7 Governing Energy Transitions: Transition Goals in the Swiss Energy Sector

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Abstract

European countries are currently committing to energy transitions so as to make the supply of electricity more sustainable. In this chapter we present our theoretical extension of a transition framework with the concepts of power, agency and politics in order to study the governance challenges of energy transitions. Furthermore, we demonstrate the application of our extended framework to a case in the Swiss energy sector. We focus on analyzing the distribution and gradual concentration of power within the sector and its implications for the energy transition. We conclude that the promotion of renewable energy through subsidization leads to a price scissor effect that squeezes small Swiss utilities out of the market by lowering electricity consumption and wholesale prices, while increasing self-production by households. The power increasingly lies with several large utilities, cities and cantons that are currently committing to ambitious energy transition goals. Such a concentration of power and alignment of goals can help in accelerating the energy transition in Switzerland.

Keywords

Agency • Energy transition • Framework • Politics • Power • Transition research

7.1 Introduction

Energy systems will undergo significant changes in the coming decades as European countries are committing to energy transitions. Energy transitions vary greatly from country to country as they are determined largely by the established

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infrastructure, institutions,[1] politics and global events. More precisely, we can state that national energy systems are under increasing pressure from outside the established (*regime*) energy system: such as climate change and nuclear disasters in the *landscape* of the system (Geels 2002; Broto et al. 2014), innovations in *niches* (Geels 2002), and from within the established system such as *regime* stakeholders responding to opportunities and threats (Smith et al. 2005).

For example, the Netherlands transitioned from electricity production using coal and oil in the 1960s to a mix of natural gas, coal and nuclear in the 1980s and 1990s, including a significant share of decentralized combined heat and power (CHP) plants (Verbong and Geels 2007). This transition was mainly driven by an abundance of natural gas resources in the Netherlands (*regime*), willingness of industrial stakeholders (*regime*) to adopt natural gas CHP technologies (*niche*) and the oil crisis (*landscape* pressure). Despite the environmental benefits of gas over coal, the Dutch government is under increasing pressure to meet European emission targets (*landscape*).

Another example is Germany, which adopted the Renewable Energy Act (EEG) in 2000, as well as the decision to phase-out nuclear energy. The adopted feed-in tariff (FIT) in Germany greatly stimulated the investments in renewables such as solar panels. These developments were mainly driven by public sentiment (*regime*) against nuclear energy and support for renewable energy. This sentiment was strengthened after the Fukushima disaster (*landscape*) (Laes et al. 2014).

These examples illustrate significant changes to large energy systems, which did not come about easily. Energy systems are characterized by high asset specificity, long asset lifetimes, and stakeholders who dominate the market and have a vested interest in maintaining the status quo (Finger et al. 2005). Furthermore, both examples illustrate the reliance of national governments on other stakeholders to realize the transitions in their national energy systems. We can state that the power[2] and agency[3] of individual stakeholders is limited and that both power and agency are increasingly (re)distributed amongst stakeholders. Thus, energy transitions present a governance challenge, where a collective of stakeholders is responsible for the evolution of the system, rather than a single powerful stakeholder.

Switzerland in particular is facing significant technical and social challenges to realize its energy transition as outlined in the Energy Strategy 2050, which is highlighted hereafter. First, the centralized energy infrastructure is under pressure to change as a result of the decision to phase-out nuclear energy. Around 40 % of the total energy production in Switzerland, or 25–26 TWh nuclear energy

[1] *Institutions* are defined as (1) *informal rules* such as customs, traditions, norms and religion, and (2) *formal rules* such as laws and property rights (North 1991, p. 97).

[2] *Power* is defined as (1) *power-over* “A has power over B to the extent that he can get B to do something that B would not otherwise do” (Dahl 1957, p. 203), and (2) *power-to* “the probability that one actor within a social relationship will be in a position to carry out his own will despite resistance” (Weber 1978, p. 53).

[3] *Agency* is defined as “the ability to take action and make a difference over a course of events.” (Giddens 1984, p. 14).

(International Energy Agency 2012), will have to be replaced with new renewables such as solar, wind, micro-hydro, biomass, and geothermal energy. The nuclear reactors will remain in operation for as long as they can be operated safely and the four nuclear plants are expected to be shut down between 2019 and 2034. Furthermore, there are social barriers to the realization of renewable energy sources such as windmills, as well as technical limitations due to network congestion and required grid reinforcements. Second, Switzerland is characterized by its decentralized government structure and fragmented energy sector with around 700 companies active in the production, distribution and supply of electricity. Third, new stakeholders, such as prosumers (e.g. consumers which are producing energy with solar panels), energy cooperatives, and investors are entering the energy sector. As a result, the Swiss national government has to steer the energy transition through a multi-level governance approach. Multi-level governance considers the interactions between public and private stakeholders working towards the realization of collective goals (Lange et al. 2013, p. 406). Multi-level governance is concerned with the changing roles of key stakeholders, power, agency, and politics. Thus, we address following research question in this chapter: How is the Swiss energy transition governed under changing social and technical system dimensions?

Transition research has paid significant attention to the study of energy transitions over the past decade (Chappin 2011; Markard et al. 2012) with the development of early transition frameworks (e.g. strategic niche management (Kemp et al. 1998; Rip and Kemp 1998), multi-level perspective (MLP) (Geels 2002) and transition management (Rotmans et al. 2001). These frameworks are useful for studying transitions as they address, for example, policy-making, technological systems, social systems, and lock-in effects. However, transition research has been criticized for neglecting concepts which are important when addressing multi-level governance issues, such as those present in energy transitions: power, agency (e.g. Smith et al. 2005, 2010) and politics (e.g. Meadowcroft 2009; Scrase and Smith 2009).

To address this conceptual problem contributions have been made to address power (e.g. Avelino and Rotmans 2009; Geels 2014), agency (e.g. Geels and Schot 2007) as well as politics (e.g. Hess 2013; Kern 2012; Voß and Bornemann 2011). However, an integrated theoretical solution is currently missing. In this chapter we adopt the MLP (described in more detail in Sect. 7.2) since it provides a descriptive framework which includes regime, landscape and niche processes that stabilize and destabilize regimes of the studied systems. Specifically, we address the closely related roles of power, agency and politics in energy transitions to add additional narrative and analytical power to the MLP.

We have structured this chapter as follows. First, we introduce the MLP and more recent theoretical contributions addressing power, agency and politics. Second, our main theoretical contribution is to extend the MLP with an integrated conceptualization of power, agency and politics. Third, our practical contribution is to demonstrate the usefulness of the extended framework by applying it to a case from the Swiss energy sector. We conclude the chapter by reflecting on the research question and insights from the Swiss energy transition.

7.2 Multi-level Perspective

The MLP is a descriptive mid-range transition framework that is best illustrated by its three levels (Fig. 7.1) and explanatory mechanisms. The *regime* captures the currently established stakeholders, institutions, governance structures and technical system to explain the inertia that we observe in infrastructures. The regime typically resists change due to the high asset specificity, high asset lifetimes, interests of established stakeholders, and slow process of institutional change. New technologies develop in *niches*, which are protected spaces where development can take place outside of the selection environment (e.g. markets) of the regime (Schot 1998). New technologies are often inferior during their start-up phase, but can potentially outperform established technologies in the long-term. *Landscapes* are external to the regime and niche, and represents external pressures and shocks such as environmental change and crises. The landscape influences both the regime and the niche, but feedback is limited and landscapes are even more inert than regimes (Geels 2002). There is *hierarchy* between the three levels, where the regime and landscape constrain and enable niches to develop over time. The landscape can also open up a regime for a niche, e.g. climate change opening energy systems to renewable energy production technologies. It should be noted that the regime could also open up itself due to internal pressures, or pressure from other regimes. The MLP does not only represent multiple levels, but also multiple stakeholders, institutions and technologies within those levels.

Perhaps the biggest strength of MLP is its compelling rationale, as summarized by Markard and Truffer (2008, p. 609): "Innovation and transition processes can be explained by the interplay of stabilizing mechanisms at the regime level and (regime-) destabilizing landscape pressures combined with the emergence of radical innovations at the niche level". Specifically, the MLP pays attention to the following mechanisms and concepts (Geels 2002, 2005; Rip and Kemp 1998)

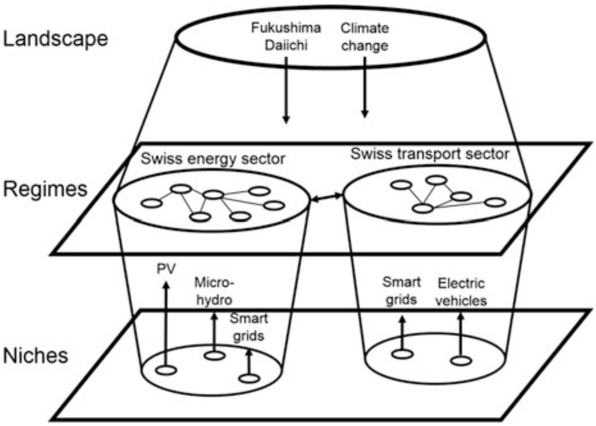

Fig. 7.1 Multi-Level Perspective (*adapted from* Geels 2002, p. 1262)

(1) *radical innovations* play a key role, as these innovations are required to change the regime, (2) s*election* of innovations and technologies, which happens in the regime, helps explain why the regime is self-reinforcing and why niches need to be protected. Radical innovations are rarely selected during their early lifetime, as they are almost always economically inferior to their alternatives, (3) *institutions* also help explain the stability of regimes by explicitly describing the routines in behavior that are present in the established regime, and (4) technological *lock-in* which increases the stability of regimes (Unruh 2002).

However, the technology and niche focus of the MLP is somewhat of a double-edged sword. First, the theoretical and conceptual foundation of the MLP cause it to have a bottom-up and technological bias due to its focus on radical technological innovation in niches (Lawhon and Murphy 2012). An important role is attributed to the development and protection of innovation niches, which could overshadow the internal renewal process of regimes (Smith et al. 2005). Second, politics are mainly reduced to an exogenous force as part of the landscape (Geels 2002). Third, power and agency are claimed to not have been explicitly addressed (Smith et al. 2005). Especially the lack of attention to power, agency and politics is important for studying the governance of energy systems. We will now go into more depth on how the concepts of power and agency have already been addressed after the conception of the MLP.

Geels and Schot (2007) refer to the duality of structure theory by Giddens (1984) when addressing *agency* in the MLP. They highlight the importance of following and reproducing institutions. The reproduction of institutions contributes to their stability, making the institutions more constraining, thus reducing the agency of agents. Agency is conceptualized using a rule-based actions model, which can be understood as *power-to* (do something). The rule-based actions model covers (1) the creation of formal *rules of the game* (e.g. regulation) through rule-creation and rule alteration, and (2) the *play of the game* (e.g. contracting) through rule-using and rule-following (Williamson 1998, p. 26). The *game* as used here is a set of actions and interactions of stakeholders, such as participation in a political process, investments in power production assets, or the engagement in competition or cooperation by firms.

Geels (2014) did not address *power* in more detail until recently, and identifies three types of power: (1) *instrumental power*, which refers to the use of resources by agents, (2) *discursive strategies* such as agenda setting, and (3) *institutional power*, referring to a wider regime reinforcing and stabilizing institutional context. This conceptualization mainly focuses on agents and institutions and their *power-over* other agents. This conceptualization is insufficient when studying transitions in socio-technical systems, such as the energy system, as we will show in the next section that markets and technologies also play an important role in power relations in energy systems.

7.3 Conceptualizing Power, Agency and Politics

The concepts of power, agency and politics are intimately related through the concept of power. We address this relationship by specifying which system elements can hold power and agency, or engage in political processes.

There are three distinct elements of socio-technical systems that can hold power. First, *stakeholders* can hold *power-over* other stakeholders through relationships, resources and discourse (Geels 2014), as well as *power-over* technologies through ownership. The power relationship between stakeholders is more complex, as the relative power of stakeholders is important to consider as well as the directionality of the relationship (e.g. one-sided dependence or mutual dependence). The power of stakeholders over other stakeholders is determined not only by their own characteristics (e.g. available resources), but also their broader institutional (e.g. norms and laws), social (relationships with other stakeholders), political, economic and technological (e.g. power plant mix) environment (Haugaard 2010, p. 425). Furthermore, stakeholders are the only system element having the *power-to* do something. In other words, stakeholders are the only system element to have agency if we recall the definition of Giddens (1984, p. 14): "the ability to take action and to make a difference over a course of events". Thus, with a systemic view of power we can see how *power-over* directly influences the *agency* of stakeholders by enabling or constraining their ability to take action.

Second, *institutions* hold significant power-over stakeholders (Fuenfschilling and Truffer 2014; Geels 2014) by enabling and constraining certain actions. At the same time, institutions are created, changed and used by stakeholders (North 1990) in political processes and the play of the game. Markets are a special type of institution, which have high incentive mechanisms (power-over stakeholders) (Williamson 1985, 1996) and strong selection mechanisms for technologies (power-over technologies) (Nelson and Winter 1982; Langlois and Robertson 2002), which structure the behavior of stakeholders operating within those markets (Frantzeskaki and de Haan 2009). Markets also have significant barriers to entry for immature renewable technologies (in niches) that public support could manage in various ways (Finon and Perez 2007), which reduces the agency of potential market entrants (Grünewald et al. 2012).

Third, technologies shape the set of feasible options in the system, thus having power-over stakeholders and other technologies (Fuenfschilling and Truffer 2014). For example, centralized electricity distribution and transmission systems have implications for investments in decentralized renewable energy sources, by limiting the feasible options that stakeholders have. On the other hand, smart-grid technologies can enable stakeholders to select from a wider range of technological solutions including local energy storage and production options.

We now turn to the issue of politics and how it can be understood in terms of power. Politics is the struggle for power resulting in the blockage of efforts to change policies, and the development of coalitions to overcome such blockages (Hess 2013, p. 849). We argue here that the political processes of blockage and coalition forming can be represented in a stylized way by means of veto power

(Tsebelis 2000). Veto power means that the policy-change cannot be realized without the support of that stakeholder. An example is a vote on new policy in parliament, where a majority is required to pass the law. The political party that is blocking the vote has veto power in this case, since the party is required to reach a majority vote. Furthermore, veto player theory helps explain policy inertia, as representatives of large groups of stakeholders are likely to prefer options that are closer to the status quo (Tsebelis 2000).

We propose to use and extend the types of power that were already defined for the MLP (Geels 2014) to ensure that it is conceptually compatible with the MLP. We extend the power definition of the MLP with two additional system elements that can hold power: technologies and markets. Furthermore, power is relational between system elements (Geels and Schot 2007; Tyfield 2014), therefore we use the power-over relation as defined by Avelino (2011). Power-over is defined as mutual dependence, one-sided dependence or independency between the stakeholders. Second, technologies shape the feasible options that agents have by creating synergy, antagonism (restricting, resting or disrupting) or neutrality between technologies. Finally, we stress again that all power is relative between system elements, such that element A can have more or less power than element B. We illustrate our theoretical contribution to the MLP in Fig. 7.2. It should be noted that these system elements and connections can exist in all and between all levels of the MLP, and are not constrained to the regime alone.

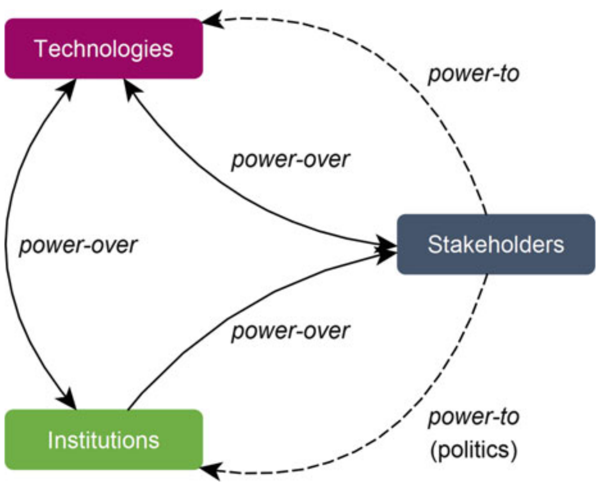

Fig. 7.2 Conceptual framework for power, agency and politics in transition studies. The conceptual framework links the concepts of power, agency and politics together through stakeholders. Stakeholders can hold both power-over and agency (power-to) and engage in political processes. Institutions and technologies (physical assets) are created, changed and reproduced through the actions of stakeholders. Simultaneously, technologies and institutions hold power-over stakeholders. Stakeholders also hold power-over other stakeholders. Thus, stakeholders have the ability to influence their environment, while having certain actions enabled or constrained by their environment at the same time

7.4 Concentration of Power in the Swiss Energy Regime

The Swiss energy system currently has a low-carbon energy mix relying mainly on centralized energy production from nuclear energy (36.4 %) and hydro (57.9 %) (Swiss Federal Office of Energy 2014). The Swiss Energy Strategy 2050 details the replacement of nuclear energy with new renewables such as wind and solar. There is only a small penetration of distributed renewable energy sources (RES) such as PV in Switzerland, and a low share of RES in the energy system in general. A higher share of RES would bring economic and technical challenges for the Swiss energy system. First, distributed renewables feed into the system at the distribution level for which the networks were originally not designed. As a result, grid reinforcements and investments in smart grid technology are to be expected if the Energy Strategy 2050 is to be realized. Second, an increase in RES will drive down the wholesale market price of electricity when the Swiss market is liberalized because RES will push other plants out of the merit order, while being offered at close to zero costs to the market. However, this effect is likely to be moderated in Switzerland due to the low share of gas fired power plants and high share of hydro storage. Another important characteristic of the Swiss energy system is the large number of utilities. There are currently around 700 utilities in Switzerland (Elcom 2015), of which most are publicly owned by Swiss cities and cantons.

Our analysis focuses mainly on the Swiss utility companies and other stakeholders involved with the integration of RES. Large companies such as Alpiq, BKW, AXPO, CKW, EWZ and Repower own and operate a large share of the production and network assets in Switzerland, and hold a large amount of shares in the transmission system operator Swissgrid. Most of these large utilities have Swiss cantons and/or cities as their shareholders (this also applies to Alpiq). Thus, cantons and cities (e.g. Zurich and Geneva) hold power-over large utilities. The amount of shares is indicated in Table 7.1. While these large utilities are important, we cannot ignore the large amount of smaller utilities that operate in Switzerland, which in most cases are also owned by cities and municipalities. Thus, the same power-over relationship applies to the smaller utility companies and their shareholders. Historically, the involvement in energy policy has been larger at the cantonal level than at the federal level (Kriesi and Jegen 2001).

The Swiss Federal Government has the power-to alter existing policy, such as the feed-in tariff (FIT) scheme that is implemented in Switzerland. However, EnDK[4] represents the Swiss cantons and has significant power-over the Federal Government and is able to block policy creation and alteration efforts by the Federal Government. As a result, in certain situations, EnDK can be considered a veto player. EnDK represents a very large number of stakeholders, which has implications for the feasible set of policy options (Tsebelis 2000). The feasible

[4] Konferenz Kantonaler Energiedirectoren.

Table 7.1 Overview of the larger Swiss utility companies and their shareholders

Utility company	Major shareholders	Shares (%)
Alpiq Holding AG (ALPIQ)	Consortium of Swiss minority shareholders	31.4
Axpo Holding AG (AXPO)	City of Zurich	18.3
	EWZ	18.4
	Canton of Aargau	14.0
BKW Energie AG (BKW)	Canton of Bern	52.5
Centralschweizerische Kraftwerke AG (CKW)	AXPO	81.0
	Canton of Luzern	9.9
Elektrizitatswerk der Stadt Zurich (EWZ)	City of Zurich	100
Repower	Canton of Graubünden	58.3
	AXPO	33.7
Services Industriels de Genève (SIG)	Canton of Geneva	55.0
	City of Geneva	30.0

The distribution of shares is a good indication of the power that cities and cantons hold over the utility companies. The information was extracted from the 2014 annual reports of the utility companies

set of policy options is limited for the Federal Government, as the energy transition goal involving a nuclear phase-out and high share of RES (e.g. PV) is far removed from the status quo.

Government support is necessary for RES because, although desirable from a social welfare perspective, their private costs are not competitive in power generation systems dominated by large electricity generation plants. Three reasons account for the bias against RES in electricity markets: (1) environmental costs are not adequately internalized for conventional electricity generation technologies. However, in Switzerland all CO_2 produced by gas fired power plants will have to be completely offset; (2) the absence of scale effects on costs, due to the small size of the plants, and (3) the intermittent production of RES such as wind and PV creates negative externalities. While there has been some local success with voluntary purchase programs of green electricity by consumers in Switzerland, additional support is required to stimulate the investments. Currently, the FIT imposes an obligation on electricity distributors to purchase renewable energy from any RES source in their service area at a minimum guaranteed tariff per kilowatt-hour that is fixed over a long period of time. Utilities are obliged by law to accept the FIT of solar energy of consumers, which can have significant consequences for their distribution networks under peak and fluctuating production. Thus, the FIT holds significant power-over utilities, reducing their agency (power-to). The FIT in Switzerland is an example of niche protection from within the regime, aiming to strengthen the niche. However the FIT suffers from a large waiting list for all RES as the funding is limited. Taking PV as an example: in July 2015 there was 390 MW of installed capacity, a further 118 MW was approved and a total of 2000 MW was on the waiting list (Frei and Ruch 2015).

Table 7.2 Relative power of the pro-growth and pro-ecology coalitions in 1998

Coalitions	Relative power		
	Geneva	Bern	Zurich
Pro-ecology	67.5	59.2	51.4
Pro-growth	30.8	51.8	74.0

Adapted from Kriesi and Jegen (2001, p. 279)

Subsidization of RES such as PV at the niche level to replace currently available nuclear production capacity leads to an increase in the energy price for consumers, and a decrease in the wholesale price of electricity. As a result, utilities in Switzerland are under pressure from what we call as the "price scissor effect": consumers will consume less or produce their own energy using PV, while the utility receives lower prices for their production. As a result there is a trend of small utilities to outsource their operations to larger utilities in Switzerland, because the smaller utilities are being squeezed out of the market as long as the distributed RES is protected through a FIT. This outsourcing trend concentrates the power in the regime to a select number of utilities, cities and cantons. The cities and cantons that are expected to gain the most power are Bern, Zurich, Aargau and Graubünden.

This concentration of power could potentially increase the feasible set of policy options of the Federal Government, if the goals of these cities and cantons are aligned with those of the Federal Government with regards to the energy transition. Indeed, it seems to be the case that there is a shift in the position of several major players in Switzerland. A detailed study of actor constellations was carried out for Switzerland by Kriesi and Jegen (2001) in which the power of cantonal stakeholders and their positions in regards to energy policy was analyzed for the cantons of Geneva, Bern, Zurich, Grisons, Valais and Vaud. We now focus on the positional shifts of the cantons of Geneva, Bern and Zurich (Table 7.2). As expected, Geneva was very early to adopt the ambitious 2000 W society vision due to its powerful pro-ecology coalition and weaker pro-growth coalition.[5] In Bern, which committed to the vision in 2014 (Stadt Bern 2015), the power was slightly in favor of the pro-ecology coalition. Perhaps more surprisingly, Zurich committed to the 2000 W society vision in 2008 (City of Zurich 2011), despite its weaker pro-ecology coalition. A recent study by Markard et al. (2015) analyzed the coalitions at the national level between 2001 and 2013 and found that the coalitions were very stable during this period. While the pro-growth coalition is still dominant, increased support for a nuclear phase-out, energy efficiency and renewables is observed. Markard et al. (2015) conclude that the coalitions have taken positions closer to each other, allowing for compromise seeking and policy change, which is very typical in Switzerland. While the study does not focus on the cantonal level, the recent policy developments with regards to the 2000 W society in Bern, and especially Zurich, suggest a similar shift in positions at the cantonal level.

[5] Broadly speaking, the pro-growth coalition is in favor of economic growth, while the pro-ecology coalition is in favor of environmental protection.

Furthermore, there is interaction between niche technologies and regime technologies, as high shares of PV constrain the feasible options for future grid development, and vice versa. Historically, electric grids used to be vertically integrated with large power plants producing electricity for end-users, and single-direction electricity flowing from production units through the transmission and distribution grids to the consumer. No matter where, most DSOs have historically operated grids with radial topologies, from high-voltage/mid-voltage substations to the end-users. Electricity flow was unidirectional only, and consumption loads largely inflexible. In this context, DSO activities were mainly focused on long term grid planning and design rather than on real-time operation, by investing in grid reinforcement in a passive way. Distributed RES such as PV introduces bidirectional flows and electricity production fluctuations with potentially high peaks, which limits the feasibility of simple grid reinforcements. Instead, more innovative solutions are likely required such as smart-grids and local energy storage. These technologies are part of different niches exerting pressure on the regime, but we do not address these niches in more detail in this chapter (Fig. 7.3).

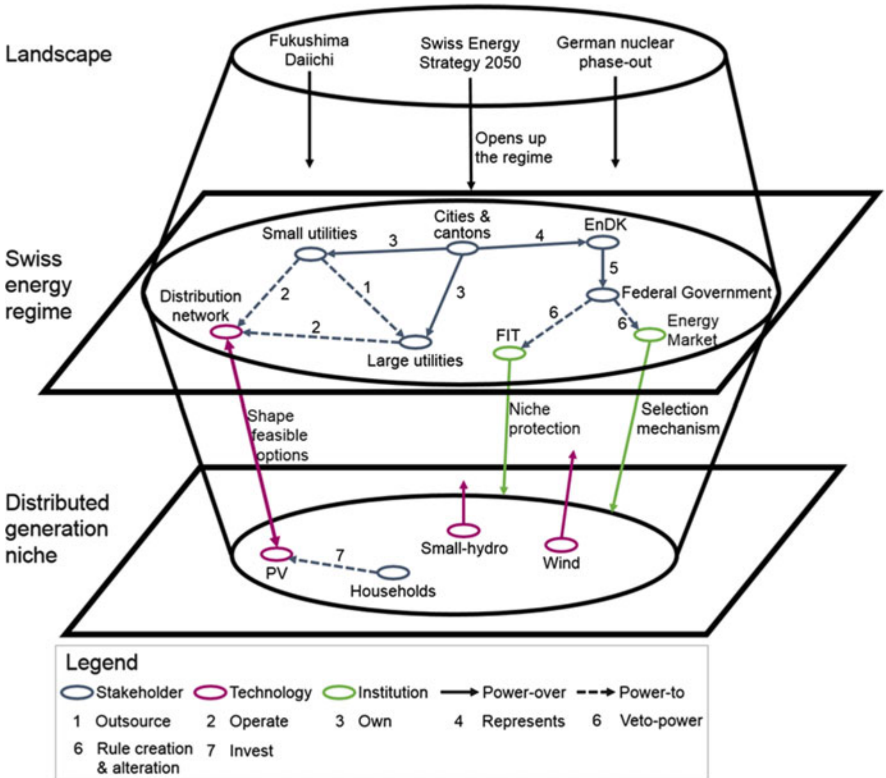

Fig. 7.3 Multi-level power, agency and politics analysis of the Swiss energy sector

7.5 Summary and Conclusions

Governments are facing significant governance challenges in the coming decades with regards to the energy transitions they are committing to. Switzerland is in a particularly challenging situation, as it envisages to phase-out nuclear energy production, which accounts for around 40 % of the country's electricity production. Apart from the technological challenges related to the integration of distributed renewable energy sources and required grid reinforcements, the country is also facing social acceptance issues of wind, geothermal and micro-hydro projects. Given these challenges, we addressed the following research question: How is the Swiss energy transition governed under changing social and technical system dimensions?

In order to answer this question, we draw upon the transition research field, and on the multi-level perspective (MLP) in particular. The MLP has proven useful for the study of transitions in numerous scientific publications. However, the MLP has been criticized for neglecting concepts such as power, agency and politics. These concepts are important when addressing multi-level governance issues, such as those present in energy transitions. Despite numerous theoretical contributions, an integrated theoretical approach is still missing. Our theoretical contribution pertains to the extension of the MLP with the concepts of power, agency and politics so as to add an additional narrative and analytical force to the framework.

Our practical contribution lies in the application of the extended MLP framework to a case in the Swiss energy market. Three conclusions can be drawn from the analysis of the landscape, regime and niche interactions and resulting power dynamics: (1) there is pressure from the landscape to significantly change the energy regime as a result of the Fukushima Daiichi reactor accident and German nuclear phase-out. However, while the Federal Government is the competent policy-maker for the FIT, it does not have full agency to create and alter these policies. This is because the policy options of the Federal Government are limited by the EnDK, which represents a large number of stakeholders which (as a group) are mostly interested in maintaining the status quo; (2) subsidization of RES (such as PV at the niche level) to replace currently available nuclear production capacity leads to an increase in the energy price for consumers, and a decrease in the wholesale price of electricity. As a result, the utilities in Switzerland are under pressure from what we call as the *price scissor effect*: consumers will consume less or produce more of their own energy (e.g. through PV), while the utility company receives lower prices for their production. We observe a trend of small utilities to outsource their operations to larger utilities in Switzerland, because the smaller utilities are being squeezed out of the market as long as the distributed RES niche is protected through a FIT; (3) due to the concentration of power, there is a potential for a larger feasible policy set, as certain powerful stakeholders have ambitious transition goals which are more closely aligned. We learnt that power within the regime would concentrate within a few large utilities. The cities and cantons that are expected to gain most power are Bern, Zurich, Aargau and Graubünden. This concentration of power and alignment of goals can help in accelerating the energy transition in Switzerland.

There are some limitations to the analysis. First, we only analyze a brief period of the Swiss energy transition, whereas the actual transition plays out over multiple decades. Secondly, we only consider the electricity sector and have not explored sectors that are becoming increasingly integrated with the energy sector, such as the transportation sector and the ICTs. There are numerous relationships between these sectors that further complicate the power, agency and political dynamics. Third, we only present one illustrative case for Switzerland, which has implications for the generalizability of our findings. However, an important strength of our framework is that it provides the concepts to illustrate the relatively low power the Swiss Federal Government has and how the feasible policy options are being constrained by EnDK. Furthermore, we illustrate how this situation is dynamic and can improve in the future to stimulate, not inhibit, the Swiss energy transition. While we do not dispute the importance of the government to steer the energy transition, we urge to use caution when assessing the role, power and agency of a government to steer a transition (for another example see; Arapostathis et al. (2013) who studied the natural gas transition in the United Kingdom). We believe that our extension of the MLP is useful to carefully assess these characteristics in an energy transition.

We recommend multiple venues for future research. First, computer simulation is not often used in simulation studies (Chappin 2011) but would allow for a long-term and dynamic assessment of power, agency and politics in energy transitions. Second, case studies that address the interactions between multiple regimes can uncover important power, agency and political dynamics. An example could be a case study on the transition towards electric vehicles and smart grids, which captures the interactions between the electricity sector, the transportation sector and the ICTs. Third, while the concepts of power, agency and politics have been conceptually addressed before, they are often not considered in the analyses of energy transitions. We hope that an integrated conceptual solution, which is consistent with the MLP, can serve as a first step to giving these concepts the attention they deserve in qualitative and quantitative transition studies.

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