.

Overall, in Germany, renewables policy appears to have maintained a dominance of positive over negative feedback effects through spreading the benefits of the policy widely through society. Policy-makers, not without controversy, have tried to solve the problem of how to manage interests during transformation discussed above not so much by balancing them but by beginning to transform energy users into producers and challenging incumbents directly. It was not clear that this was intended at the start of the policy, but it has evolved in such a way as to produce this outcome. In the UK, by contrast, policy has benefitted incumbent producers, but the problem of balancing this approach with the interests of users has become increasingly fraught over time.

India and China

This framework can also be applied in the very different settings of countries like India and China. These countries are still at a relatively early stage of transformation in terms of renewable power. For example, despite rapid growth (Lewis, 2011; Sharma et al, 2012), wind power as the leading technology in both countries still only provided 2.5 per cent of total electricity generation in India in 2011 and 1.5 per cent in China. Policy feedback effects are likely to be much weaker at this stage. However, both countries also have ambitious targets for renewable energy, and the policy feedback approach can help identify how far, and where, these ambitions are likely to encounter political problems.

Investment in wind power in India has historically been driven by capital subsidies and tax incentives, including accelerated depreciation (AD). This policy has drawn in investors from a wide range of businesses (who also seek on-site power generation given the unreliability of the Indian grid), and also fostered substantial development of wind farms by wind turbine manufacturers themselves in a so-called ‘vertically integrated’ model (Benecke, 2011; Shrimali, 2014). Interestingly, in terms of Figure 6.1 above, this policy approach means that the distinction between energy providers and consumers is again broken down, but unlike as in Germany, only for industrial and commercial customers, not for domestic customers, and with quite different political effects. Additional support mechanisms have also been introduced over the 2000s, including feed-in tariffs at the state level, a ‘generation-based incentive’ offered by the central government and a renewables obligation on (largely-state owned) electricity companies, but not all of these are functioning particularly effectively (Shrimali and Tirumalachetty, 2013).

The cost of feed-in tariffs for wind is incurred by state utilities, and passed on to customers. While the relatively small role of wind means that this is not yet a major problem, in some states, utilities and regulators have begun to worry about the sustainability of such costs and are pressing for a move to an auctioning policy (Kanchan, 2013), which has been successful in bringing down generation costs in solar PV (Deshmukh et al, 2011).

At the same time, support via accelerated depreciation has also produced negative feedback effects, not so much via electricity consumers as via the federal budget. In theory, this route leads ultimately to taxpayers, but the nature of Indian politics means that mechanisms of accountability are limited, and the pressure for cuts to support mainly comes from reformist

policy-makers themselves. Accelerated depreciation covers other investments in addition to wind farms, but overall it is responsible for almost half India's foregone tax revenue from the corporate sector (Bandyopadhyay, 2013), and has come under increasing pressure from a government interested in fiscal reform. In 2012, the allowance for wind investments was slashed and the generation-based incentive was cut, leading to a sharp slowdown in new investment.³

If wind, and indeed large-scale solar PV investments grow on the scale envisaged by national targets for renewables, a further negative feedback effect may arise through competition for land. Early so-called solar 'ultra-mega power plants' are being sited on government-owned land, but clashes over the siting of renewables in farming communities are not unknown, and informed observers argue that without benefits for local communities this will be a potential problem for the growth of renewables in future.⁴

Against these negative feedback effects, positive effects are also likely to play some role. India has favoured local turbine manufacturing through import duties, although its industrial policy for wind has been nowhere nearly as active as China's (Lewis, 2011). The leading turbine manufacturer, Suzlon, estimates that the wind industry is creating around 40,000 jobs a year. Also important, as in Germany, will be popular ownership of, or participation in renewables, with a large increase in solar PV on domestic roofs anticipated, partly financed and/or owned by energy services companies.

China's wind boom originates from 2003, when the government introduced a policy of auctioning opportunities to build wind farms on pre-selected sites, with preferential loans and tax conditions, grid access and other infrastructure provided, while at the same time placing

obligations on state-owned power generation companies to generate a certain proportion of electricity from wind, and on state-owned supply companies to buy a certain proportion of electricity from renewable sources (Lema and Ruby, 2007; Lewis, 2011). The approach has incentivized a very rapid expansion of investment in wind capacity, with less attention to quality. There have been problems with poor turbine performance, lack of grid access and poor maintenance, and increasingly frequent incidents of turbine failure (Wang et al, 2012; Zhang et al, 2013). From 2009, a feed-in tariff policy was introduced to try to address some of these issues.

The key success of China's policy has been in building up what is now a globally successful wind industry through a highly active industrial policy (Lewis, 2011; Wang et al, 2012; Lema et al, 2013). This has led to positive feedback effects both through employment (in 2008 an estimated 1 million people were employed in the Chinese renewables industry, mostly in wind (Li, 2010)), and export earnings. These effects can be expected to grow further if the Chinese wind industry can further develop its position and if global wind markets hold up.

As in India, much of the political dynamics of the wind energy boom in China play out between large energy companies and policy-makers. At the national level, the state has been keen to promote a wind industry which is now a major exporter. Local governments are often keen promoters of smaller wind farms, which do not require state-level approval, because they bring tax revenue, provide jobs and help local industry (Zhang et al, 2013, p338). Energy companies, meanwhile, have mixed interests. Grid and supply firms have to buy wind energy, but to some extent have been allowed to pass costs through to consumers and in any case have soft budget constraints as state-owned enterprises. State-owned generation companies have invested heavily in wind power, because of the requirement on

them to meet their portfolio targets, which affects their ability to obtain permission to build more conventional (coal and nuclear) capacity. Such companies own more than 80 per cent of China's wind capacity (Zhang et al, 2013, p338).

The costs of wind and other renewables in China are now financed from a fund set up by a surcharge on consumers' bills (Yuan and Zuo, 2011). The surcharge is still fairly low, but has been increased several times since the mid-2000s. In spite of this, the renewables fund is still facing shortfalls, and there have as a result been delays in payments to wind developers since 2010 (Davidson, 2013). The most recent increase to the surcharge has involved a doubling for industrial customers but no change for domestic customers, a reverse of the German policy by which most industrial users were exempt from such charges. At the same time, feed-in tariffs have been somewhat scaled back, especially for solar PV. However, the overall political effects of negative cost feedback are likely to be limited. This is because the Chinese government sets electricity prices centrally and consumer prices have been kept low, including for industrial users (Rutkowski, 2013).

In China then, policy has been kept on track by strong positive feedback via the development of wind as industrial policy and by more direct control of energy companies by the state. The potential negative feedback effects of costs falling on electricity consumers is likely to remain small as long as the state continues to keep power prices low. In effect, in terms of Figure 6.1 above, the Chinese state is using its huge fiscal resources to act as a buffer between providers and users.

The role of institutional context

Diversity in social and economic institutional systems

In addition to the nature of policies themselves, we might also expect the wider discursive, institutional and political context in which policies are made and implemented to also have an influence (Pierson, 1993, p602, Patashnik and Zelizer, 2009, p3). As discussed above, it is these contexts that determine the exact nature of the structural relationships between energy providers, users and policy-makers (see Figure 6.1 above) in different countries.

First, the range of options for policy design which are acceptable in any particular context will to a great extent be prescribed by what are sometimes called ‘policy paradigms’, i.e. interpretive frameworks of ideas and standards that are ‘embedded in the very terminology through which policy-makers communicate about their work... influential precisely because so much of it is taken for granted and unamenable to scrutiny as a whole’ (Hall, 1993, p279). Particular policy paradigms are in turn often associated with particular institutional systems. For example, Schmidt (2002) argues that in Britain policy has been dominated by a neo-liberal paradigm, linked to a liberalized market institutional system and a politics deeply influenced by Thatcherism. By contrast, Germany’s distinctive ‘social market’ paradigm complements a set of more deliberative economic institutions, while France’s paradigm of *dirigisme* is a good fit for an institutional system in which the state plays a prominent role.

Beyond policy design, institutional systems may also influence the articulation of policies and political effects, i.e. how far positive and negative feedback effects are likely to arise, and whether these effects are amplified or dampened. Many policies for green transformation are

essentially economic policies, involving taxes, subsidies and other forms of state or institutional support, so economic institutions are particularly important. For example, a renewable energy support policy can offer a subsidy, but how far investment in renewables actually takes place depends on how far financial institutions complement that policy and provide credit on acceptable terms. Equally, a country with labour market and welfare systems that produce high levels of poverty and inequality may find it hard to place the costs of renewable energy support on energy bills, as it this amplifies the political effects of a negative policy feedback to the point of crisis.

The importance of context for policy feedback effects suggests that differences in speeds and paths of green transformation in different countries may be related to *institutional diversity* across countries. There are many approaches to understanding such institutional diversity (see e.g. Crouch and Streeck, 1997; Schmidt, 2002; Morgan et al, 2010), and considerable debate over whether it is possible to classify countries into particular ‘varieties of capitalism’ (Hall and Soskice, 2001; Crouch, 2005a; Hancké et al, 2007) or the relevance of those models for countries outside of Europe (Carney et al, 2009; Schneider, 2009). However, common to all these approaches is the idea that different countries do have distinctive systems of social and economic institutions that complement one another, and which evolve over time (Crouch, 2005b, Streeck and Thelen, 2005). We can therefore expect such systems to have significant implications for the speed and path of a green transformation.

Germany and the UK

Returning to the cases of Germany and the UK, there are several contrasts in institutions and discourses that may help explain why Germany adopted a policy which had the potential to

create stronger positive feedback effects, and also why that potential was realized more fully.⁵

The Renewables Obligation (RO) was chosen in the UK explicitly as a mechanism that attempted to mimic a market, i.e. not setting a fixed price, and avoided an explicit technology-specific focus, and seen as superior to the German feed-in tariff specifically for these reasons. This approach was entirely consistent with a policy-making environment in the UK dominated by a neo-classical, and often neo-liberal, economic paradigm. In Germany, the neo-liberally minded finance ministry was also opposed to a technology-specific feed-in tariff. However, the wider German policy paradigm was more influenced by the concept of ‘Ordoliberalism’, a social market approach developed in Germany after the Second World War which laid much greater emphasis on active government intervention to ensure competition and prevent monopolistic or oligopolistic market power (Toke and Lauber, 2007).

Ordoliberalism also turned out to be far more consistent with the idea of an active industrial policy – and therefore a mission-oriented green industrial policy (see Mazzucato, chapter 9) – than the UK’s policy paradigm. In the UK, governments since the 1970s have largely been sceptical of any directed form of industrial policy, with the Treasury in particular a major opponent. More widely, many comparative analyses of economic institutions lay emphasis on the much greater degree of coordination amongst industrial companies and the state in Germany compared with the UK (e.g. Hall and Soskice, 2001; Schmidt, 2002).

Other aspects of Germany’s institutions have also turned out to play important roles in facilitating both the implementation of its renewable policy, and in increasing its net positive

political feedback effects. Much of the investment by non-corporate actors in renewables has been supported by state finance in the form of the KfW bank, channelled through a network of local and regional banks, which know their clients personally. The UK has no equivalent financial institutions.

In Germany, higher energy costs for consumers have not produced quite the same political backlash as in the UK partly because higher levels of welfare and lower inequality in Germany make fuel poverty and squeezed incomes in the middle less acute problems (Crepaz 1998; Iversen and Soskice, 2006).

Below the level of national political economy, German federalism and decentralization has also meant that municipalism is strong, at least compared with the UK's currently highly centralized system. Both municipal and regional government in Germany have been highly supportive of various aspects of renewables growth, and many municipalities in Germany still own energy supply and generation businesses that have given them a vehicle for investment. In the UK, such companies disappeared after the Second World War.

India and China

In the case of India and China, there are similarities as well as differences in institutional context, which partly explains why they initially adopted similar support policies for wind that focused on capital costs and directed subsidy towards those institutions that play a leading role in their respective political economies – state-owned enterprises in China and family-owned corporations in India (e.g. Taylor and Nölke, 2008). Both countries have also historically embraced significant state intervention on the economy (although China to a

greater extent than India), including active industrial policy. Chinese provinces and many Indian states also have state-owned energy utilities with soft budget constraints, a situation which has given policy-makers more room for manoeuvre in the balance between providers and users, and has also softened negative policy feedback that might work through private sector incumbents.

However, one key difference between the two countries that helps explain why the pace of wind expansion is currently faltering in India and not in China is the unwillingness of policy-makers in India's central government to continue to subsidize wind via accelerated depreciation. This unwillingness can be explained in part by the policy paradigm of the current Indian government led until 2014 by Prime Minister Manmohan Singh, who has pursued a series of reforms over the last decade aimed at liberalization, tax simplification and fiscal consolidation clearly influenced by the ideas of orthodox economics.

Concluding remarks

What constitutes a green transformation will be open to contestation, but for any kind of transformation actually to occur it must be politically sustainable. Alliances for transformations need not only to be formed but also maintained and expanded. In this sense, if policies (or actions or campaigns by social movements) are to be successful in bringing about green transformations, they must be self-reinforcing, creating constituencies for their own implementation and expansion.

In terms of the concepts explored here, this means that policies must have a preponderance of positive feedback effects over negative ones if they are to become 'locked in'. For many

sustainability problems, including climate change, this represents a major challenge, since transformative policies fly in the face of existing high-carbon lock-in, and will challenge existing vested interests, norms and institutions. In that sense, policies for green transformations are always likely to encounter negative feedback.

Here I have argued that an important factor in the balance between positive and negative feedback effects is the design of policies, using a number of comparative case studies. For example, Germany's policy approach has been to distribute subsidies from policy relatively widely, and use industrial policy to create employment, both of which have created important positive feedback effects to offset the inevitable negative feedback on the costs of the policy. This is not so much a case of grassroots innovation from below (see Smith and Ely, chapter 7) as mass appropriation of innovation from above. The UK's renewable support mechanism has done neither of these things, leaving subsidy to be captured by large and highly unpopular energy incumbents and the policy exposed.

I have also argued that both policy design and political effects in turn will depend in part on institutional systems and dominant policy paradigms present in a country. Again, taking the contrast between the UK and Germany, a technology-neutral, market-mimicking policy was the natural fit for the liberal policy paradigm in the former case, whereas an industrial policy for renewables was very difficult to get going, in contrast to Germany's more managed, coordinated institutional system and discourse.

Most of the analysis in this paper focuses on two sets of comparisons, one between Germany and the UK and another between China and India. However, it is also worth briefly considering what can be learned from comparing Asia with Europe. The first region has fast

growing rising powers with young populations, whereas the second is now economically sclerotic and fiscally constrained. This implies that, for a number of reasons, we might expect renewable energy policy to have a greater degree of political sustainability in the Asian countries, especially China. The Chinese state has deep pockets, which enables it to limit the negative feedback arising from costs to consumers. Both India and China can expect to create exporting industries in renewable energy on a greater scale, certainly than the UK. Both are at a much earlier stage of mass deployment. However, they could still learn from the different experiences of Germany and the UK, and be aware of both the political opportunities and potential traps that arise from policy design.

What are the lessons from this approach, if any, for accelerating green transformations? One is simply that climate policy-making, which is dominated by economics, should include more consideration of the political implications of policy. To some extent, policy-makers already do this in a self-censoring way, avoiding policies that they think will be too controversial with some groups, but they rarely think about deliberate strategies for positive feedback. In this sense, we should learn from the German experience. The creation of positive feedback effects in renewable energy policy in Germany was not an initially explicit aim; rather, this aspect emerged as an unintended consequence of policy design. But this does not mean that feedback aspects of policy should not be thought about from the start; indeed there is precisely an opportunity to do so. As the political dynamics of policy unfold over time, a strategy of adaptive management may also be important; responding to opportunities for positive feedback, or the threats of negative feedback as they arise. To some extent, the German case again provides a fairly successful example of this.

A second implication is that countries with institutions that are less supportive of positive feedback effects should seek to change their institutions or develop new ones. This is a controversial area, with some arguing that institutional systems cannot be changed and others that they can. The key thing seems to be that what matters for learning from others is institutional function rather than form.

Finally, the approach taken here also throws some light on the relationships between social justice and green transformations. Policies which spread the benefits of transformations more widely, for example, Germany's employment in renewable supply chains in the deprived north and east of the country, are likely to produce valuable positive feedback effects and be more sustainable. A different perspective on the issue is to pose the question the other way round, i.e. does greater social justice make green transformation easier? Again, the experience of Germany and the UK would suggest that it does, because the better off are the poorest in society, the more able they are to bear some part of the costs of transformation, and able to claim some share of the benefits.

Notes

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² www.carbonbrief.org/blog/2014/04/germany%E2%80%99s-renewables-reforms-are-a-step-towards-giving-energy-sector-back-to-big-corporations/, accessed 16 June 2014

³ www.business-standard.com/article/companies/restore-accelerated-depreciation-scheme-for-wind-sector-suzlon-114020900114_1.html, accessed 16 June 2014

⁴ Personal communication, Ashwin Gambhir, PRAYAS

⁵ See also Laird and Stefes (2009) for a similar analysis of Germany and the US.

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