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Socio-technical transitions and policy change - Advocacy coalitions in Swiss energy policy

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Abstract

Policies and politics are an integral part of socio-technical transitions but have not received much attention in the transitions literature so far. Our paper addresses this gap with a study on actors and coalitions in Swiss energy policy making. Drawing on the advocacy coalition framework, we develop first ideas about the interplay of socio-technical systems and policy systems. Then we investigate empirically how coalitions have changed and whether there are indications for major policy change. Our results show that advocacy coalitions in Switzerland have largely remained stable despite the Fukushima shock. However, heterogeneity of beliefs has increased and in 2013, even a majority of actors expressed their support for the energy transition – an indication that major policy change might be ahead. It seems that in socio-technical transitions policy change is not just a matter of core beliefs. Instead, changes in the policy issue and in the actor base – both as a consequence of technological change – play a role as well. We make suggestions how the advocacy coalition framework can inform analysis and theory building in transition studies.

Keywords: Politics, policy change, advocacy coalition framework, energy transition, energy policy, Switzerland

1 Introduction

Politics and policy change are part and parcel of larger socio-technical transitions, in which established sectors such as energy supply, transport or agriculture undergo fundamental changes (Grin, 2010; Hess, 2014; Kern and Smith, 2008). The energy transition in Germany, for example, is closely linked to a variety of policies, including deployment subsidies for renewable energies or regulations targeting nuclear phase-out (Jacobsson and Lauber, 2006; Strunz, 2014). Understanding the conditions for policy change is therefore a crucial ingredient for a comprehensive theoretical perspective on socio-technical transitions (Meadowcroft, 2011; Smith and Stirling, 2007).

This holds even more for sustainability transitions (Markard et al., 2012), which are fundamental and long-term transformations of large socio-technical systems guided by sustainability goals and policies. Sustainability transitions are not just purposeful but also inherently value laden and political. This means that we can expect actors having different interpretations of sustainability problems and normative struggles unfolding over the pace and directions such transitions should take (Geels and Verhees, 2011; Lawhon and Murphy, 2012; Smith and Stirling, 2010).

Despite the crucial role of politics and policies, transition studies are just beginning to pay more attention to "the *political* circumstances that make the adoption of such policies likely" (Meadowcroft, 2011, p. 73). With this paper, we respond to recent calls to strengthen research on the 'politics of transitions' (Lawhon and Murphy, 2012; Shove and Walker, 2007; Smith et al., 2010). We will explore changes in advocacy coalitions as a precondition for major policy change. As we foreground actors (political parties, associations, environmental NGOs, firms) and coalitions and their role in the policy process, we also contribute to the emerging line of research on actors and agency in transitions (Farla et al., 2012).

We draw on two strands of literature. From policy analysis, we adopt the advocacy coalition framework (ACF), which maintains that actors with similar beliefs form alliances that affect the output of the policy process (Sabatier, 2007). Secondly, we position this study in the literature on sustainability transition studies (Markard et al., 2012; Smith et al., 2010), which is interested in the conditions for and dynamics of far-reaching changes in socio-technical systems (Grin et al., 2010).

Transitions are characterized by fundamental uncertainties, which means that even the formulation of a policy problem is ambiguous and contested, let alone policy goals, strategies and expected outcomes. Policy process theories, which highlight the importance of cognition and framing, therefore seem to be

particularly fruitful for transition studies (Kern, 2009). Among the cognitive approaches, we have selected the ACF because of the underlying systems concept, its focus on actors and beliefs, and the emphasis on external shocks as key mechanism for major change, which altogether seem to provide a good match with socio-technical systems approaches in transition studies (e.g. Coenen and Diaz Lopez, 2010).

Our empirical study centers around the transition of the energy sector towards higher shares of renewable energies, increased energy efficiency and lower demand. This 'energy transition' has caught political attention in many countries, including Switzerland. In the aftermath of the Fukushima nuclear accident, the Swiss government has proposed to phase-out nuclear energy (which currently accounts for up to 40% of the country's electricity generation) and to launch a fundamental reform of the energy sector. Such a far-reaching transformation requires political support from a broad range of actors over a long period of time. As of 2015 the actual process of policy making is still ongoing. So the question arises, to what extent key actors in Swiss energy policy will support such a fundamental policy change.

In the following, we study which coalitions of actors characterize the Swiss energy policy subsystem, whether and how they have changed over time and whether there are indications for policy change. Our paper is based on the analysis of consultation documents of three major energy policy processes at different points in time (2001, 2007 and 2013). We identify relevant political actors and systematically analyze their policy beliefs.

The paper is structured as follows. Next we introduce socio-technical transitions and the ACF and develop first conceptual ideas on the interplay of policy systems and socio-technical systems. Section 3 then introduces the empirical setting and briefly reviews prior work. Section 4 presents the methods and section 5 the results. In section 6 we discuss our findings and methods. Section 7 concludes.

2 Theoretical background

2.1 Key concepts

A socio-technical transition is commonly understood as a fundamental transformation of a socio-technical system (e.g. Geels and Schot, 2010). Such a transition is multi-dimensional, i.e. it encompasses technological as well as organizational, institutional and socio-cultural change. In the course of a transition, new products, services, business models, organizations, regulations, norms and user practices emerge, partly complementing but more often substituting existing ones. Historical examples of socio-technical transitions

include the introduction of pipe based water supply (Geels, 2005a), the shift from cesspools to sewer systems (Geels, 2006) or from carriages to automobiles (Geels, 2005b).

Socio-technical transitions have been analyzed with different theoretical frameworks (Markard et al., 2012). One of these is the multi-level perspective (Smith et al., 2010; Geels, 2011), which suggests that established socio-technical systems[1] are very resistant to change due to a high degree of structuration (both material and institutional), close relationships among incumbent actors and vested interests. Transitions are set in motion through a combination of external developments or shocks (e.g. nuclear accidents) at the so-called landscape level and novel technologies emerging in protected niches (Geels and Schot, 2007; Verbong et al., 2007). As novel technologies develop and diffuse, new socio-technical systems emerge with them. These emerging systems also include actors, networks and technology-specific institutional structures and have been referred to as technological innovation systems in the literature (Bergek, Jacobsson, Carlsson, et al., 2008; Markard and Truffer, 2008b).

Policy change is a key process in socio-technical transitions. It is about the implementation, adaptation and discontinuation of public policies. With *policies* we refer to the content or substance of policy making, including objectives, programs, regulations, laws and funding priorities. When using the term public policies we refer to policies issued by a governmental entity. Policies are the answer of the political system to societal problems. Policies are often formalized and can be conceptualized as key elements of the institutional structures of socio-technical systems, next to social norms, expectations, technical standards etc.

Policies affect socio-technical systems in various ways. Technology and innovation policies contribute to the generation and diffusion of knowledge, which is vital for new technologies to emerge, while deployment policies contribute to the formation of markets and an up-scaling of novel socio-technical systems. In the ongoing energy transition in Germany, for example, a range of policies have fostered the development of renewable energy technologies such as wind or solar (Jacobsson and Lauber, 2006; Strunz, 2014). Conversely, policy change may also contribute to the decline of socio-technical systems - through a removal of earlier subsidies or technology bans (e.g. nuclear power in Germany,

[1] The transitions literature refers to these systems as socio-technical regimes. We will not use the term regime very much in the following because it is used differently in the political science literature. We understand a socio-technical system as an interdependent set of actors and institutional structures in a specific technological domain.

incandescent light bulbs in the European Union). Note that policies do not just enable but also constrain socio-technical change, for example as they reduce diversity and contribute to the creation of novel technology paths (e.g. nuclear in France or ethanol in Brazil, cf. Solomon and Krishna, 2011).

Politics is another essential process in socio-technical transitions (Meadowcroft, 2011). Politics refers to the process of policy making, with a variety of state and non-state actors negotiating and interacting (Knill and Tosun, 2012). Policies and policy change can be viewed as a result of politics. Examples for politics in the energy sector include different groups of actors struggling to legitimize and delegitimize nuclear power (Garud et al., 2010; Geels and Verhees, 2011) and to influence nuclear policy making (Nohrstedt, 2010). Similar struggles have been reported for renewable energy policies with incumbent actors trying to prevent policy change and renewable energy proponents lobbying in favor of deployment policies (Hess, 2014; Sühlsen and Hisschemöller, 2014). Also the Dutch transition management program has been depicted as a case in which politics, namely the strong influence of incumbent actors, prevented any major changes thus failing the original intentions (Kern, 2011; Kern and Smith, 2008).

These examples illustrate that politics, policies and policy change are central for socio-technical transitions. In the case of sustainability transitions, the exposure to politics can be expected to be even more prominent (Lawhon and Murphy, 2012; Meadowcroft, 2011). Sustainability transitions have been conceptualized as an *intentional* endeavor of socio-technical transformation, guided by public policies (Kemp and Loorbach, 2006; Voß et al., 2006). Such a process is not just inherently value-laden but also affects a broad range of stakeholders, which win or lose depending on how the transition unfolds.

In the sustainability transitions literature, there is an emerging strand of research on the politics of transitions, where scholars have studied power and power relations (Avelino and Rotmans, 2009; Grin, 2012), the ways in which resources are mobilized (Avelino and Rotmans, 2009), which language is used in political discourse (Lawhon and Murphy, 2012), or how alliances form and accumulate around specific transition paths (Grin, 2012; Lawhon and Murphy, 2012). A related stream of research focuses on actors and networks in transitions (Farla et al., 2012), their strategies and interests (Bakker, 2014; Markard and Truffer, 2008a; Smink et al., 2013) or their role in the creation of novel technological fields (Konrad et al., 2012; Musiolik et al., 2012). With our work, we contribute to both of these emerging lines of research on actors and politics in

transitions. More specifically, we concentrate on the identification of advocacy coalitions and changes in coalitions as an explanation for policy change.[2]

2.2 Policy change and the advocacy coalition framework

In policy analysis, and more specifically in policy process theories, different frameworks have been developed to study and explain policy change (Sabatier, 2007). These include, among others, institutional rational choice (Ostrom, 1990; Scharpf, 1997), the punctuated-equilibrium theory (Jones and Baumgartner, 1993; True et al., 2007) and the advocacy coalitions framework (Sabatier and Jenkins-Smith, 1993; Sabatier and Weible, 2007).

In the following we concentrate on the advocacy coalition framework (ACF), which has been applied to a wide range of policy issues and policy making systems, including the US, Canada and European countries (Weible et al., 2009). Due to its focus on actors and their beliefs, the ACF seems to nicely resonate with the study of sustainability transitions, for which competing values, distinct views on problems and causalities, and interpretation of scientific findings are central (Lawhon and Murphy, 2012). Given its wide range of applications, we also expect the ACF to be sufficiently general to be applied for the study of socio-technical transitions.

The ACF has a strong focus on actors and explains policy change with changes in the beliefs held by these actors (Sabatier and Weible, 2007). It is part of the 'cognitive turn' in policy studies, which places perceptions, ideas and cognitive processes over purely interest or power based explanations (Kern, 2009; Kuebler, 2007; John, 2012). Next, we briefly introduce the key conceptual elements of the ACF together with the assumptions on which the framework rests.

Policy participants, or actors, are "legislators, agency officials, and interest group leaders, but also researchers and journalists who specialize in [a specific] policy area … and judicial officials who regularly intervene in a policy subsystem." (Sabatier and Weible, 2007, p. 192). Participants are considered to be experts in a specific policy field. A *policy subsystem* is a set of policy participants that "have sought to influence public policy in [a specific] policy domain for an extended

[2] Interestingly, the term 'advocacy coalitions' already appears quite frequently in studies on socio-technical transformation, referring to groups of actors with common interests that shape discourses (Ulmanen et al., 2009), influence political decision-making (Jacobssen and Lauber, 2006) or legitimize novel technologies (Bergek et al., 2008; Negro et al., 2008). However, the underlying idea that shared beliefs are the basis for collective action and that these beliefs are rather resistant to change, has not been mobilized yet in the aforementioned studies.

period" (ibid). Policy subsystems often exist for decades. Examples of how subsystems have been defined include air pollution control in the US, steel policy in the European Union, climate change policy in Canada or health policy in the UK (Weible et al., 2009).

Policy actors are assumed to hold normative and causal beliefs that are difficult to change and act as filters for how information is perceived. The ACF distinguishes three hierarchical levels of actor beliefs: *Deep core beliefs* refer to fundamental assumptions and worldviews and are very difficult to change. *Policy core beliefs* are about basic positions in a policy subsystem, e.g. with regard to the role of the state or the salience and understanding of the policy issue. As they are "applications of deep core beliefs that span an entire policy subsystem" (Sabatier and Weible, 2007, p. 194) they are almost equally difficult to change. At the third level are *secondary beliefs* (also: secondary aspects) about specific policies to be implemented or measures to be taken within a specific subsystem.

Advocacy coalitions are groups of policy actors that share similar belief systems and engage in a "non-trivial degree of coordination": they collaborate and coordinate actions to enhance the chance that their belief systems get translated into policy outputs and objectives (Henry, 2011; Sabatier and Weible, 2007, p. 196). It is assumed that a policy subsystem consists of 2-4 advocacy coalitions, of which one is dominant and has the most influence on policy output (Weible et al., 2009). It is also assumed that policy core beliefs are rather stable over time, which is why coalitions - and policies - typically do not change very much.

However, policy change does occur and the ACF distinguishes minor and major policy change. Minor policy change is associated with adaptations of political programs and policy measures, while major change is about new or fundamentally different policy goals, programs and measures. Minor change is seen as a result of changes in secondary beliefs, whereas major change is a consequence of shifting core beliefs (Sabatier and Jenkins-Smith, 1999). For the ACF it is very unlikely that core beliefs change voluntarily (Sabatier and Weible, 2007: 198), which explains its emphasis on external reasons for policy change. In fact, it proposes several sources for major policy change: *External shocks* (e.g. larger changes in socio-economic conditions, outputs from other policy subsystems, political regime changes) can be a central source for changes in core beliefs as they redistribute resources and change policy venues. Further sources are *internal shocks* in the policy subsystem (e.g. environmental disasters, accidents) and *negotiated agreements* among different coalitions.

2.3 Comparison of frameworks

The advocacy coalition framework and systems approaches to socio-technical change have some similarities but also differences, which we will briefly discuss below. We concentrate on the multi-level perspective (MLP). Both ACF and MLP take a systemic perspective and seek to explain major changes of configurations or structures that are typically very stable and resistant to change. Both assume that changes are long-term but the time horizon is different: major policy change is expected to take about a decade, while socio-technical transitions are assumed to take 50 years, or more. Moreover, both frameworks refer to (external) shocks as a major source of change but also highlight other processes such as learning or novelties emerging.

The phenomena they seek to explain are different but may overlap: policy changes are a central element in socio-technical transitions and socio-technical change may trigger policy change. However, socio-technical transitions are a broader phenomenon with many different kinds of institutional structures (e.g. societal norms, user practices, organizational routines, business models, markets, technology standards, policies) changing.

Table 1: Comparison of the advocacy coalition framework and the multi-level perspective

	Advocacy coalition framework (ACF)	**Multi-level perspective (MLP)**
Purpose	Explain major changes in policy subsystem	Explain major changes in socio-technical systems
Timespan	≈ 10 years	≈ 50 years
Key conceptual elements	Policy subsystem, Actors, Beliefs, Advocacy coalitions	Regime (socio-technical system), Niche, Landscape
Key mechanisms and assumptions	Policy core beliefs and coalitions tend to be stable; major change occurs through external shocks, internal shocks and negotiated agreements	Regimes tend to be stable; niches protect and nurture novelties (source of change); landscape as a source of external pressures or shocks
Theoretical roots	Social psychology, cognition, bounded rationality	Evolutionary theory, social construction of technology, institutional theory
Potential overlap	Socio-technical change as one driver for policy change	Policy change as one driver (and constraint) for socio-technical change

The two frameworks also differ in their underlying explanatory mechanisms for change. The ACF has very much of a micro-foundation with its focus on actors and their beliefs (and resources and coordination). The MLP highlights technology variation and selection as core explanatory principles (Geels, 2010). The ACF conceptualizes the policy subsystem as a network of actors without paying much attention to broader institutional structures (e.g. taken for granted assumptions, collective expectations, socio-technical paradigms) that characterize a policy subsystem, or affect coalition building (Sabatier and Weible,

2007). The MLP in contrast very much emphasizes institutional structures, especially at the regime level. The study of actors, their resources and networks is less prominent and mostly confined to the niche level (Farla et al., 2012; Markard and Truffer, 2008b). Against this background, the ACF seems to be an interesting complement for transition studies, strengthening the somewhat neglected view on role of actors and politics in transitions (Lawhon and Murphy, 2012).

2.4 Interaction of policy change and socio-technical change

Below, we introduce first ideas of how changes in policy subsystems and in socio-technical systems affect each other. We conceptualize socio-technical systems and policy subsystems as overlapping systems that are linked through resource flows and 'share' certain actors. We regard the two types of systems as tightly interwoven in the sense that they co-constitute each other (Smith and Stirling, 2007). At the same time, the systems have their own 'logics' about how they work and can exhibit independent dynamics.

We assume that actors can pursue (at least) two kinds of activities: they can contribute to policy making and they can provide services within the socio-technical system (e.g. energy generation and distribution, technology development, knowledge creation). Of course, they also can do both. Examples for the latter are firms that apply existing or develop novel technologies *and* lobby for favorable regulation. Or industry associations, which provide a variety of services for their members, including political representation of their interests. Such actors are involved in both systems.

Actors of the socio-technical system provide resources such as finances or information for actors in the policy subsystem (political parties, NGOs, associations, public administration etc.). In exchange, they receive political support, e.g. in the form of favorable regulation, subsidies or provision of legitimacy. At a systems level, we might say that a socio-technical system provides resources for the policy subsystem, while the policy subsystem delivers favorable policies (which again secure resource flows into the socio-technical system). Actors in both systems also interact as they exchange and adapt beliefs, including views about key challenges and prospects of socio-technical configurations. These views are shared among some but not all actors, which is why there is inherent conflict and struggle about dominant beliefs, policies and technologies.

In a stable situation (Figure 1a), actors of an established socio-technical system, or regime, are well represented in the dominant advocacy coalition and there are substantial resource flows from the socio-technical system to the policy

subsystem and vice versa. There is no or just incremental policy change, which means that the policy related institutional structures of the socio-technical system are maintained. Beliefs and resource endowments of actors as well as actor networks (business alliances and advocacy coalitions) do not change much. There might be competing coalitions and alternative technologies but these play a minor role.

In an early destabilization (Figure 1b), 'landscape' developments such as new policy issues (e.g. climate change), accidents (e.g. Fukushima), crises (e.g. oil price crisis), megatrends (e.g. market liberalization) or technological advances in other sectors (e.g. ICT) exert pressure on the existing systems. A similar effect can be assigned to internal developments (e.g. policy learning, negotiation among coalitions, new technologies in the focal sector). In response, actors may develop and follow different beliefs and explore technological alternatives. These new technologies may receive early policy support, e.g. in the form of R&D subsidies or pilot programs. As a consequence, a niche is created which supports the emergence of an alternative socio-technical system. Advocates of alternative technologies will also participate in the political process, providing resources and strengthening ties to political parties and intermediaries.

In a phase of major policy change (Figure 1c), the former minority coalition has gained influence due to new actors joining and existing actors changing their core beliefs. The alternative socio-technical configurations consequently receive increased political support, while favorable policies for the established socio-technical system will be reduced or withdrawn. This leads to a destabilization of established institutional structures and a re-orientation or exit of incumbent actors.

Note that this is a simplified model of how policy change and socio-technical change are intertwined, i.e. how developments in one system feed back into the other. It does not imply that policy change is the only or primary driver for socio-technical change, or vice versa.[3] Also note that the model seems to suggest that policy subsystems and socio-technical systems have the same boundaries (e.g. national or regional). However, socio-technical systems may well reach beyond a specific policy subsystem. In the case of the energy transition, technology development (e.g. in photovoltaics or wind energy) is simultaneously affected by multiple national policy subsystems. The socio-technical system can also be seen as a channel through which different policy subsystems indirectly interact.

[3] There may be other influences at play such as changes in adjacent socio-technical systems or policy subsystems, larger policy changes etc.

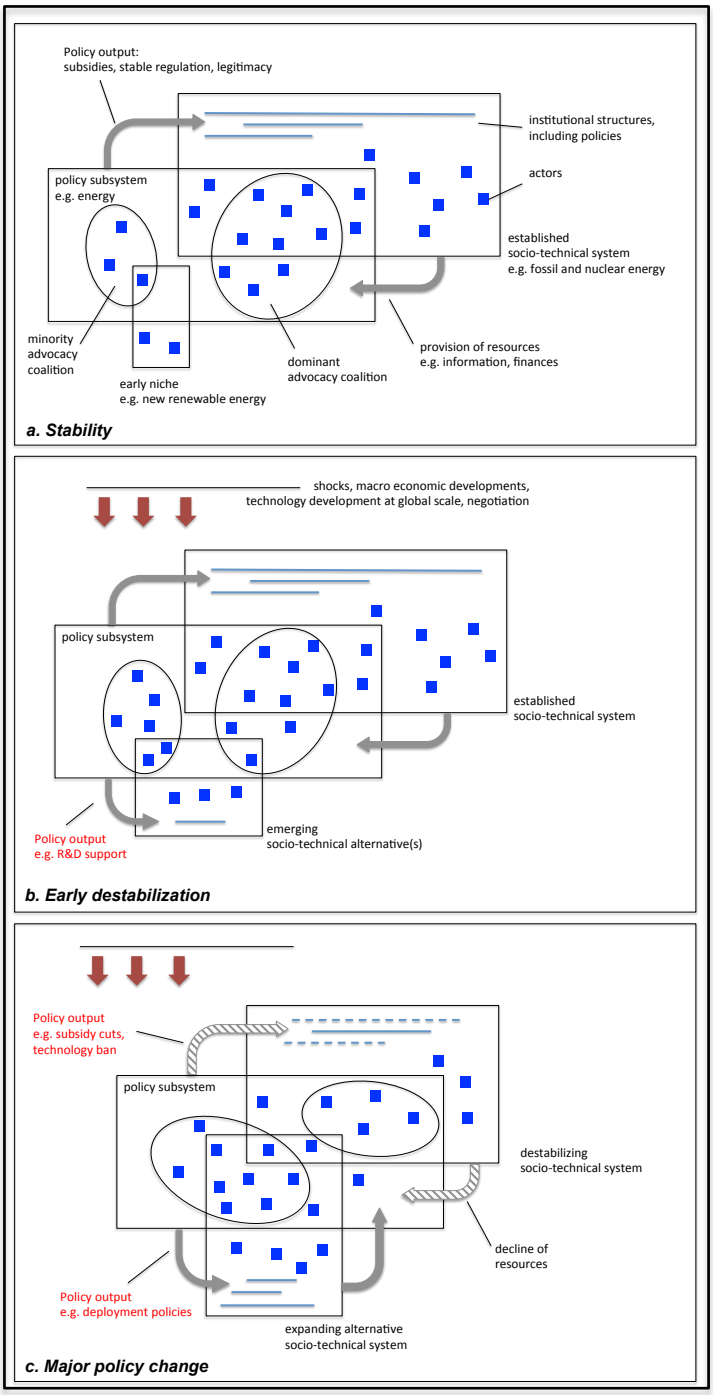

Figure 1: Interaction of policy subsystem and socio-technical systems

3 Energy transition and the Swiss energy policy subsystem

The energy transition is about fundamental socio-technical, organizational and institutional changes in the energy sector of a particular country or region. In many industrialized countries, the energy sector has witnessed transitions in the past 200 years (Solomon and Krishna, 2011). These were characterized by a massive growth of energy demand and major shifts in the use of energy carriers:

from wood to coal, from coal to oil, from oil to nuclear energy and natural gas. These transitions included both, the exploitation of new primary energy sources and the development of novel energy conversion technologies (steam engine, internal combustion engine, steam turbine, nuclear reactor). Moreover, they also reached into related sectors such as industrial production, transportation, heating and electricity.

Currently, we see the beginning of another transition, in which fossil and nuclear fuels are substituted by new renewable energy technologies such as wind, solar or biomass. An important feature of the ongoing energy transition is that it is associated with societal goals (e.g. reduction of greenhouse gas emissions or nuclear risks, energy independence, regional value creation). It can therefore be viewed as an example of a sustainability transition, where public policy has a strong influence on the pace and direction of development. The German "Energiewende" with various public policies to strengthen renewable energies and energy efficiency and the political decision to phase out nuclear until 2022 is certainly a prominent example in this regard (Strunz, 2014).

3.1 Energy transition policy in Switzerland

In Switzerland, there is a host of energy policies that range from rules for market liberalization to programs for energy conservation, subsidies for renewables and regulations for CO_2 reduction. Here, we concentrate on the policy proposal of the "Energiestrategie 2050" currently under debate (EnG, 2012). In May 2011, in the aftermath of the Fukushima nuclear accident, the Swiss government and parliament decided to phase-out nuclear and to stimulate energy efficiency and the use of renewable energies instead. As a consequence, the government developed the 'Energy Strategy 2050', a policy proposal that was presented for stakeholder consultation in September 2012.

The proposal sets long-term targets (for 2035 and 2050) for the reduction of energy consumption (54% reduction until 2050) and the expansion of renewable electricity generation and combined generation of power and heat. It includes a variety of measures, including grid access and feed-in regulations, changes in spatial planning, subsidies and auctions for renewable energies etc. In a first phase until 2020, there is a focus on subsidies to stimulate new power generation and energy efficiency in the building sector, the service sector and industry. In a later stage, these support programs shall be replaced by an energy tax.

Energy generation and consumption have not changed much in Switzerland in the past 10 to 20 years (see box). There have been various attempts to increase the share of new renewable energies and to reduce greenhouse gas emissions

(primarily transport and heating) but both renewables policies and taxation of CO_2 have remained very moderate. The electricity sector has seen major regulatory change with a gradual market liberalization that started in 2009, allowing very large customers to choose their supplier. Full market access for all customers was originally foreseen for 2014 but has been postponed due to the new energy transition policy.

In December 2014, the Swiss National Council voted in favor of the energy transition policy although the earlier proposal of the government was altered in several, mostly minor aspects. Nuclear phase-out, for example, will take effect step-by-step with a maximum lifetime of 60 years for existing plants. Decisions are not final though as the Council of States will discuss the proposal in Spring 2015.

Compared to many other European countries, the Swiss energy market is rather small with an annual energy consumption of 245 TWh, of which 24% are accounted for by electricity, 34% by transport, 28% by heating, and 14% by other purposes (SFOE, 2012). Energy demand has continuously increased from 1979 to 2012 with an average of 0.85% per year, despite several measures to increase energy efficiency.

A particularity of the Swiss energy system is that the electricity sector is almost 'CO_2-free' as power production is primarily from hydropower (57% on average) and nuclear (38% on average). New renewable energies still play a minor role for electricity generation with solar, wind and biomass contributing to 1.7% of the electricity production in 2013 (SFOE, 2013). Over the past 14 years, there were no major changes in Swiss electricity generation. However, new renewables (especially solar) have seen some growth in the last five years, although they are still at very low levels compared to most other European countries.

Box 1: Key figures of the Swiss energy sector

Under the ACF, Fukushima can be interpreted as an external shock, while the governmental decision to phase out nuclear is an internal shock to the Swiss energy policy subsystem. Such events might lead to alterations of core beliefs and major policy change (see Nohrstedt, 2010; Sabatier and Jenkins-Smith, 1999; Zafonte and Sabatier, 2001), although one decade or more is expected to be in between the shock and observable policy outputs (Sabatier and Jenkins-Smith, 1993). An important pre-condition for such a change and thus interesting to study are beliefs and coalitions right after the shock. It is here where we expect important insights about the propensity for major policy change in the future.

3.2 Prior studies on advocacy coalitions in Swiss energy policy

Coalitions in Swiss energy and climate policy have already been analyzed in prior studies. A study of three subsequent policy processes and subsystems (nuclear energy, energy efficiency, and electricity market liberalization) revealed two stable coalitions, a pro-growth and a pro-ecology coalition in Swiss energy policy from 1987 to 2000 (Jegen, 2003). Polarization between these two coalitions was most pronounced in nuclear policy subsystem. For more recent policy processes such as market liberalization, belief differences among members of the two coalitions were more moderate and cross-coalition collaboration could be observed.

Almost one decade later, Ingold (2011) and Sutter (2011) analyzed Swiss climate policy between 1995 and 2010. They also identified two major coalitions, a pro-economy, and a pro-ecology coalition. And again they found coalitions to be very stable with not much exchange across coalition boundaries. For some political issues such as energy efficiency or adaptation to climate change, however, cross-coalition cooperation and thus a potential adaptation of otherwise contrasting policy beliefs seemed to be possible (Sutter, 2011). Some actors like cantonal representatives, moderate parties or federal agencies might act as so-called policy brokers (Ingold and Varone, 2012; Kriesi and Jegen, 2001) and thus facilitate policy compromise or even policy change.

In summary, existing studies point to rather stable and polarized coalitions in the Swiss energy policy subsystem but also highlight that – depending on the actual policy issue – some actors work across coalition boundaries and may thus contribute to policy agreements.

4 Methods

Our analysis consisted of four steps including i) definition of scope and selection of key actors, ii) development of a belief coding scheme, iii) coding of three consultation procedures and categorization of actors and iv) identification of coalitions based on actors' belief systems. For our study we used public consultation documents. In a consultation procedure, the administration invites all interested actors to submit written statements on a particular policy proposal. In some cases, stakeholders are even asked specific questions (cf. List 1). Submissions vary in length: some just cover a few pages, while others contain 40 to 80 pages of argumentation. The Energy Strategy 2050 proposal received

almost 460 submissions, which points to the relevance of the topic and the potentially large size of the policy subsystem.[4]

In order to identify changes in coalitions, we compared findings from the Energy Strategy 2050 (EnStrat) with two earlier energy policy proposals on market liberalization, the Electricity Market Directive (EMD) of 2001 and the Revision of the Power Supply and Energy Directive (PSED) of 2007. There is some overlap in policy content as both also cover the issue of support for renewable energies.

Scope of analysis and selection of key actors

Defining the scope of a policy subsystem and selecting key actors ("policy participants") is a crucial step in the application of the ACF (Sabatier and Weible, 2007). We started with a broad definition: The Swiss energy policy subsystem includes all actors involved in energy policy decision-making in Switzerland. This was narrowed down subsequently. Here the focus was on those actors that participate in the pre-parliamentary phase (consultation procedure).

To narrow down the number of actors, we first compiled a list of 70 organizations, which we assumed to have a high interest in the proposal. To prepare this list, we talked to experts in Swiss energy and climate policy and consulted earlier studies in the field (e.g. Ingold, 2011; Kriesi and Jegen, 2001; Sutter, 2011). Different types of organizations were covered, including political parties, industry associations, energy associations, environmental NGOs, utility companies, commissions and universities.

Next, a shortlist was prepared following the reputational approach (French, 1969), in which actors are included based on their perceived relevance. We contacted seven experts in the field (scientists, administration officials, consultants) and asked them to rank each of the 70 organizations in terms of relevance[5] for energy policy making in Switzerland. Experts could also add additional actors. As a result, we yielded a sample of 23 organizations that – on average – were ranked relevant or highly relevant (cf. Table 4). Following the positional approach (Knoke, 1993), in which actors are selected because they hold formal decisional power or competences in the issue, we included additional actors from the housing sector, industry, commerce and transportation. Our final sample covered 41 actors divided into seven different groups (cf. Table 4).

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[4] Earlier proposals in the field of energy and climate policy from 2000 to 2008 received 170 to 255 submissions and the 2010 revision of unemployment insurance regulation received 73 submissions.

[5] Responds could choose between "highly relevant", "relevant" and "rather not relevant".

Development of coding scheme

According to Sabatier (1993), a qualitative content analysis of publications of interest groups is a very suitable method to empirically examine policy core beliefs. To ensure a systematic and reproducible analysis we developed a category system that reflects both the applied framework and the data available. We briefly substantiate our categories below. This seems important, as several earlier publications in this area did not explain the set-up of the categorical framework used (e.g. Elliott and Schlaepfer, 2001; Lubell, 2003; Heintz, 1988).

We started with a list on policy core beliefs from the literature (Sabatier, 1998). That list was Sabatier's attempt to illustrate policy core beliefs in a concrete but general way. Besides subsystem-specific and institutional aspects, we also included the three dimensions of sustainability (environmental protection, social justice and economic efficiency). Next we tested our initial scheme with a selection of consultation documents and refined it. In particular, we split the initial categories of policy core beliefs into sub-dimensions. This bottom-up approach helped us to classify actor statements more precisely. We ended up with a list of 5 dimensions, and 18 sub-dimensions to identify policy core beliefs (cf. Table 5).

Secondary beliefs (cf. List 1) were derived from four questions out of the questionnaire that was part of the consultation. These questions are about specific policy goals and instruments.

Coding of beliefs and categorization of actors

To facilitate coding, we defined exemplary statements for each sub-dimension and used a four-stage ordinal scale to classify the text phrases found in the actors' consultation answers for Energy Strategy 2050 (cf. Table 6). In a pre-test, three submissions were coded independently by two researchers. Results were compared, coding guidelines adapted and specified. To better handle the large text quantities, we worked with MAXQDA, a computer program for qualitative data analysis.

As the two other policy proposals had a somewhat different focus, not the exact same coding scheme could be applied. For instance, the dimension of social justice had to be removed because it did not yield a sufficient number of statements.

Also note that not all actors made submissions to all three proposals, some submissions were insufficient for solid belief identification, new actors appeared and some actors changed names. As a result we could only analyze statements of 24 actors for the EMD, 29 actors for the PSED and 31 actors for the Energy Strategy 2050 (out of the 41 preselected organizations).

Identification of coalitions

To identify coalitions, we pursued the following steps. First a matrix was created with one row for each actor and one column for all 18 core and four secondary beliefs. Each cell was then filled with a number between 1 and 4 (Table 6) indicating varying levels of agreement with the respective belief dimension. Second, a Manhattan Distance Analysis was conducted to transform this "actor vs. belief" matrix into an "actor vs. actor" matrix, where every cell indicates the distance in belief attribution between two actors. Third, clustering of actors was carried out with the Tabu Search Clustering approach. To assess the optimal number of clusters, Tabu Search Clustering provides a relative goodness of fit (Hanneman and Riddle 2005). In our case, the most robust results were produced by a split of the subsystem into two clusters, i.e. two coalitions. By using multidimensional scaling the distances of all actors can finally be illustrated graphically in two-dimensional maps (cf. section 5).

5 Results

In this section we first present our results from the Energy Strategy 2050 consultation, in terms of both policy core beliefs and secondary aspects. In a second step, we compare the current actor base, policy core beliefs and coalitions with those of the two earlier policy processes.

5.1 Energy Strategy 2050

Analysis of policy core beliefs

Our analysis shows that the policy core beliefs of the key actors in the Swiss energy policy subsystem of 2013 are distributed heterogeneously (cf. Figure 2). There are two coalitions emerging from the cluster analysis. A larger group of actors (1) encircled on the bottom-right part of the graph, and a smaller one on the left side (2).

Group 1 encompasses mid- and right-wing parties, 'classical' industry associations such as Economiesuisse, energy associations and the large Swiss utility companies (cf. Table 2). Group 2 consists of three green and left-wing parties, the Swiss Federation of Trade Unions (SGB), a clean-technology industry association (Swisscleantech), the major environmental NGOs and two renewable energy associations. In the following, we will refer to the first group as "pro-economy" coalition and to the second as "pro ecology" coalition.[6]

[6] These labels are proxies for the dominant beliefs in the two coalitions and chosen in accordance with earlier studies (e.g. Ingold 2011). It has to be noted though that the

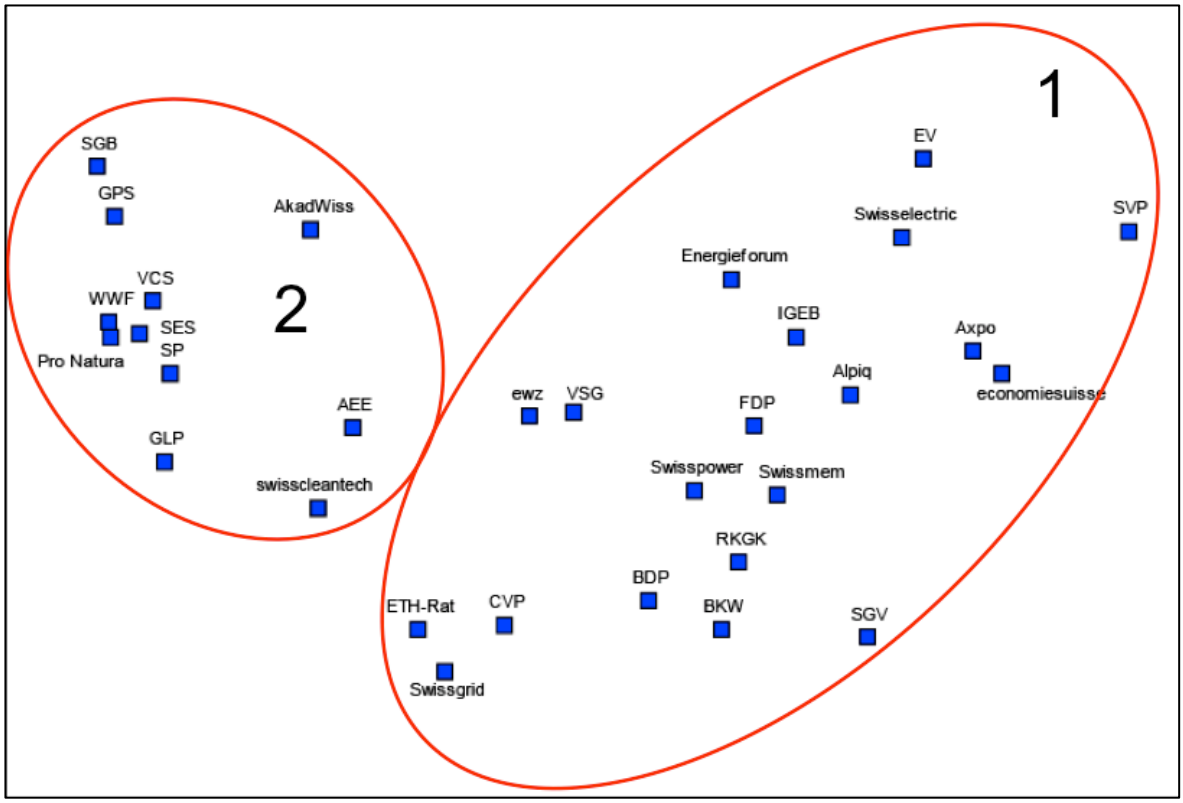

Figure 2: EnStrat 2013 – Relative distances of actors in terms of policy core beliefs

Although there are belief differences within each coalition, we could identify some common threads in each of the five dimensions of our category system (cf. Table 3). While pro-ecology actors regard the energy transition as a chance and attach great importance to renewable energies, pro-economy actors see no need to change the established energy system. Moreover, pro-ecology actors call for policy intervention and regulatory change to get the energy transition off the ground. Pro-economy actors, in contrast, reject regulatory intervention and some even show a general mistrust of the state. The following statement by a leading industry association may serve as an illustration here:

> „[At stake here is] the basic public policy question, which role the state should play in energy policy. The proposal is strongly marked by state control, influence and re-education in wide areas of life- and work organization. … We regard the entire political mix of regulation, subsidies, intervention in planning and bureaucracy as not productive. … The [energy] strategy at hand would lead Switzerland into an economic dead end." Economiesuisse 2013

Both groups of actors refer to environmental, economic and social concerns but they set quite different priorities. Pro-ecology actors assign a high priority to

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labels are somewhat misleading as actors of the first coalition also highlight environmental concerns (but to a lesser extent) and actors of the second group also highlight economic motivations.

environmental protection and climate change and they mobilize pro-environment arguments much more frequently than pro-economy actors. An inverse relationship applies for economic priorities. Pro-economy actors repeatedly emphasize that low energy prices and competitiveness of the Swiss industry are very important. However, also actors in the pro-ecology coalition mobilize economic arguments. They highlight that the energy transition creates jobs and reduces dependence on energy imports, as expressed in the following statement by the Social Democratic Party.

> „Until 2030, 50% of the energy consumption in Switzerland must be covered by renewable energies. … the required targets lead to a massive expansion of renewable energies and an increase of energy efficiency, which create jobs and added value in Switzerland. [This] represents an opportunity for the economy and reduces foreign dependence on fossil energies." SP 2013

Table 2: EnStrat 2013 - Key actors in the two coalitions

	"pro ecology" coalition (2)	"pro economy" coalition (1)
Political parties	GLP, GPS, SP	BDP, CVP, FDP, SVP
Trade associations	SGB, Swisscleantech	Economiesuisse, EV, SGV, Swissmem
Environmental protection and consumer organizations	Pro Natura, VCS, WWF	
Energy supply companies		Alpiq, Axpo, BKW, EWZ, Swissgrid, Swisspower
Energy associations	AEE Suisse, SES	Energieforum, IGEB, Swisselectric, VSE
Scientific organizations	AkadWiss	ETH-Rat
Others		RKGK

In terms of social impacts, pro-ecology actors claim that energy must be affordable for everyone (with the households in mind), while pro-economy actors are more occupied with broad public legitimation for energy policy.

While the general differences are remarkable, belief distances between specific pro-ecology and pro-economy actors are in some cases much smaller. The Electric Utility of Zurich (ewz) and the Swiss Association of the Gas Industry (VSG), for example, are close to the positions of the Association for Renewable Energies and Energy Efficiency (AEE) and Swisscleantech (Figure 2). These actors are located at the common boundary of coalitions, which means that their distance to actors of the other coalition is even smaller than to some members of their own coalition. They same holds for the Swiss Federal Institute of Technology (ETH), the Christian Democratic People's Party (CVP) or Swissgrid, the Swiss transmission grid operator. These actors hold comparably moderate policy core beliefs, which makes it easier for them to potentially engage in cross-

coalition collaboration. The following illustrates that the CVP highlights the benefits of the energy transition, despite being classified as a pro-economy actor.

> „The CVP considers the phase-out of nuclear energy and the related expansion of energy generation from renewable, domestic energy sources an opportunity for Switzerland. With [this kind of] energy generation the regional economy can be strengthened and jobs can be created." CVP 2013

Table 3: EnStrat 2013 - Typical policy core beliefs of actors in the two coalitions

Policy Core Beliefs	"pro ecology" coalition (2)	"pro economy" coalition (1)
Seriousness of the problem	Expansion of renewable energies is important; energy transition is an opportunity	No need to change the existing energy supply system
Role of the state	Public policies are necessary for energy policy	State interventionism has negative effects on the economy in general
Environment	Climate change and environmental protection are important issues for energy g	[low degree of mobilization]
Economy	Expansion of renewable energies creates jobs and reduces import dependency	Low energy prices are important to maintain industry competitiveness
Society	Energy must be affordable for everyone, including households	Energy transition must be ultimately approved by public vote

Analysis of secondary beliefs

With regard to secondary aspects we compared whether the actors are in favor of nuclear phase-out and support targets for renewables, energy efficiency and energy demand (cf. List 1). Here the picture is very much different compared to what we saw for policy core beliefs (Figure 3).[7]

We find that most organizations support the new policy objectives. Interestingly, even actors that – in terms of policy core beliefs – are part of the pro-economy show various levels of consent. This includes electricity sector players such as EWZ, Swisspower and BKW as well as CVP, the Swiss association of small and medium enterprises (SGV), ETH and the Swiss mountain cantons. The statement of BKW, one of the Swiss nuclear power plant operators, illustrates how cautiously nuclear proponents argued in 2013.

> "After the events in Japan, it is clear for BKW that the substitution of … Swiss nuclear power plants cannot take place with nuclear power plants of present-day technology. BKW can therefore understand the political will to ban the construction of new nuclear power plants. … However, a legally consolidated technology ban for nuclear energy based solutions has to be rejected." BKW 2013

[7] Note that we do not refer to coalitions in this part of the analysis because this term is exclusively used for differentiation on the basis of policy core beliefs.

The analysis also shows that the positions of those in favor of the propositions are widespread, while most opponents express identical secondary beliefs. This might make it easier for the opponents to join forces against the proposal.

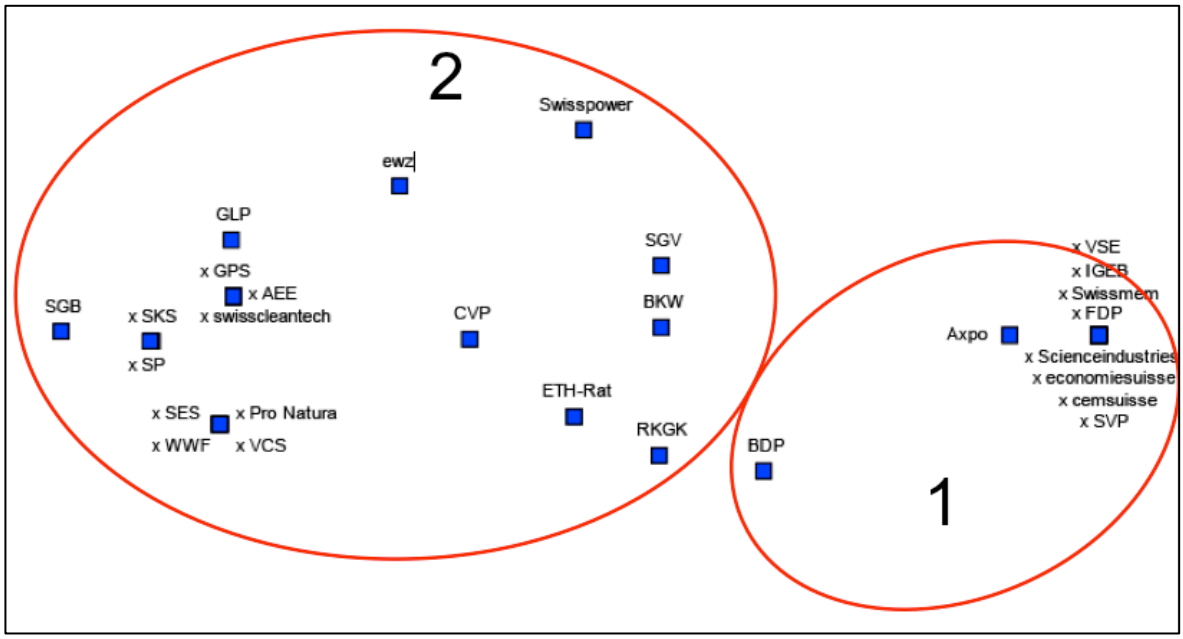

Figure 3: EnStrat 2013 - Relative distances of actors in terms of secondary beliefs

5.2 Changes in advocacy coalitions

We distinguish two types of change, changes in the actor base and changes in beliefs and coalition configurations. Therefore, we systematically compare policy core beliefs and coalition formations of the Energy Strategy (EnStrat 2013), the Electricity Market Directive (EMD 2001) and the Power Supply and Energy Directive (PSED 2007).

Changes in the actor base

Within our observation period, we find a series of changes in the set of key actors. Among others, two new political parties emerged. The Green Liberal Party (GLP) was founded in 2004 in the Canton of Zurich as a split-off of the Green Party and has become active at the national level from 2007 onwards. The Civic Democratic Party (BDP) was founded in 2008 as a separation from the right-wing Swiss People's Party (SVP). In our data, both newcomers show up only in the 2013 consultation procedure.

In the electricity sector, there was a merger of two large electricity producers in 2009, which resulted in a new firm named Alpiq.[8] Furthermore, two novel associations emerged. Swisselectric was founded in 2002 by the four largest utility companies in Switzerland to strengthen technological and political collaboration. Swisscleantech was founded in 2009 to supports the interests of 'clean-technology' firms, many of which are SMEs that offer 'green' products or services. In 2013, Swisscleantech had close to 300 members.

Some of these changes (foundation of new parties) were largely independent of the developments in the energy sector, while others were not. Market liberalization has led to mergers, new alliances and a diversion of interests in the electricity sector. For utilities with a focus on distribution, the energy transition seems to represent less of a threat than for power producers (esp. those invested in nuclear energy). The foundation of Swisscleantech is related to an even broader phenomenon, the rise and increasing impact of eco-oriented products and services.[9] These are often related to energy but also go beyond it.

Changes in core beliefs and coalitions

In all three policy consultations, the pro-economy coalition (1) was the dominant one. In 2001, it held almost three times as many actors as the pro-ecology coalition (Figure 4) and in 2007 it comprised still twice as many (Figure 5), similar to what we found for 2013 (Figure 3).[10]

The three cases also vary in terms of belief distances. In 2001 the distance between the two coalitions was very prominent, while in 2007 actor beliefs were more heterogeneous and the two coalitions less far apart. In fact, from 2001 to 2013 there is increasing belief heterogeneity among pro-economy actors while the average belief distance in the pro-ecology coalition remains largely the same.[11]

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[8] For the consultations of 2001 and 2007 we took the statements of both predecessors (Atel and EOS) and compiled their aggregated beliefs to improve comparability. The differences of the positions of the two companies were rather marginal.

[9] In March 2013, the Swiss government has launched a set of instruments to foster green consumption and a circular flow economy ("action plan green economy").

[10] Note that the size of a coalition is not a sufficient indicator to determine its actual influence on the policy process. See also related comment on resources in section 6.2.

[11] It has to be noted though that a direct comparison of actor positions and average distances over time is somewhat limited because the overall number of actors we could include in our analysis varied. This is due to data availability and changes in the actor base.

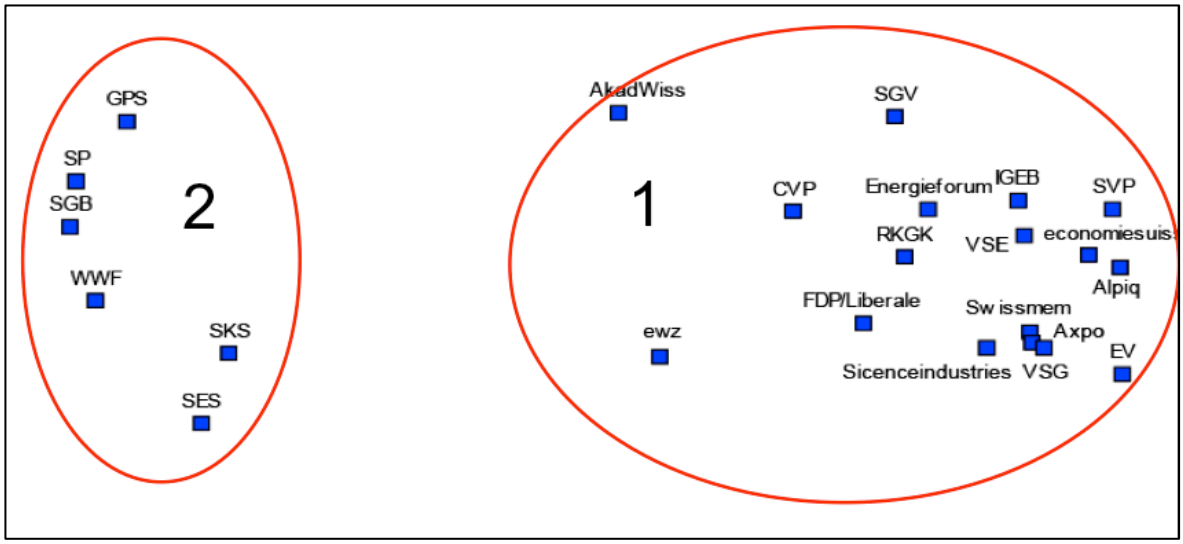

Figure 4: EMD 2001 - Relative distances of actors in terms of policy core beliefs

We also found that three pro-economy actors, the Swiss Academy of Sciences (AkadWiss), the municipal utility of Zurich (EWZ) and the Christian Democratic People's Party (CVP) were comparatively close to the other coalition in 2001 and in 2007. This also applies for 2013 with the exception that AkadWiss was then even part of the pro-ecology coalition. Also pro-ecology had such 'boundary-spanning actors'. These are AEE, Swisscleantech and Swissolar.

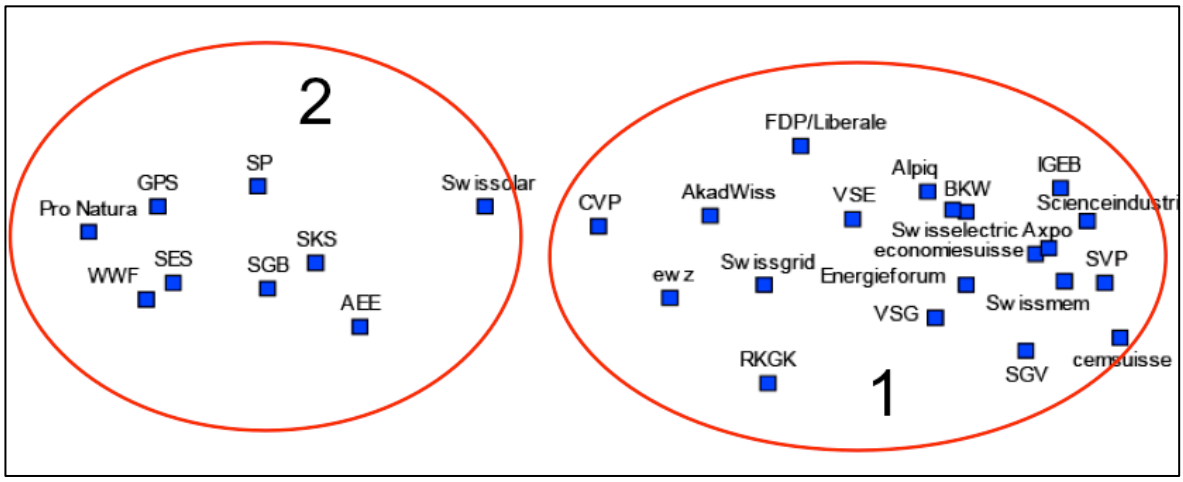

Figure 5: PSED 2007 – Relative distances of actors in terms of policy core beliefs

Finally, the comparison shows that two new actors, the Green Liberal Party (GLP) and Swisscleantech 'joined' the pro-ecology coalition, while another two newcomers, Swisselectric and the Civic Democratic Party (BDP), were found the pro-economy coalition.

5.3 Summary of findings

The Swiss energy policy subsystem is characterized by two coalitions: A larger group of key actors ("pro-economy") tend to give priority to low energy prices and rather oppose regulatory intervention, while a smaller group of actors ("pro-ecology") highlight the importance of environmental and climate protection and the necessity of public policies towards these goals. Over a period of 13 years, the two coalitions have remained very stable and policy core beliefs of the key actors have not changed very much.

However, the spectrum of policy core beliefs has increased: Positions back in 2001 were much more polarized compared to 2013. Especially actors in the mid-right political spectrum today exhibit a greater variety of beliefs than in earlier years. Meanwhile, we find actors in both coalitions who show beliefs that are close to the opposite coalition. Actors that display moderate beliefs and engage in cross-coalition collaboration and coordination can play a crucial role for policy change (Beyers and Braun 2013; Kriesi and Jegen 2001). As brokers they seem particularly relevant in Swiss policy-making, which is generally characterized by compromise seeking. Our study points to EWZ, VSG, CVP, Swisscleantech, AEE and Swissolar as potential candidates for such a role.

Moreover and most importantly, we found quite some support for the energy transition policy proposal at the level of secondary beliefs – despite otherwise stable coalitions. Several pro-economy actors agree with essential aspects of the proposal such as more support for renewables and nuclear phase-out, although they display otherwise conservative policy core beliefs.[12]

Finally, our study revealed that there is a comparatively high political interest in the energy transition. The current policy proposal received a record-breaking 460 submissions, while earlier bills got 2 to 3 times less. The proposal has touched upon the interests of a wide range of organizations and industries, including transportation, building, cement industry, machinery industry etc. Many of these are not 'the usual suspects' of the energy policy constituency.

[12] The recent parliamentary debate and voting on the energy transition (Dec. 2014, not part of our analysis) was in fact dominated by a mid-left wing alliance with representatives of CVP and BDP, both pro-economy parties, voting similarly as representatives of the pro-ecology parties SP, GP, GLP.

6 Discussion

6.1 Discussion of results

Our findings that two coalitions characterize Swiss energy policy making and that these were largely stable in the past are supported by earlier studies. Jegen (2003) found a dominant "pro-growth" and a minor "pro-ecology" coalition competing from 1987 to 2000 and also Ingold (2011) and Sutter (2011) identified very similar coalitions and very little change for the case of climate policy in Switzerland.

The dominant, conservative coalition included *incumbent actors* of the energy sector and their representatives. This is in line with our initial conceptual ideas (Figure 1a, b) and with studies from other countries that found energy incumbents rather lobbying against major policy changes (Kern and Smith, 2008; Stenzel and Frenzel, 2008). However, we also saw that incumbents are not necessarily united in their positions. Three incumbent players (EWZ, BKW and Swisspower) were in favor of several of the proposed policy changes in 2013. EWZ is the largest municipal utility and Swisspower is a joint venture of 23 municipal utilities. So it seems that some incumbents also see opportunities rather than risks in the energy transition.

Given the observed stability of Swiss energy policy coalitions, it might come as a surprise that *secondary beliefs* are in favor of policy change and many key actors today support nuclear phase-out and an expansion of renewables by means of regulation. Following the theoretical assumptions of the ACF, we can expect that the Fukushima shock has played a major role in here. This is particularly important as nuclear has been one of the most contested energy policy issues in Switzerland in the past, with very polarized views and a strong advocacy coalition in favor of its continued use (Jegen, 2003). Today, views on nuclear and renewables are obviously changing. Even actors, who hold essentially conservative policy core beliefs, meanwhile express doubts on nuclear and see economic potential in alternatives (see earlier statement of CVP).

But how can we explain the apparent contradiction of secondary and policy core beliefs? In addition to environmental issues, the energy transition is meanwhile associated with arguments about job creation, regional value creation and independence of energy imports. Such arguments fit very nicely to conservative policy core beliefs but are also mobilized by pro-ecology actors. This means that the policy issue (energy transition) has outgrown the traditional lines of conflict between environmental and economic values. In fact, it seems that the substance and perception of the *policy issue have shifted* as renewables became more mature and economically viable and nuclear has lost some of its earlier

legitimacy. Such a (gradual) shift in the policy issue would be very much in line with findings from the German energy transition, where it was argued that the dramatic political turnaround in 2011 was only possible due to a long period of experiences with and continued performance improvements of renewable energies (Strunz, 2014).

A second, related explanation is about changes in the actor basis. Our study showed that in 2013 the pro-ecology coalition included three major industry associations (AEE, Swissolar and Swisscleantech). This coalition, in other words, is not just constituted by left-wing parties and environmentalists but also accommodates for a new type of industry actors. There is a range of industries such as clean-tech, energy efficiency, energy services, solar or wind whose members expect to benefit from the ongoing energy transition, which is why they are in favor of stringent transition policies. As a consequence, the underlying *actor basis shifts* both in the policy system and in the newly emerging socio-technical system (cf. Figure 1). Meanwhile, the energy transition has become not just a struggle of environmental vs. economic interests but of emerging vs. established industries, and who will win or lose.

6.2 Methodological challenges

One motivation for our study was to explore how established methods for analyzing coalitions in policy subsystems can inform transition studies. The systematic identification of key actors, their policy core and secondary beliefs has helped us to make major lines of political conflict transparent (Table 3), to detect typical arguments, to discover potential boundary-spanning actors and to draw conclusions on further developments in the field. In our analysis, however, we encountered some methodological and conceptual challenges that deserve consideration in further research.

Actual influence on policy process

While we could point to the numbers of key actors in each coalition this tells us little about what resources the different actors can mobilize and what influence the coalitions have on the final policy output (Stokman and van den Bos, 1992). Further research will therefore benefit from systematic analyses of power (Avelino and Rotmans, 2009), coordination among actors (Henry, 2011; Ingold, 2011; Ingold and Fischer, 2014;) and of the resources actors control (Sabatier and Weible, 2007). The latter include formal decision-making power, access to political venues, financial resources, social ties, legitimacy etc. In the case of political parties, for example, one could use seats in parliament or voting shares as proxies for political influence. Another possibility is to look into the financial resources different coalitions have available (cf. Hess, 2014) or into relationships

they maintain with formal decision-makers (Beyers and Braun 2013). Combining investigations of beliefs and resources seems also promising as it adds material aspects to ideational explanations of the policy process.

Study of cooperation and resource flows

In this study we identified coalitions on the basis of belief similarity. We did not venture into examining *actual collaboration* among actors. Although previous work (cf. Henry, 2011; Ingold and Fischer, 2014; Weible and Sabatier, 2005) has shown that policy core beliefs typically exhibit a strong overlap with collaboration (e.g. information exchange, joining forces, alignment of positions), we could not demonstrate this for the case at hand. Further research may want to explore alternative measures on both the existence of coalitions and the collaboration of actors within advocacy coalitions and other types of alliances such as innovation networks (Musiolik and Markard, 2011). It is especially the building of networks and the exchange of resources within alliances we expect to deliver further insights into the actual influence of coalitions on policy making (Ingold and Leifeld, 2014; Leifeld, 2013).

Incomplete data & belief mobilization

With position papers from many different actors available, the approach of identifying policy core beliefs on the basis of written accounts is both promising and feasible. However, even with an essentially nice stock of data it might not always be possible to accurately map the core beliefs of every actor. We came across many instances in which submissions were not long or detailed enough to extract policy core beliefs. In addition, we encountered a systematic challenge as several pro-economy actors made no or just very few statements on environmental or social issues. If an actor does not mobilize a specific belief dimension (e.g. environment) we can assume but do not know for sure that it is not considered important. One way out is to mobilize further sources (e.g. press releases, annual reports, programs of political parties), another would be to work with questionnaires that explicitly try to reveal different dimensions of policy core beliefs (Ingold, 2011).

7 Conclusions

Socio-technical transitions such as the current transformation of the energy sector are of fundamental societal, economic and environmental importance and inherently political. Scholars in the field of innovation and transition studies have therefore repeatedly called for paying more attention to the underlying policy processes. With this paper, we have shown how the advocacy coalition framework can be mobilized to analyze the conditions for policy change in the case of the energy transition. We also presented first ideas of a model that

explains the interplay of policy change and socio-technical change with cognitive processes (changes in beliefs), technological developments and changes in the actor base.

For energy policy in Switzerland we found that policy core beliefs and advocacy coalitions have remained largely stable over the last 12 years. It thus seems that the Fukushima crisis and the subsequent governmental decision about the step-wise nuclear phasing out did not yet induce a major policy change firstly apparent through an adaptation or change of policy core beliefs. Nonetheless, there are indications for the propensity of major policy change: Policy core beliefs of actors in the dominant, conservative coalition have become more heterogeneous and a majority of key actors meanwhile support key aspects of the energy transition. Transition proponents include new actors from emerging industries such as clean-tech or solar but even some incumbent utility companies that expect to benefit from the transition.

Moreover, it seems that changes in the policy issue also contribute to policy change: Renewable energies meanwhile offer economic opportunities and can be more easily associated with conservative values such as job creation and energy independence. At the same time, nuclear energy has lost some of its former legitimacy and became increasingly expensive, which also provides grounds for re-valuation.

In conceptual terms, these observations can be interpreted as three interrelated processes: (beginning) changes in policy core beliefs, changes in the actor base (e.g. new industries emerging and incumbent actors re-orienting) and changes in the policy issue. Note that the latter process covers both, substantial changes (e.g. technology performance, market size, diffusion rate) and changes in the discourse (e.g. expectations, framing of the technology).

This has implications for policy analysis: In the case of socio-technical transitions, it seems that policy change is not just a matter of changes in policy core beliefs and resource flows. Instead, change of the policy issue (substantive and discursive) and changes in the actor base (substantive) also play a role. This essentially points to the interdependence of policy change and socio-technical change as suggested by our framework.

In conclusion, we think that the ACF represents an interesting complement to the existing concepts for studying socio-technical transitions. With its focus on cognitive processes to explain collaboration and policy change, it seems to be well suited for the study of sustainability transitions, which are characterized by high uncertainties. It also holds promises for future research on the cognitive aspects of contested transitions, e.g. when exploring overlaps with the sociology of expectations (Borup et al., 2006) or discourse theories (Avelino, 2011; Geels and Verhees, 2011). With its focus on actors and resources, finally, it also mobilizes

'material' explanations for policy change, which – in further research – can be linked with resource and strategy based approaches for studying socio-technical transitions (Farla et al., 2012; Musiolik and Markard, 2011). More generally, research on the politics of transitions opens up an essential as well as highly promising avenue for research in the field of sustainability transitions.

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References

Avelino, F., 2011. Power in Transition. Empowering discourses on Sustainability Transitions. Erasmus University, Rotterdam.

Avelino, F., Rotmans, J., 2009. Power in Transition: An Interdisciplinary Framework to Study Power in Relation to Structural Change. European Journal of Social Theory 12, 543-569.

Bakker, S., 2014. Actor rationales in sustainability transitions - Interests and expectations regarding electric vehicle recharging. Environmental Innovation and Societal Transitions 13, 60-74.

Bergek, A., Jacobsson, S., Carlsson, B., Lindmark, S., Rickne, A., 2008. Analyzing the functional dynamics of technological innovation systems: A scheme of analysis. Research Policy 37, 407-429.

Bergek, A., Jacobsson, S., Sanden, B.A., 2008. 'Legitimation' and 'Development of external economies': Two key processes in the formation phase of technological innovation systems. Technology Analysis & Strategic Management 20, 575-592.

Borup, M., Brown, N., Konrad, K., Van Lente, H., 2006. The Sociology of Expectations in Science and Technology. Technology Analysis & Strategic Management 18, 285-298.

Coenen, L., Diaz Lopez, F.J., 2010. Comparing systems approaches to innovation and technological change for sustainable and competitive economies: An explorative study into conceptual commonalities, differences and complementarities. Journal of Cleaner Production 18, 1149-1160.

Elliott, C., Schlaepfer, R., 2001. The advocacy coalition framework: application to the policy process for the development of forest certification in Sweden. Journal of European Public Policy 8, 642-661.

EnG, 2012. Entwurf vom 28. September 2012 zum Energiegesetz.

Farla, J., Markard, J., Raven, R., Coenen, L., 2012. Sustainability transitions in the making: A closer look at actors, strategies and resources. Technological Forecasting and Social Change 79, 991-998.

French, R.M., 1969. Effectiveness of the various techniques employed in the study of community power. The Journal of Politics 31, 818-820.

Garud, R., Gehman, J., Karnoe, P., 2010. Categorization by association: Nuclear technology and emission-free electricity, in: Sine, W.D., David, R. (Eds.), Research in the Sociology of Work. Emerald Group Publishing Ltd, Bingley, UK, pp. 51-93.

Geels, F.W., 2005a. Co-evolution of technology and society: The transition in water supply and personal hygiene in the Netherlands (1850-1930) - a case study in multi-level perspective. Technology in Society 27, 363-397.

Geels, F.W., 2005b. The Dynamics of Transitions in Socio-technical Systems: A Multi-level Analysis of the Transition Pathway from Horse-drawn Carriages to Automobiles (1860–1930). Technology Analysis & Strategic Management 17, 445–476.

Geels, F.W., 2006. The hygienic transition from cesspools to sewer systems (1840-1930): The dynamics of regime transformation. Research Policy 35, 1069-1082.

Geels, F.W., 2010. Ontologies, socio-technical transitions (to sustainability), and the multi-level perspective. Research Policy 39, 495-510.

Geels, F.W., 2011. The multi-level perspective on sustainability transitions: Responses to seven criticisms. Environmental Innovation and Societal Transitions 1, 24-40.

Geels, F.W., Schot, J., 2007. Typology of sociotechnical transition pathways. Research Policy 36, 399-417.

Geels, F.W., Schot, J., 2010. The dynamics of sociotechnical transitions - a socio-technical perspective, in: Grin, J., Rotmans, J., Schot, J. (Eds.), Transitions to sustainable development. Routledge, pp. 9-101.

Geels, F.W., Verhees, B., 2011. Cultural legitimacy and framing struggles in innovation journeys: A cultural-performative perspective and a case study of Dutch nuclear energy (1945-1986). Technological Forecasting and Social Change 78, 910-930.

Grin, J., 2010. Understanding transitions from a governance perspective, in: Grin, J., Rotmans, J., Schot, J. (Eds.), Transitions to sustainable developmet. Routledge, pp. 223-319.

Grin, J., 2012. The politics of transition governance in Dutch agriculture. Conceptual understanding and implications for transition management. International Journal of Sustainable Development 15, 72-89.

Grin, J., Rotmans, J., Schot, J., 2010. Transitions to sustainable development. Routledge, New York.

Heintz, H.T., Jr., 1988. Advocacy coalitions and the OCS leasing debate: A case study in policy evolution. Policy Sciences 21, 213-238.

Henry, A.D., 2011. Ideology, power, and the structure of policy networks. Policy Studies Journal 39, 361–383.

Hess, D.J., 2014. Sustainability transitions: A political coalition perspective. Research Policy 43, 278-283.

Ingold, K., 2011. Network Structures within Policy Processes: Coalitions, Power, and Brokerage in Swiss Climate Policy. Policy Studies Journal 39, 435-459.

Ingold, K., Fischer, M., 2014. Drivers of Collaboration to Mitigate Climate Change: An Illustration of Swiss Climate Policy over 15 Years. Global Environmental Change 24, 88-98.

Ingold, K., Leifeld, P., 2014. Structural and Institutional Determinants of Influence Reputation: A Comparison of Collaborative and Adversarial Policy Networks in

Decision Making and Implementation. Journal of Public Administration Research and Theory.

Ingold, K., Varone, F., 2012. Treating Policy Brokers Seriously: Evidence from the Climate Policy. Journal of Public Administration Research and Theory 22, 319-346.

Jacobsson, S., Lauber, V., 2006. The politics and policy of energy system transformation - Explaining the German diffusion of renewable energy technology. Energy Policy 34, 256-276.

Jegen, M., 2003. Energiepolitische Vernetzung in der Schweiz. Helbig & Lichtenhahn, Basel.

John, P., 2012. Analyzing Public Policy, 2nd edition ed. Routledge, London.

Jones, B.D., Baumgartner, F.R., 1993. Agendas and Instabilities in American Politics. University of Chicago Press, Chicago.

Kemp, R., Loorbach, D., 2006. Transition management: a reflexive governance approach, in: Voß, J.-P., Bauknecht, D., Kemp, R. (Eds.), Reflexive Governance for Sustainable Development. Edward Elgar, Cheltenham, pp. 103-130.

Kern, F., 2009. The politics of governing 'system innovations' towards sustainable electricity systems, SPRU - Science and Technology Policy Research. University of Sussex, Brighton.

Kern, F., 2011. Ideas, institutions, and interests: Explaining policy divergence in fostering 'system innovations' towards sustainability. Environment and Planning C: Government and Policy 29, 1116-1134.

Kern, F., Smith, A., 2008. Restructuring energy systems for sustainability? Energy transition policy in the Netherlands. Energy Policy 36, 4093-4103.

Knill, C., Tosun, J., 2012. Public Policy: A New Introduction. Palgrave Macmillan, London.

Knoke, D., 1993. Networks of elite structure and decision making. Sociological Methods & Research 22, 23-45.

Konrad, K., Markard, J., Ruef, A., Truffer, B., 2012. Strategic responses to fuel cell hype and disappointment. Technological Forecasting and Social Change 79, 1084-1098.

Kriesi, H., Jegen, M., 2001. The Swiss energy policy elite: The actor constellation of a policy domain in transition. European Journal of Political Research 39, 251-287.

Kuebler, D., 2007. Understanding the recent expansion of Swiss family policy: An idea-centred approach. Journal of Social Policy 36, 217-237.

Lawhon, M., Murphy, J.T., 2012. Socio-technical regimes and sustainability transitions: Insights from political ecology. Progress in Human Geography 36, 354-378.

Leifeld, P., 2013. Reconceptualizing Major Policy Change in the Advocacy Coalition Framework: A Discourse Network Analysis of German Pension Politics. Policy Studies Journal 41, 169-198.

Lubell, M., 2003. Collaborative Institutions, Belief-Systems, and Perceived Policy Effectiveness. Political Research Quarterly 56, 309-323.

Markard, J., Raven, R., Truffer, B., 2012. Sustainability Transitions: An emerging field of research and its prospects. Research Policy 41, 955-967.

Markard, J., Truffer, B., 2008a. Actor-oriented analysis of innovation systems: exploring micro-meso level linkages in the case of stationary fuel cells. Technology Analysis & Strategic Management 20, 443-464.

Markard, J., Truffer, B., 2008b. Technological innovation systems and the multi-level perspective: towards an integrated framework. Research Policy 37, 596-615.

Meadowcroft, J., 2011. Engaging with the politics of sustainability transitions. Environmental Innovation and Societal Transitions 1, 70-75.

Musiolik, J., Markard, J., 2011. Creating and shaping innovation systems: Formal networks in the innovation system for stationary fuel cells in Germany. Energy Policy 39, 1909-1922.

Musiolik, J., Markard, J., Hekkert, M., 2012. Networks and network resources in technological innovation systems: Towards a conceptual framework for system building. Technological Forecasting and Social Change 79, 1032-1048.

Negro, S., Suurs, R.A.A., Hekkert, M., 2008. The bumpy road of Biomass Gasification in the Netherlands: Explaining the rise and fall of an emerging innovation system. Technological Forecasting and Social Change 75, 57-77.

Nohrstedt, D., 2010. Do advocacy coalitions matter? Crisis and change in Swedish nuclear energy policy. Journal of Public Administration Research and Theory 20, 309-333.

Ostrom, E., 1990. Governing the commons. Cambridge University Press, Cambridge.

Sabatier, P.A., 1998. The advocacy coalition framework: revisions and relevance for Europe. Journal of European Policy 51, 98-130.

Sabatier, P.A., 2007. Theories of the policy process. Westview Press, Boulder, CO.

Sabatier, P.A., Jenkins-Smith, H.C., 1993. Policy change and learning: An advocacy coalition approach. Westview Press, Boulder, CO.

Sabatier, P.A., Jenkins-Smith, H.C., 1999. The Advocacy Coalition Framework: An Assessment, in: Sabatier, P.A. (Ed.), Theories of the Policy Process. Westview Press, Boulder, CO, pp. 117-166.

Sabatier, P.A., Weible, C.M., 2007. The Advocacy Coalition Framework: Innovations and Clarifications, in: Sabatier, P.A. (Ed.), Theories of the policy process. Westview Press, Boulder, CO, pp. 189-220.

Scharpf, F.W., 1997. Games policy actors play. Westview Press, Boulder.

SFOE, 2012. Schweizerische Statistik der erneuerbaren Energien. Swiss Federal Office of Energy (SFOE), Bern.

SFOE, 2013. Schweizerische Statistik der erneuerbaren Energien. Swiss Federal Office of Energy (SFOE), Bern.

Shove, E., Walker, G., 2007. CAUTION! Transitions ahead: politics, practice and sustainable transition management. Environment and Planning A 39, 763-770.

Smink, M.M., Hekkert, M.P., Negro, S.O., 2013. Keeping sustainable innovation on a leash? Exploring incumbents' institutional strategies. Business Strategy and the Environment, n/a-n/a.

Smith, A., Stirling, A., 2007. Moving Outside or Inside? Objectification and Reflexivity in the Governance of Socio-Technical Systems. Journal of Environmental Policy & Planning 9, 351-373.

Smith, A., Stirling, A., 2010. The Politics of Social-ecological Resilience and Sustainable Socio-technical Transitions. Ecology and Society 15.

Smith, A., Voß, J.-P., Grin, J., 2010. Innovation studies and sustainability transitions: The allure of the multi-level perspective and its challenges. Research Policy 39, 435-448.

Solomon, B.D., Krishna, K., 2011. The coming sustainable energy transition: History, strategies, and outlook. Energy Policy 39, 7422-7431.

Stenzel, T., Frenzel, A., 2008. Regulating technological change--The strategic reactions of utility companies towards subsidy policies in the German, Spanish and UK electricity markets. Energy Policy 36, 2645-2657.

Stokman, F.N., van den Bos, J.M.M., 1992. A Two-Stage Model of Policy Analysis with an Empirical Test in The U.S. Energy Policy Domain, in: Moore, G., Whitt, J.A. (Eds.), The Political Consequences of Social Networks. JAI Press, Greenwich, p. 219–253.

Strunz, S., 2014. The German energy transition as a regime shift. Ecological Economics 100, 150-158.

Sühlsen, K., Hisschemöller, M., 2014. Lobbying the 'Energiewende'. Assessing the effectiveness of strategies to promote the renewable energy business in Germany. Energy Policy 69, 316-325.

Sutter, A., 2011. Schweizer Klimapolitik nach 2012 - Prüfstand für die Wertvorstellungen der politischen Elite. ETH Zurich.

True, J.L., Jones, B.D., Baumgartner, F.R., 2007. Punctuated-Equilibrium Theory, in: Sabatier, P.A. (Ed.), Theories of the policy process. Westview Press, Boulder, CO, pp. 155-188.

Ulmanen, J.H., Verbong, G.P.J., Raven, R.P.J.M., 2009. Biofuel developments in Sweden and the Netherlands: Protection and socio-technical change in a long-term perspective. Renewable and Sustainable Energy Reviews 13, 1406-1417.

Verbong, G.P.J., Geels, F.W., Raven, R.P.J.M., 2007. Multi-niche analysis of dynamics and policies in Dutch renewable energy innovation journeys (1970-2006): hype-cycles, closed networks and technology-focused learning. Technology Analysis & Strategic Management 20, 555-573.

Voß, J.-P., Bauknecht, D., Kemp, R., 2006. Reflexive Governance for Sustainable Development. Edward Elgar, Cheltenham UK.

Weible, C., Sabatier, P.A., 2005. Comparing Policy Networks: Marine Protected Areas in California. Policy Studies Journal 33, 181-202.

Weible, C.M., Sabatier, P.A., McQueen, K., 2009. Themes and Variations: Taking Stock of the Advocacy Coalition Framework. The Policy Studies Journal 37, 121–140.

Zafonte, M., Sabatier, P.A., 2001. Short-Term Versus Long-Term Coalitions in the Policy Process: Automotive Pollution Control, 1963-1989. Policy Studies Journal 32, 75-107.

Appendix

Table 4: Most relevant actors in the Swiss energy policy subsystem

Category	**Actor name**
Political parties	Civic Democratic Party (BDP)
	Christian Democratic People's Party (CVP)
	Liberal Democratic Party (FDP)
	Green Liberal Party (GLP)
	Green Party (GPS)
	Social Democrat Party (SP)
	Swiss People's Party (SVP)
Trade associations	Association of Swiss automobile importers (Auto Schweiz)
	Association of Swiss cement industry (CemSuisse)
	Swiss business federation (EconomieSuisse)
	Oil association (EV)
	Federation of home owners (HEV)
	Tenants association (MV)
	Scienceindustries
	Swiss federation of trade unions (SGB)
	Swiss federation of small and medium enterprises (SGV)
	Swiss Cleantech
	Swiss association of machinery, electro and metal industry (Swissmem)
	Swiss Touring Club (TCS)
Environmental protection and consumer organizations	Pro Natura
	Foundation for consumer protection (SKS)
	Swiss Traffic Club (VCS)
	WWF Switzerland (WWF)
Electric utility companies	Alpiq Holding AG (Alpiq)
	Axpo Holding AG (Axpo)
	BKW Energy AG (BKW)
	Municipal utility of Zurich (EWZ)
	Swissgrid [transmission system operator]
	Swisspower [energy service joint venture of Swiss municipal utilities]
Energy associations	Association for renewable energies and energy efficiency (AEE)
	Energyforum
	Alliance of energy intensive industries (IGEB)
	Swiss energy foundation (SES)
	Swisselectric [Association of the major power producers]
	Swiss association for solar energy (Swissolar)
	Federation of Swiss electric utilities (VSE)
	Federation of the Swiss gas industry (VSG)
Scientific organizations	Swiss academy of sciences (AkadWiss)
	ETH-Rat
Others	Swiss electricity commission (ElCom)
	Intergovernmental conference of mountain cantons (RKGK)

List 1: Questions in the consultation along which we distinguished secondary beliefs

- Do you agree with a step-wise phase-out of nuclear energy? Yes/No.
- Do you agree that new nuclear power plants cannot be approved any more? Yes/No.
- Do you agree with expansion targets for electricity from renewable energies and with targets for energy demand? Yes/No.
- Do you agree that electricity suppliers have to fulfill targets for a steady improvement of energy efficiency (with the use of white certificates)? Yes/No.

Table 5: Coding scheme

Policy Core Beliefs			Sub-dimensions
1) Subsystem-specific aspects	Seriousness of the problem	Relevance of the energy transition	Increase in renewable energies and improvement of energy efficiency
			Importance of taking actions
			Risks of nuclear energy
2) Institutional aspects	Market - State	Responsibilities between market and state	Reliance on market forces
			General position with regard to policy instruments
	Centralized - decentralized	Responsibilities between different levels of government	Restriction of federalism
			Orientation towards the principle of subsidiarity
Sustainability dimensions	3) Ecological aspects	Protection of climate, environment and resources	Comprehension of climate goals
			Protection of landscape vs. expansion of renewable energies
			Greater involvement of mobility sector
			Other aspects
	4) Social justice	Involvement in decision-making processes	Democratic legitimization and objection rights
		Price for Energy	Affordable energy supply
	5) Economic efficiency	Supply security	Energy independence
			Legal certainty and clear framework conditions
			Priority of supply security
		Costs of energy	Effects on employment
			Importance of energy prices for economy
			Criterion for choice of technology
		Competitiveness	Importance of competitiveness

Table 6: Example of code assignment

Policy Core Belief			Sub-dimension	Ordinal Scale
2) Institutional aspects	Market - State	Responsibilities between market and state	Fundamental position on policy instruments	The actor generally opposes any further regulation and policy intervention
				1 = Yes
				2 = Rather yes.
				3 = Rather no.
				4 = No. State interventions help to achieve pre-set goals.

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