

Energy Transition in Europe and the United States: Policy Entrepreneurs and Veto Players in Federalist Systems

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Abstract

The focus of this special issue is on the energy transformations taking place in several European countries (Austria, Belgium, Germany, and Switzerland) and at the federal and subnational (state) levels in the United States with special attention given to California. The cases examined all have federalist structures, and with the exception of the federal level of the United States, all have relatively ambitious climate and renewable energy targets. We compare these states out of an interest in better understanding how federalism interacts with energy transitions. The comparison is also intriguing as at the federal level the United States presents a stark contrast with the federalist European countries considered in this special issue but at the subnational level many similarities can be found.

Keywords

energy transition, renewable energy, United States, Europe, Switzerland, Germany, climate change, Austria, Belgium, federalism

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Energy Transition and Federalism: An Introduction

As a result of growing international concerns about climate change, energy policy worldwide is under substantial pressure to transform in a low-carbon direction.¹ The Paris Climate Agreement sets a goal of keeping the rise in global average temperatures to well below 2°C and strives to keep the temperature rise to below 1.5°C above preindustrial levels. This will require major transitions in domestic energy structures, a major source of greenhouse gas emissions. Whether the energy transitions needed to meet these targets will happen quickly enough will be determined by a mixture of technological, political, and social factors (Cléménçon, 2016b; Klein, Carazo, Doelle, Bulmer, & Higham, 2017). Existing climate plans and targets are still insufficient to meet the Paris goals.

To meet their climate goals, countries are being forced to reconsider their dependence on fossil fuels, and this has given a boost to renewable energy development. The nuclear reactor disaster in Fukushima, Japan in 2011, further contributed to the pressure to transition not only away from fossil fuel energies but also from nuclear energy.

Energy-relevant economic and technological developments are starting to take place in different world regions (Hübner, 2019) but are particularly prominent in Europe where renewable energy development has been strongly promoted by the European Union (EU), many national governments, and at the regional and local levels (De Lovinfosse & Varone, 2004; Newinger, Geyer, & Kellberg, 2016; Skjærseth, Eikeland, Gulbrandsen, & Jevnaker, 2016). Many European states are considered renewable energy pioneers and climate change leaders (Jacobs, 2016; Solorio & Jörgens, 2017). The need for a renewable energy transition as a component of climate change mitigation measures has not, however, been embraced with equal enthusiasm everywhere as the U.S. decision to pull out of the Paris Climate Agreement attests. Low-carbon energy policy change in the United States under the Donald Trump administration is largely dependent on municipal- and state-level actions (Karapın, 2016; Schreurs, 2016).

This special issue of the *Journal of Environment and Development* addresses how federalist institutions affect the deployment, expansion, and promotion of renewable energies, as part of low-carbon energy transitions. It does this by examining energy transition case studies in Austria, Belgium, Germany, Switzerland, and the United States, with special attention given to the state of California.

The articles address questions about how federalist structures matter for the introduction of renewable energy and the promotion of climate change policy. They consider which levels of government have been key to the promotion or blocking of renewable energy development and climate action and explore why this differs across federalist systems. They also look at the legal, administrative,

and financial ability of national and subnational governments that have to act, and at which factors are relevant for the willingness of different levels of government to promote renewable electricity and low-carbon energy transitions. The contributions are theoretically, methodologically, and empirically rich.

Federalism and Energy Transitions

Questions about the ability and willingness of different governance levels in federalist systems to promote renewable energy and climate change policy are highly relevant at a time when climate change concerns are mounting. Federalist institutions can promote low-carbon energy transitions by creating enabling scope for subnational governments to promote change, or they can result in stagnation, allowing incumbent actors to block efforts to promote a transition to renewable energy.

The effects of federalism on renewable energy expansion policy are ambivalent. A political system can either concentrate or fragment policy-making processes across institutional venues. Federalist structures, that is, formal fragmentation of policy responsibilities across federal and subfederal authorities, have important impacts as they require a coordinated effort of various governments to develop a coherent public policy. The increase in numbers of decision arenas makes the strategic game of actors more complex and renders the policy outcomes more uncertain. In other words, federalist structures offer many opportunities and constraints to policy stakeholders (i.e., agency), who aim at influencing the policy process and outcomes. Formulating clear expectations about the impacts of federalist institutions on agency is thus challenging.

On the one hand, federalist institutions offer institutionalized blockage points to veto players who are opposed to renewable energy expansion (such as business groups in the fossil fuel industry or conservative or right-wing political parties) (Tsebelis, 1995; Vatter, 2006). Federalist institutions can hinder energy transformations by increasing the number of veto points available to supporters of the status quo or opponents of a low-carbon energy transition. Such opponents will try to activate veto players within federalist structures to slow or block action. Opponents of change may seek to block the formulation of national climate change or renewable energy policy through their representatives in the national legislature or by blocking the implementation of supportive policies at the regional (state, provincial, and cantonal) or local levels.

Furthermore, coordination challenges are a major concern for energy transitions in federalist systems. The patchwork of energy policies being promoted at different government levels can result in coordination difficulties (e.g., Appunn, 2016; Chemnitz, 2019; Müller & Kahl, 2015; Ohlhorst, 2015; Ohlhorst, Tews, & Schreurs, 2014; Schreurs & Steuer, 2015).

Conversely, federalist institutions may be used, activated, or mobilized by policy entrepreneurs promoting renewable energy and climate change action

(e.g., for the Swiss case, see Strebel, 2011). Federalist institutions offer many access points to the decision-making process and may be used by policy entrepreneurs (such as environmental groups, ecobusinesses, and green parties) to promote low-carbon energy transitions. There may even be a kind of multilevel reinforcement of policy action with different actors at different levels supporting each other in the push for policy change. Progressive renewable and climate policies at different levels of government can help keep momentum behind action, despite the existence of veto players (Jänicke, 2015; Jordan, van Asselt, Berkhout, & Huitema, 2012; Schreurs & Tiberghien, 2010).

Constitutional division of powers and legal arrangements can provide the room for experimentation and innovation at the subnational level (Bulmer, 2017; Harrison, 2010; Rabe, 2004; Wiseman & Owen, 2018). On many energy issues, federalist systems offer subnational units various potential to introduce new policies and programs. Pioneering states, provinces, or cantons may experiment with innovative legislation, fiscal incentives, voluntary programs, or technological developments. If these are sufficiently attractive, they may diffuse horizontally across subnational levels (Daley & Garand, 2005; Varone & Aebischer, 2001). Examples of this are the spread of feed-in-tariffs and renewable energy portfolio standards (Jacobs, 2016).

When there is a push for policy change at the subnational level, it may also result in vertical policy change. This kind of bottom-up diffusion from the subnational to the national and supranational levels has arguably been critical both in relation to climate mitigation efforts and renewable energy promotion (Jordan, 2012; Schreurs, 2008; Schreurs & Tiberghien, 2010). Such bottom-up diffusion is evident in the case of Germany within the EU on climate change (Weidner & Mez, 2008) or California within the United States in relation to, for example, automobile efficiency standards (Karapin, 2016; Mazmanian, Jurewitz, & Nelson, 2008; Peevey & Wittenberg, 2017). Pointing to the example of Switzerland, Rieder, Balthasar, and Kissling-Näf (2014) also note that federalism can offer increased flexibility when it comes to the implementation of national policies. This can be important in terms of finding implementation solutions which fit local needs and circumstances.

Each of these tendencies can be found in the different federal systems analyzed in this special issue. In the articles of this special issue, we will see cases of federalism enhancing renewable energy transitions, instances where interjurisdictional differences slow or block energy transitions, and cases where coordination is made challenging by the different understandings and priorities of actors at different levels of government.

A common conception of federalist structures classifies the United States and Belgium as forms of jurisdictional or dual federalism, whereas Switzerland, Austria, and Germany are typically considered to exhibit greater functional or cooperative federalism (Benz & Lehmruch, 2002). Different kinds of federalist structures can influence jurisdictional responsibilities, innovation potential, and

multilevel coordination. Federalist relationships, however, are not static; they can shift in direction with time. Indeed, much of the U.S. literature on environmental and energy federalism examines the shifting centers of authority between the federal and state levels with some arguing that there is a move away from dual federalism toward concurrent jurisdictions in electricity regulation (Lyons, 2018; Rossi, 2016), and others calling for a more holistic understanding of the energy system and preferring the label: dynamic federalism (Osofsky & Wiseman, 2013). There is also considerable attention being paid to the conflicts that have arisen between different jurisdictional levels in terms of environmental direction (Millimet, 2013), with renewed attention to this issue since the start of the Trump administration (Konisky & Woods, 2018) and its role not only as a veto player for new legislation and initiatives but also as an active advocate of environmental legislative rollback.²

Comparing Renewable Energy Paths: Contrasting Supranational Leadership in the EU With Federal Ambivalence in the United States

One of the big differences between Europe, on the one hand, and the United States, on the other, is the level of support provided at the national/supranational level for the low-carbon energy transition (Schreurs, 2019). The EU has set ambitious targets backed by numerous policy and programmatic initiatives intended to encourage national action on climate change (Cléménçon, 2016a; Oberthür & Kelly, 2008; Schreurs, 2016). The EU has committed to a 40% reduction in greenhouse gas emissions by 2030 (compared with 1990 levels), a 32% share for renewable energy in the energy mix, and at least a 32.5% improvement in energy efficiency compared with a 2005 base line. This framework was adopted by the European Council in October 2014, and the targets were revised upward in 2018. In addition, in November 2018, the European Commission (2018) issued a strategic road map, “A Clean Planet for All,” that calls for a climate-neutral Europe by 2050. These targets are specific to the members of the EU, but other European states that are not in the EU, such as Lichtenstein, Norway, and Switzerland, tend to develop national policies that move in similar directions. There is close cooperation in Europe on environmental and climate matters and on the development of policies to achieve the internationally agreed target of limiting global warming to a maximum of 2°C and making best efforts to stay below a 1.5°C increase compared with the preindustrial era. To enhance implementation success, EU member states are expected to draw up National Energy and Climate Plans outlining their climate and energy objectives, targets, policies, and measures and to report these to the European Commission.

The situation is quite different in the United States where since the election of Donald Trump the federal government has done little to address climate change and has begun a process of rolling back various policies aimed at reducing greenhouse gas emissions. The George W. Bush administration pulled the United States out of the Kyoto Protocol, and the Donald Trump administration has indicated its intentions to pull the United States out of the Paris Agreement. During both of these administrations, fossil fuel exploration was supported. Even when there have been presidents supportive of climate action, like Bill Clinton and Barack Obama, their intentions have been stymied by lack of adequate support from Congress for meaningful climate policy. Nevertheless, a subset of subnational actors in the United States have sought to make progress toward a low-carbon energy transition despite the unfavorable conditions at the federal level (Karapın, 2016; Mazmanian et al., 2008).

The United States has no federal renewable energy target. Yet, many U.S. states have adopted renewable energy portfolio standards, and these have helped drive renewable energy capacity expansion even though their role might decline in the future as the price of renewables rapidly declines (National Council of State Legislatures, 2019). Several states have particularly ambitious climate change and renewable energy targets (primarily, but not exclusively, for the electricity mix), among them California (44% by 2024; 100% clean energy by 2045), Connecticut (44% by 2030), Hawaii (40% by 2030; 100% by 2045), and both New Jersey and New York (50% by 2030).

Rejecting Nuclear Energy While Promoting Renewable Energy

The European states considered in this special issue not only share the goal of major greenhouse gas emission cuts and strong renewable energy growth, but they also share the goal of exiting from nuclear energy use or in the case of Austria, voted in a referendum in 1978 not to begin using it (Brunnengraber & Schreurs, 2015). Germany, which once obtained more than a quarter of its electricity from nuclear sources, has a plan to shut down its last nuclear power plants in 2022. Belgium, which at one time obtained around half its electricity from nuclear, aims to shut down the last of its seven aging nuclear power plants between 2022 and 2025 (Morgan, 2018), and Switzerland plans to close its five nuclear power plants as their operating licenses expire, with one scheduled for termination in 2019.

These states have simultaneously formulated and implemented different strategies for accelerating their renewable energy transitions while phasing out nuclear energy. They share the goals of moving toward energy efficient, renewable energy driven, and largely climate-neutral economic structures. Germany, the largest economy in the EU, has embarked on a multistage energy transition

(Hager & Stefes, 2016; Morris & Jungjohann, 2016; Steinbacher, 2016). The first stages have involved the phase out of nuclear energy, and the phase in of renewable energy (an on-going process). Within the next few years, Germany should be supplying about half of its electricity from renewable energy sources (a mix of wind, solar, biomass, hydro, geothermal, and other sources). The next steps of the transition will involve phasing out the use of coal (presumably by 2038 at the latest if the recommendations of the 2019 report of the Commission on Growth, Structural Transformation and Employment are adopted by the federal government), and the shift away from fossil fuel use in the building and transport sectors. Germany aims to achieve a 55% reduction in its greenhouse gas emissions by 2030 (compared with 1990) and an 80% to 95% reduction by 2050 (Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit, 2016). This is largely to be achieved through energy efficiency improvements, reductions in energy consumption, and strong growth in renewable energies and related technologies. Targets include a minimum 80% share for renewables in the electricity sector by 2050 and a 60% share in gross final energy consumption. The Climate Cabinet organized by Chancellor Angela Merkel in 2019 was tasked with developing a plan for meeting its 2030 targets. In October 2019, a climate package outlining steps to reduce emissions in accordance with Germany's commitments under the Paris Agreement was agreed to by the cabinet (Bundesregierung, 2019). The plan which is quite ambitious by international standards was heavily criticized domestically for not going far enough, indicating just how strong environmental concerns are in the country. A climate protection law is also in the makings.

As a reaction to the Fukushima nuclear accident, the Swiss government decided in June 2011 not to replace any of its nuclear reactors and in 2018 an amendment to the Swiss Nuclear Energy Act came into effect prohibiting the issuing of new general licenses for the nuclear reactors. A national referendum in 2017 vetoed the idea of moving up the shutdown date for the nuclear power plants but confirmed that the country's population desired that the five nuclear reactors be shut down when their operating licenses expire. The Swiss subsequently launched national debates regarding a new "Energy Strategy 2050" which went into effect on January 1, 2018, with the new Energy Act. The Swiss goal is to dramatically reduce end energy consumption (by 43% of per capita energy consumption between 2000 and 2035), promote strong growth in renewable energy, and further cut CO₂ emissions. The Swiss cantons supported the strategy but insisted that the Confederation respect constitutional powers especially concerning cantonal tax sovereignty and their responsibility for the building sector (Swiss Federal Office of Energy, 2018). Referring to the new scientific evidence provided by the Intergovernmental Panel on Climate Change, the Swiss government decided on August 28, 2019, to reduce its net carbon emissions to zero by 2050.

Austria embarked on an energy transition in 1978 already when a law was passed prohibiting the construction of nuclear power plants and the commissioning of existing plants. In 2018, the Austrian government issued its Climate and Energy Strategy setting 2030 targets: achieving a 100% share of renewable electricity in national electricity consumption (national balance) and reducing greenhouse gas emissions by 36% of 2005 levels. The Austrian government's strategy sets out guidelines for all key sectors to prevent bad investments and structural gaps which could endanger meeting the goal of becoming a highly efficient and climate-neutral energy and mobility system and economy (Federal Ministry Republic of Austria Sustainability and Tourism & Federal Ministry Republic of Austria Transport, Innovation and Technology, 2018).

On December 19, 2018, Belgium adopted the first version of the National Energy and Climate Plan, a compilation of the climate plans drawn up by each of its three regions. It proposes to reduce greenhouse gas emissions in the sectors not covered by the European Emissions Trading System by 35% by 2030 and to achieve a renewables target of 18.3% in the energy mix by 2030 (ENOVER/Nationale Klimaat Commissie, 2018).

There is no plan to exit nuclear power in the United States, although rising costs associated with heightened security standards and maintenance needs in the aging fleet are factors behind numerous plant closures. Successive administrations have highlighted the importance they place on continuing nuclear energy use. Regulators have granted 20-year operating license extensions to numerous plants. Yet, at the subnational level, nuclear energy is on the way out in several states for various reasons. Fourteen states have placed restrictions (not bans) on the construction of new nuclear power facilities (California, Connecticut, Hawaii, Illinois, Maine, Massachusetts, Minnesota, Montana, New Jersey, New York, Oregon, Rhode Island, Vermont, and West Virginia; National Council of State Legislatures, 2017). California, the state looked at in most detail in this special issue, is *de facto* on a path toward a nuclear phase out. State regulators in California voted to shut down Diablo Canyon, the last of the state's nuclear power plants, by 2024 to 2025 (Nikolewski, 2018).

An Overview of the Special Issue Contributions

The articles in this special issue offer an opportunity to examine how federalist structures influence jurisdictional responsibilities, innovation potential, and multilevel coordination toward low-carbon energy transformations recognizing that the support for transitions is not always present at different government levels, nor is it necessarily stable over time. Pressures for change increase and decrease related to various political and economic conditions.

The article by Roger Karapin (2020), "Federalism as a Double-Edged Sword: The Slow Energy Transition in the United States," paints a picture of a slow and stuttering energy transition occurring in the United States. It portrays the

fragility and inconsistency of the federal government's role as well as the differentiated role of the states, some of which are actively pursuing renewable energy transitions and others that are little engaged with new energy technologies. Karapin shows that the effects of federalism are ambivalent on renewable energy development. States have contributed to the development and diffusion of renewable energy with various support schemes and requirements, but the impact of these initiatives in terms of vertical diffusion has been limited and in terms of horizontal diffusion mixed. Fossil fuel interests and partisan politics have often stymied the energy transition, aided by national institutions such as territorial representation in Congress and by their footholds in many state governments, which have substantial autonomy to make energy policy. While some states have pursued transitions on their own with renewable energy portfolio standards, net metering, and green power purchasing, others have taken few steps to promote change. There are also substantial differences in the ambitions of the state-level initiatives. Importantly, Karapin concludes that while state policies (bottom-up federalism) can move renewable energy development forward, it is limited in the influence it can have as both horizontal and vertical diffusions are dependent on having the right mix of supportive political and economic factors in place.

In their article, "State Leadership in Climate Change and Energy Policy: California's Race to the Top," Daniel A. Mazmanian, John Jurewitz, and Hal Nelson (2020) analyze California's recent policy efforts to address greenhouse gas emissions by moving energy consumption away from fossil fuels and toward nearly complete reliance on renewable energy. The article explores the factors that have incentivized California to move beyond the pact and, instead of following a *race to the bottom* strategy of regulatory competition and minimal effort, to pursue a leadership role in renewable energy development and climate policy. California's energy leadership within the U.S. federal system, they argue, stems from a shift in public understanding that environmental quality is critical for the quality of life and the economy. Important, of course, is that the U.S. Constitution grants states considerable authority to adopt regulations in the interest of the public welfare, and this largely applies in the fields of environment and energy. Also highly significant is the special legal situation of California, which, for historical reasons, permits California to apply to the federal government for a waiver (*the California waiver*) allowing it to introduce its own emission standards so long as they are at least as strict as national ones, setting the stage for California to be a pioneer. Yet other factors have been important, such as bipartisan support within the state for policy action and a strong capacity (e.g., regulatory agencies and scientific expertise) to act.

Switzerland is a particularly interesting case for examining the energy transition in a country known for the strength of cantonal representation and policy-making powers. Isabelle Stadelmann-Steffen, Stefan Rieder, and Chantal Strotz (2020) in their article, "The Politics of Renewable Energy Production in a

Federalist Context: The Deployment of Small Hydropower in the Swiss Cantons,” explore the hurdles and promoters of the deployment of renewable energy generation infrastructure in the Swiss cantons using the example of small hydropower. Hydropower is Switzerland’s most important renewable energy, representing about 60% of produced electricity. While national policies and regulatory frameworks have outlined the direction Switzerland’s energy transition is to take and national politicians are eager to push ahead with the expansion of renewable energy technology, cantons have considerable leeway to determine which mix of policy instruments to deploy. The authors show how cantonal policy contexts interact with national political regulations and local political processes to influence the introduction of renewable energy technology. Complementing a quantitative analysis of small hydropower deployment in Swiss cantons, case studies of successful hydropower development in Valais and a failed attempt in Berne are presented. The authors conclude noting the importance of providing local policy entrepreneurs with environments conducive to renewable energy development.

The article by Olivier Ejderyan, Franziska Ruef, and Michael Stauffacher (2020), “Entanglement of Top-Down and Bottom-Up: Sociotechnical Innovation Pathways of Geothermal Energy in Switzerland,” focuses on the development of deep geothermal energy (DGE) in Switzerland, a technology strongly supported by the federal government but that has developed only slowly for a variety of factors, including public acceptance problems after earthquakes were triggered by earlier drilling operations. The authors’ research did, however, point to regional differences with some cantons pursuing sociotechnical innovations that make geothermal energy more acceptable to local publics. Meeting the ambitious goals of Switzerland’s federal Energy Strategy 2050 will require cooperation from the cantons that have control over the use of the underground and public acceptance. Ejderyan et al. (2020) show that federal policies for more controversial renewable energy technologies need to relate to local realities if they are to gain acceptance.

Benjamin Schmid, Thomas Meister, Britta Klagge, and Irmi Seidl (2020) in their article entitled “Energy Cooperatives and Municipalities in Local Energy Governance Arrangements in Switzerland and Germany” observe two kinds of policy instruments that have shaped local energy transition processes in recent years, that is, feed-in tariffs and nationwide programs. The authors compare local energy governance arrangements within and between Switzerland and Germany by focusing on how energy cooperatives are supported by and interact with local governments and power utilities. The authors note that much of the literature on community energy speaks to its positive impacts in terms of enhancing local acceptance of renewable energy installations, regional value creation, and energy democracy and justice. Critical in both Switzerland and Germany is the principle of vertical subsidiarity, which means that public tasks should be carried out at the lowest level of government practicable. This means that

cantons and municipalities in Switzerland and municipalities in Germany have substantial possibilities and responsibilities when it comes to the provision of electricity. In both countries, there has been a growth in renewable energy cooperatives, aided by policy changes supportive of renewable energies at the national level (including feed-in-tariff legislation) as well as supportive policies on the part of municipalities (such as the provision of roof space on public buildings for photovoltaics). Differences exist in respect to the functioning of the feed-in-tariff legislation, the degree of financial support provided to renewable energy cooperatives, and the form of citizen participation. In both countries, municipalities benefit economically and in terms of the technical know-how gained from cooperating with energy cooperatives. Renewable energy cooperatives can also help with gaining public acceptance and in meeting energy policy goals although with noticeable differences in how this works in Germany and Switzerland.

In “Expansion of Renewables in a Federal Setting—Austria, Belgium, and Germany in Comparison,” Stefan Wurster and Christian Hagemann (2020) explore the factors that might explain the different speeds at which new renewable energies (wind and solar) are being adopted at the subnational level. The article focuses on the variance in the expansion of renewables across the federal states of Germany (16), Austria (9), and Belgium (3). While, of course, some of the variance is related to geographic conditions, their results point to the intriguing finding that renewable energy development appears to be a modernization strategy for poorer regions. Supported by national feed-in-tariff schemes in Austria and Germany, less well-off states most eagerly pursued renewable energy development. In Belgium which made use of a quota system, national policy appeared less supportive of change than the feed-in-tariff schemes in Austria and Germany.

Empirical Findings

A look across the empirical findings delivered by the six articles offers important insights into when and how federal political structures matter for renewable energy development and deployment. These findings suggest hypotheses for further research and testing on these and other federalist cases.

Geographic Factors Matter

Within federalist systems, as conventional wisdom would suggest, geographical conditions can be an important enabling factor for the development of renewable energy. Wurster and Hagemann (2020) find that geographical factors influence renewable energy deployment at the subnational level in Austria, Belgium, and Germany.

Yet, geographic potential alone is not enough to explain where renewable energy is being deployed. This is obviously the case in the United States. As

Karapin (2020) shows, states with large wind or solar power potential do not all have mandatory renewable energy portfolio standards. Stadelmann-Steffen et al. (2020) similarly demonstrate that Swiss cantons exploit their natural small-scale hydropower potential to differing degrees based in part on the extent of local support or opposition to small hydropower development. Their work suggests that institutional capacities and the mix of policy instruments can either incentivize or constrain entrepreneurial activities. Wurster and Hagemann (2020) found that less well-off *Länder* were the most aggressive at promoting renewables, presumably as a modernization strategy. In sum, the full exploitation of a favorable geographical potential strongly depends upon the policy instruments implemented at the subnational level and the motivations of policy entrepreneurs at the local level.

Federalist Institutions Have an Ambivalent Effect on Renewable Energy Expansion: Policy Entrepreneurs Versus Veto Players

Various factors influence whether a federalist structure will promote or inhibit renewable energy development or climate policy implementation. When the federal level sets ambitious renewable energy or climate policy goals and these are backed by well-developed regulatory frameworks at the federal and state levels, renewable energy entrepreneurs can prosper. This has been the case for some cantons in Switzerland where ambitious federal goals have been coupled with supportive cantonal policies to promote the development of geothermal facilities (e.g., the case of St. Gallen; see Ejderyan et al., 2020) and small hydro-power plants (e.g., the case of Valais; see Stadelmann-Steffen et al., 2020). Schmid et al. (2020) note how energy cooperatives have been able to flourish in Germany and Switzerland as a result of the supportive framework provided by feed-in-tariffs. Various measures at the *Länder* and cantonal level have provided further support to these local initiatives.

In contrast, in the absence of a supportive federal system, subnational governments and even local actors can take the lead presuming they have the legal authority to do so. Mazmanian et al. (2020) show this with the case of California, which has become a pace setter on climate change and renewable energy development in the United States. Many U.S. states have themselves chosen to introduce various supportive measures to promote renewable energy development (see Karapin, 2020).

Federal institutions, however, are ripe with potential veto points. The difference between the United States under the Trump administration and the European countries examined here is stark in this regard. In the United States, powerful business lobbies representing the fossil fuel and other energy-intensive industries have succeeded in placing pressure on Congressional representatives to block climate action. Congress, because it has a strongly territorial basis of representation and Senate rules have permitted

a minority to block action through the filibuster, has acted as a major veto point preventing the introduction of federal climate legislation.

Of course, veto points can also exist at the state level. Many U.S. states have taken few or no steps to promote renewable energy or otherwise to act on climate change (see Karapın, 2020). Despite federal policies promoting small hydropower and geothermal energy, various Swiss cantons have been hesitant to (further) develop these energy forms (see Stadelmann-Steffen et al., 2020). German *Länder* differ in the speed with which they are introducing renewable energy (see Wurster & Hagemann, 2020).

Multilevel Governance Results in Challenges of Vertical Diffusion Between Subfederal and Federal Policies

A strong and stable national renewable energy policy is not a *necessary condition* for renewable energy deployment at the local level. Federal structures provide avenues for continued experimentation at the subfederal level when the national government deliberately adopts a policy blocking renewable energy development.

Empirical evidence of this *compensatory federalism* (Derthick, 2010) can be seen in the case of U.S. states promoting renewable energy despite a federal renewable energy program at the federal level (e.g., under the George W. Bush presidency). Similarly, at the municipal level in Switzerland and Germany, municipalities have supported energy cooperatives to compensate for shortcomings in national and cantonal/*Länder* policy (see Schmid et al., 2020).

Nor is a strong and stable national renewable energy policy a *sufficient condition* for renewable energy deployment at the local level. Federal governments are limited in their top-down influence over the implementation strategies of subnational governments. Local resistance to renewable energy may lead states or local governments to delay or inhibit renewable energy policy implementation. As a result, in the federal systems examined, we see more of a checkered quilt than a harmonized set of policies across subnational governments. Subnational governments can essentially adopt their own policies so that while some states may fervently promote renewable energy others may hinder its deployment, effectively *invalidating* supportive federal policies.

Empirical evidence can be seen in Switzerland, where the existence of a national feed-in-tariff scheme did not prevent local opposition to the development of small-scale hydropower (see Stadelmann-Steffen et al., 2020) or DGE (see Ejderyan et al., 2020).

In a similar vein, the multiplication of effective and efficient renewable energy policies at the decentralized level is *not a sufficient condition* for bottom-up innovation and vertical diffusion, transfer, or lesson-drawing at the federal level. There is much potential for gridlock in the federalist laboratory as a result of the mobilization of vested interests or party polarization. For instance,

a federal bill to establish a national renewable portfolio standard was eventually not adopted in the United States despite the obvious success of this policy instrument in other U.S. states (see Karapın, 2020).

On the other hand, there are also cases where feedback from local governments—largely communicated through project success or failure—seems to result in a rethinking and adjustment of policies at the national level. Examples include the impacts of the St. Gallen and Geneva geothermal projects on the national strategy to promote DGE in Switzerland (see Ejderyan et al., 2020). These projects focused on hydrothermal energy (which is less risky than petrothermal energy) and cooperated with a public utility (and not a private investor), thereby helping to keep public support. Local experimentation can thus stimulate new ways of policy promotion at different government levels.

Policy Transfer Across Subnational Entities Can Spur Action

Schmid et al. (2020) show that horizontal policy transfer may be strengthened by local energy cooperatives. Concretely, energy cooperatives that are operating in many municipalities have acted as vehicles for horizontal collaboration. This has certainly also been the case with U.S. states that have learned from each other regarding renewable energy support schemes. California has also been an important trendsetter, with other states often adopting policies or programs once they have first been introduced or tried out in California (see Mazmanian et al., 2020). An interesting topic for future research would be to examine whether horizontal policy transfer across subnational entities increases when the vertical diffusion of bottom-up innovation is blocked and specifically whether this is occurring since Trump's election as it apparently did following the 2000 election of George W. Bush.

Local Cobenefits Can Help Sustain a Race to the Top: Renewable Energy Deployment as an (Economic) Modernization Strategy

Different corporate structures and economic systems may influence renewable energy policy direction and development as it can affect (regulatory) risk perceptions and investment horizons (Arent, Arndt, Miller, Tarp, & Zinaman, 2017; Chassot, Hampl, & Wüstenhagen, 2014; Četković & Buzogány, 2016).

Beyond its direct contribution to the energy transition away from fossil fuels and nuclear energy, the expansion of renewable energy has many positive side benefits. These include various economic cobenefits, such as green finance and investments, technological innovations, jobs created by ecobusinesses, and new business constituents as labeled by Mazmanian et al. (2020); environmental cobenefits (e.g., decarbonization); and health cobenefits (e.g., less air pollution). These cobenefits are probably as important as the direct benefits of the energy

transition and renewable energy expansion. Federalism strengthens this as economic cobenefits are generated at the local or decentralized level.

This is certainly the case in very affluent regions, such as California, which are following a clean energy technology-forcing strategy (see Mazmanian et al., 2020). But, remarkably, it can also occur in economically disadvantaged states. Indeed, Wurster and Hagemann (2020) show that renewable energy deployment is part of an economic modernization strategy of poorer subnational entities in Austria, Belgium, and Germany. All in all, this is rather good news for the impact of federalism on renewable energy expansion: Decentralized entities that launch ambitious renewable energy policies may have a direct return on their investments.

This conclusion is also valid for energy cooperatives at the municipal level (see Schmid et al., 2020) because some small municipalities appear to be enabling cooperatives (with a large membership, funding, and technical know-how) to coproduce the local energy policy (e.g., by installing photovoltaics on municipal roofs) and in this way contributing to local economic development.

Establishing a geothermal energy project as a local project supported by local authorities and the local public utility (as was the case in St. Gallen and Geneva) increased citizens' acceptance. These cases show the added value for the local economy of developing a new technology and economic sector (see Ejderyan et al., 2020).

Stadelmann-Steffen et al. (2020) similarly found that the mix of policy instruments at the cantonal level interacted with local interests to determine how aggressively a canton pursued small-scale hydropower development.

The Formal Ability, Capacity, and Political Will to Act Makes a Difference

An important factor behind subnational renewable energy and climate action is the simple fact that many energy powers are devolved in federal systems. This gives subnational governments considerable influence over the mix of policy instruments deployed and, in some cases, even the renewable energy and climate goals to be achieved. The capacity of subnational regulatory agencies or public administrations to act, however, is not only a legal or constitutional issue. It may also be influenced by such factors as whether there are skilled personnel familiar with renewable energy technologies. Market factors can also matter. Whether the grid is monopoly owned or not, may influence the take up of renewable energy and thus may encourage or discourage green investment.

The strong collaboration between municipalities and energy cooperatives helped incentivize capacity building in municipal energy administrations. These administrative capacities have proved important for the adoption of innovative renewable policies at the local level (see Schmid et al., 2020).

Public Acceptance/Rejection of Energy Transitions

There are differences in the extent to which energy transitions are facing populist backlash (Radtke, Canzler, Schreurs, & Wurster, 2019). The on-going transformations concern not only the mix of energy sources but also the technologies and infrastructures for the supply, transport, and consumption of energy. This can lead to challenges with public acceptance. Opposition to specific local renewable energy projects can be influenced by policy design (Ejderyan et al., 2020; Stadelmann-Steffen et al. (2020); see also Hildebrand, 2015; Schreurs & Ohlhorst, 2015). Differences are linked to each country's specific institutional, economic, social, and political conditions (Bues, 2020; Radtke & Kersting, 2018).

Engagement With Local Communities Is Important

In the end, despite governmental policies promoting renewable energy, local support or opposition can determine whether policy implementation will be successful. Local opposition can act as a powerful disincentive for governments to aggressively pursue policy implementation. Yet, some local governments also appear more willing and possibly more able to interact with local communities to mitigate or dispel distrust of particular renewable energy technologies. Incentives provided to local communities may encourage them to become renewable energy innovators. Dialogue with local communities may lead to modifications of project ideas to make them more acceptable. There may thus also be lesson-drawing mechanisms at work. As Ejderyan et al. (2020) show, this was the case of St. Gallen, which engaged with the local public and even organized a local referendum on the question. The referendum was not only about whether to pursue geothermal energy after drilling for a geothermal energy facility triggered an earthquake but also about what kind of geothermal energy project might be acceptable.

Party Politics at the Central Level Versus Depoliticized Problem-Solving at the Local Level

The empirical studies presented in this special issue suggest that party politics at the local or decentralized level fail to account for renewable energy expansion. Surprisingly, the existence of green representatives in a governmental coalition and even a green majority does not explain renewable energy deployment. This has been shown by Wurster and Hagemann (2020) (in Austria, Belgium, and Germany) and by Stadelmann-Steffen et al. (2020) (in Switzerland). In some sense, the bipartisan support of renewable energy expansion in California is also an indication that party politics does not seem to hamper renewable energy deployment at the local level.

By contrast, partisan politics, and therefore also election outcomes, are key variables for explaining policy stalemates or party gridlock at the national level.

Emblematic examples of election- and party-driven blockades are the George W. Bush and Richard Cheney administration's opposition to a national renewable portfolio standard or the Donald Trump administration's rejection of any pro-active climate change policy (see Karapın, 2020). The extent to which federalist institutions foster or hinder renewable energy depends in large part on which actors control national and subnational governments.

On the opposite side of the political spectrum, the presence of Green parties in national cabinets seems to have played a role in fostering the adoption of feed-in-tariffs in several European federal systems (see Wurster & Hagemann, 2020). Feed-in-tariffs have provided a very important supportive framework condition for renewable energy expansion at the local level. With climate change becoming an increasingly important matter of concern to voters, it is likely that climate policies and low-carbon energy transitions will receive more political attention at all levels of government. This tendency is likely to be stronger, however, in those countries where green parties or other parties that have made climate issue a policy priority gain in strength.

These findings are consistent with research that shows that it makes a difference whether the parties in power are strong or weak supporters of climate action or defenders of the status quo (Gründinger, 2017; Hess, 2018; Hess & Renner, 2019; Wurster & Hagemann, 2018). Party polarization, the extent to which party leadership is or supports "green," and the pressure from the grassroots for change can all influence the level of commitment to renewable energy and to related issues, such as energy transitions, climate change policy, land-use policy, landscape and environmental protection policy, and sustainable economic growth strategies.

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Notes

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2. See the Environmental & Energy Law Program, Harvard University's Regulatory Rollback Tracker, <https://eelp.law.harvard.edu/regulatory-rollback-tracker/>.

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