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Public Control over the Decentralization of Electricity Systems in Switzerland

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The Workings of Administrative Federalism in the Field of Wind Energy in Switzerland: A Cantonal Comparison

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dissertation project proposal, 6th of September 2019

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List of used abbreviations and acronyms

ACI	Actor-centered Institutionalism
BFE	Swiss Federal Office of Energy (Bundesamt für Energie)
CSP	Cantonal Structure Plan (Kantonaler Richtplan)
CWEAP	Cross-Level Wind Electricity Authorization Procedure
CWEAPIN	Cross-Level Wind Electricity Authorization Procedure Interorganizational Network
EHA	Event History Analysis
EnG	Federal Law on Energy (Energiegesetz)
ES 2050	Energy Strategy 2050
ESTI	Federal Inspectorate for Heavy Current Installations (Eidgenössisches Starkstrominspektorat)
FMG	Telecommunications Law (Fernmeldegesetz)
IOL	Index of Output Legitimacy
JSG	Hunting Law (Jagdschutzgesetz)
KEV	Compensatory Feed-In Compensation Scheme (Kostendeckende Einspeisevergütung)
KGSG	Federal Law on Heritage Protection in Armed Conflict, in Catastrophes and Emergency Situations (Bundesgesetz über den Schutz der Kulturgüter bei bewaffneten Konflikten, bei Katastrophen und Notlagen)
LLUP	Local Land-Use Plan (Kommunaler Nutzungsplan)
LSV	Ordinance on Noise Control (Lärmschutzverordnung)
MetG	Federal Law on Meteorology and Climatology (Bundesgesetz über die Meteorologie und Klimatologie
MG	Military Law (Militärgesetz)
MLG	Multi-Level Governance
NHG / NHV	Nature and Cultural Heritage Protection Law / Ordinance (Natur und Heimatschutzgesetz / -Verordnung)
RE	Renewable Electricity
RPG	Federal Spatial Planning Law (Raumplanungsgesetz)

SNA	Social Network Analysis
StromVG	Federal Law on Electrical Supply (Stromversorgungsgesetz)
SÜL	Sectoral Plan on Electrical Transmission Lines (Sachplan Übertragungsleitungen)
TCE	Transaction Cost Economics
TL	Throughput Legitimacy
UNESCO	United Nations Educational, Scientific and Cultural Organization
UVP(V)	Law/ Ordinance on the Integrated Environmental Assessment (Umweltverträglichkeitsprüfungsgesetz, -verordnung)
(V)BLN	(Ordinance on the) Federal Inventory of Landscapes, Sites and Natural Monuments ((Verordnung über das) Bundesinventar der Landschaften und Naturdenkmäler
VBR	Associations' Right of Appeal (Verbandsbeschwerderecht)
VIL	Ordinance on Aerial Infrastructure (Verordnung über die Infrastruktur der Luftfahrt)
(V)ISOS	Law (Ordinance) on the Federal Inventory of Swiss Heritage Sites ((Verordnung über das) Bundesinventar der schützenswerten Ortsbilder der Schweiz)
WaG	Federal Law on the Forests (Waldgesetz)
WE	Wind Electricity
WEA	Wind Electricity Authorization
WEAP	Wind Electricity Authorization Procedure
WMO	World Meteorological Organization

Introduction

This is a study of procedural federalism – of how federalism "works in practice" in Switzerland. Many researchers have lamented the fact that federalism research has focused too heavily on comparing constitutions but has neglected the "actual" workings of the polities that are being compared (e.g. Palermo and Kössler 2017, 450; Linder and Mueller 2017, 421ff.; Elazar 1987, 67). This dissertation project attempts to start filling this gap by looking at coordination and independence, the two cornerstones of federalism (Wheare 1963), in mainly cantonal administrators' day-to-day practice.

The case of wind energy authorization procedures (WEAPs) has been chosen to illustrate the workings of federalism. I will only examine the "implementation phase" of wind energy siting policy, not the preceding instance of policy formulation, the reasons being the practical relevance and the rare scientific emphasis on cross-sectoral policy implementation. Hence, this dissertation project proposes to scrutinize the workings of administrative federalism[1] across Swiss cantons with the illustration of the established procedure about how it is collectively decided whether and to what extent wind turbines are built. It represents an in-depth study of Swiss organizational structures in an inherently multi-level setting that unites the different policy fields of spatial planning, infrastructure building authorizations and energy policy. In addition to diversifying the federalism literature, the project contributes to the underdeveloped conceptualization of problem-solving (Thomann et al. 2019; Trein et al. 2019) and administration (Benz et al. 2016) in multilevel settings and adds to the emerging literature on performance effects of federal structures on policy effectiveness in the environmental sector (e.g. Jahn and Wälti 2007; Scruggs 2003; Keman 2000). To the author's knowledge, there has so far not been a political science study on the comparative spatial planning policy and its implications for energy infrastructure construction.

The project derives its practical relevance from the goals and prescriptions of the federal Energy Strategy 2050 (ES 2050). The ES 2050 ambitiously set an electricity production goal from wind turbines for 2050 that is 32 times the energy of what was produced in 2017 (BFE 2017; BR 2013; Kirchner et al. 2011). As of January 1st 2019, there were 433 wind energy projects inscribed for public feed-in support (Pronovo AG 2019). Even if only half of them will request building permits, the current authorization system would still be fully overloaded, seeing that one procedure may take more than fifteen years, as was the case of the wind park on the St. Gotthard (Losa 2019). The EN 2050 also explicitly mandates cantons to change their permission practices (Art. 14 EnG) and this study may be viewed as a first attempt of a "benchmark" that should help officers to fulfill this re-design mandate. Moreover, by addressing wind energy authorization procedures (WEAPs) directly, this dissertation project addresses the "elephant in the room" of wind energy in Switzerland (Stalder 2018; Stadelmann-Steffen et al. 2018, 131).

The present dissertation project *evaluates* implementation outputs (building authorization decrees). It looks into how efficiently these outputs are produced ("problem-solving efficiency", see section 3.3) and how effective these outcomes, as perceived by stakeholders ("problem-solving effectiveness", see section 3.4.). Of primary interest are the factors and their combinations that allow for higher efficiency

[1] term: Hueglin and Fenna 2015, in German: "Vollzugsföderalismus"

and effectiveness. In terms of methodology, this dissertation uses a controlled-correlation comparative approach between cantons. The overarching analytical framework that will be used to structure the analysis, is Scharpf and Mayntz' actor-centered institutionalism (ACI) that is uniquely suited for the project (see Mayntz and Scharpf 1995; Scharpf 1997).

This project proposes two research questions, where the second builds upon on the answers to the first. The first establishes the comparative baseline between cantons and the second evaluates the found differences in the light of their problem-solving capacity:

(1) How does the implementation of wind energy authorization policy differ across cantons?
(2) Which administrative federalism factors of implementation explain the problem-solving capacity of cantonal wind turbine building permit production?

RQ-1 will be treated in modules A and B (henceforth called "products") and RQ-2, the main interest of this project, will be answered with product C. Product A conducts a social network analysis (SNA) with the aim of establishing the comparative baseline between cross-level wind energy authorization procedure interorganizational networks (CWEAPINs, see section 2.3). As only the inner workings of the WEAP are examined, product A essentially deals with "throughputs". Product B then clusters the CWEAPINs based on the previously calculated, throughput-describing network routines. It will then continue to try to explain different clusters by resorting to external data. The evaluation is then conducted in product C. By means of an event history analysis (EHA) and an ordered logit (or probit) model, product C will evaluate outputs ("problem-solving efficiency", see section 3.3) and outcomes ("problem-solving effectiveness", see section 3.4). Figure 1 below illustrates the project structure in a visual overview.

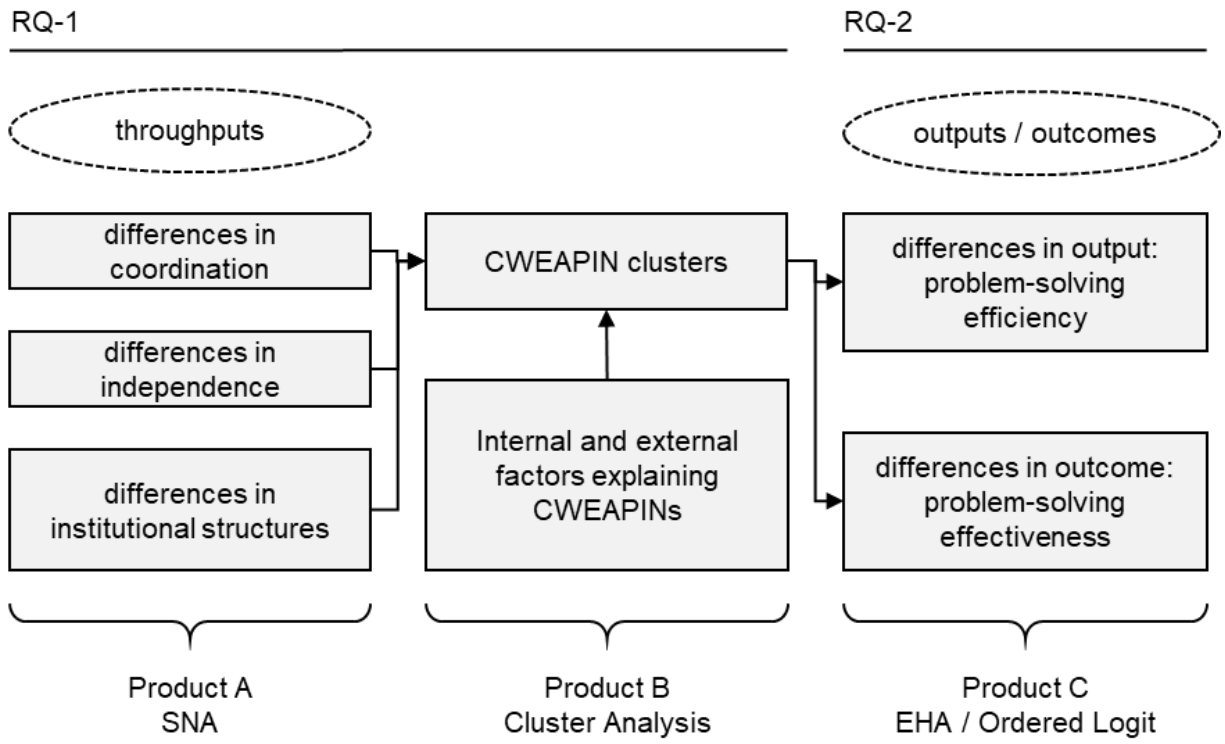

Figure 1: Visual Overview over project structure.

This proposal is structured as follows: After putting the topic of procedural, practical administrative federalism in context and choosing a suitable analytical framework (chapter 1), the case of WEAPs is presented (chapter 2). Chapter 3 then discusses and operationalizes the dependent variables. In the succeeding chapter 4, the independent variables are examined and hypotheses are derived. Before concluding, chapter 5 presents each of the three products' research design in their barebone essentials.

1. Swiss administrative federalism in practice

1.1. The topic in context

Federalism is frequently defined as "self-rule plus shared rule" (Elazar 1987, 12), where self-rule is granted to regional political entities on tasks of local and regional scope and power is shared between regional political entities and the central state regarding matters of common concern for functional, historic or political reasons (Arens forthcoming). More concretely, Wheare's "federal principle"[2] regards *independence* in the self-rule sphere and *coordination* resulting from shared rule as the basic two cornerstones of federalism. In this understanding, the bargaining processes resulting from the use and transfer of political power are innate to federal systems (e.g. Riker 1975, 141; Hueglin 2013).

How independence and coordination is measured depends on whether researchers treat federalism as a static institutional attribute or as function of time and political communities in a "process of federalizing" (Friedrich 1968, 7). Instead of analyzing the "federal structures", meaning the setup of political institutions as defined in constitutions, this dissertation project takes a "dynamic" and procedural perspective of federalism, because a federalist day-to-day practice does not necessarily follow from the existence of federal rules inscribed in constitutions. In fact, Elazar (1987) contents that historically, "[…] many polities with federal structures were not truly federal in practice – that the structures masked a centralized concentration of power that stands in direct contradiction to the federal principle" (67). Such a perspective – to which the author subscribes – reflects the idea that what matters is the "rules-in-use", not the "rules-in-form" (Papadopoulos 2011, 226). As such, this dissertation will put a spotlight on the "rules-in-use", but to a lesser degree, will also check for effects of "rules-in-form", such as effects of the range of municipal competences (municipal autonomy).

A procedural federalism orientation (see Linder and Mueller 2017, 421ff.) requires that the federal principle be made visible in day-to-day political and bureaucratic practice. Where and how does one see it "at work"? I argue that organizational arrangements and patterns of interactions between agencies should reflect the federal principle in practice. These empirical manifestations of in-practice federalism as captured by organizational arrangements and coordination patterns will be this dissertation's units of analysis. The project is interested in the variations of these units of analysis across cantons in a controlled correlation comparative approach.

A procedural comparative perspective further requires the selection of a practically relevant, intercantonally comparable procedure. The procedure must further describe an instance of federalism in that cantons must have legislation in common (federal law) but enjoy significant autonomy in their

[2] Wheare describes federalism as "the method of dividing powers so that the general and regional governments are each, within a sphere, co-ordinate and independent" (1963, 10).

own policy formulation and in their implementation of federal law. Satisfying these selection criteria, the bureaucratic problem-solving procedure that evaluates whether or not wind turbines are denied or receive a building permit has been chosen. Comparability is assured by the more or less strict requirements in the federal law on spatial planning (RPG, SR 700) that defines a clear start and an end by decree[3] (unless the procedure has been previously cancelled). The procedure starts with the hand-in of a wind energy pre-project by a planner to the cantonal authorities and ends with a clearly definable decree-output. Essentially, it is the *decision-making process* leading up to the policy implementation decision of refusing or handing out a wind turbine building permit that represents the procedure to be modelled.

As analytical scope, only the implementation phase of policy-cycle (see Lasswell 1956) is selected. Since Pressmann and Wildavsky's (1973) classic account of the failures of implementation of a central state program in Oakland (CA) on the international scale, and Linder's (1987) seminal work on policy implementation in Switzerland, a very large corpus of literature on implementation specificities in federal countries has developed. This dissertation presents "another" study on implementation and the choice of investigating a procedure in this phase of the policy cycle must be justified: The choice largely reflects the societal relevance of the chosen procedure, as well as the lack of studies on the specific problem in Swiss political science. The choice further presents an innovative application of actor-centered institutionalism (Mayntz and Scharpf 1995; Scharpf 1997) to a different phase than what is commonly done.

In the day-to-day work of public officers' work, the federalist dualism of coordination and independence is as visible in the implementation[4] phase, as it is in the policy formulation phase. In the implementation phase, independence (self-rule) exists when cantons decide upon implementing their own legislation, but also enjoy significant liberties in how they want to implement federal laws. Coordination (shared-rule) in implementation is driven by the problem's "wickedness" (Rittel and Webber 1973) that mandates close collaboration. In implementation phases, politics are as present as they are in policy formulation phases. As Linder (1987, 217) writes, one should keep in mind that administering a policy is a social process, in which a wide variety of actors with their own expectations and interests use their power to pursue their preferred solution. These social processes have certain patterns, Linder and Mueller (2017, 221ff.) maintain, which are a function of the consensus of policy-makers (the clarity of the goals) and the consensus of implementors on how the goals are to be reached. The two phases of formulation and implementation compared, one might at first glance assume that the margin of action would be highly restricted in the latter, but Linder (1987, 217) providing evidence to the contrary, writes that previously agreed upon laws influence implementation procedures only in a limited way. As a consequence, this means that foreseeability based on a formal policy is practically non-existent[5] (ibid., 218f.), requiring researchers to investigate programs, not formal rules (policy).

[3] "Verfügung" in German
[4] The term "administative federalism", in this project's understanding, only ever refers to the implementation phase of policy.
[5] According to Linder (ibid.), limited predictability of implementation outputs based on the policy text is especially salient with regulative policies (Mayntz 1980) that govern authorizations and sanctions.

In addition to knowledge from implementation studies, insights on "administrative federalism in practice" may also be drawn from the literature on multi-level governance (MLG), as a procedural perspective of federalism combines well with this highly dynamic approach on governance across the territorial levels (e.g. Hooghe and Marks 2003, 2010; Braun 2010; Papadopoulos 2010). Where federalism scholars, preoccupied with constitutional provisions, have preferred to maintain conceptual clarity by investigating (and keeping alive) distinct territorial levels,[6] the MLG-literature has been much closer to accepting organizational networks (see Agranoff and McGuire 2003; Börzel 1998; Galaskiewicz 2007; Podolny and Page 1998; Powell 1990; Provan and Milward 2001) as units of analysis. Aside from incorporating a MLG-perspective into discussions on organizational arrangements, this dissertation project profits from recent developments in the MLG-literature on explaining problem-solving capacities (Thomann et al. 2019; Trein et al. 2019; Irepoglu Carreras 2019) and from developments in the conceptualization of multi-level administration (Benz et al. 2016). Whereas federalism studies have focused both on self-rule and shared rule, MLG scholars uniquely analyze processes of shared rule, such as entanglement, asymmetries between actors on territorial levels and cooperative dynamics. MLG may thus be seen as a conceptual generalization, extension and "flexibilization" of what had previously been labelled "cooperative" or "collaborative" federalism (e.g. Arnold 2015; Bussmann 1988; Hills 1998; Saunders 2002).

To the author's knowledge, there has not been a study that analyzes energy infrastructure building rules across the cantons. Neither has there been a study on the implementors of these rules across cantons, nor has their performance been investigated scientifically. There have, however, been studies that relate federal organization with general economic performance, and more specifically, with environmental performance. Both strands of literature have and will continue to inform the present project. Regarding the impact of federal organization on the former, public economists have been preoccupied with finding the appropriate territorial scale of service-provision that would optimally fulfill economic requirements (Oates 2011, 1999; 1968; Alesina and Spolaore 2005; O'Dwyer and Ziblatt 2006; Hulten and Schwab 1997). However, authors of empirical studies that practically asked how to find an economically optimal governmental level for a given task (Dafflon 2006; Braun 2000) have been disillusioned, due to what de Vries (2000) has labelled "the fantasy of the optimal scale" (203). Closely related to public economics are transaction cost economics (TCE, Williamson 1993; 1985; 1979) that usually represent the analytical centerpiece of public performance studies. Like general public economics, TCE is also concerned with optimizing organizational forms[7] based on the characteristics of a product or a service. TCE will also inform this project's theory-building to a large extent.

A well-developed literature also discusses the effects of federal organization on *environmental* performance (Knoepfel and Boisseaux 2013; Jahn and Wälti 2007; Knoepfel 2002; Oates 2001; Keman 2000), a topic that is a closely related to this project's topic of analyzing practical federalism effects on wind energy siting performance. The results of these studies are highly ambivalent: Scruggs (2003, 183-187) and Keman (2000) maintain that there is no difference between environmental policy performance in unitary and in federal states. Oates (2001) even posits that federal organization may be detrimental

[6] Akin to «type I» MLG-understandings (Hooghe and Marks 2010, 18ff.)
[7] network, market or hierarchy (see Shelanski and Klein 1995)

to environmental performance because externalities can be better integrated in central states. However, Wälti (2004), Müller-Brandeck-Bocquet (1996) and Pollack (1997) contend otherwise by pointing out that the federal organization permits flexibility, innovation and locally optimized environmental solutions. Wälti (2004) regards this flexibility as especially positive for the policy implementation phase.

1.2. Evaluating the workings of administrative federalism: the analytical framework

This section presents the selected analytical framework. It lists the topic's requirements towards an analytical framework, justifies its selection and then briefly presents the main analytical categories of the chosen framework.

The number of requirements of an analytical framework that must permit the scrutiny of practical administrative federalism in Switzerland is high: First, it must thematically permit an analysis of the murky intersection between classical institutional topics of political institutions (as defined e.g. in Rhodes 2006) and public management (Moore 1995; Agranoff and McGuire 2003; Klijn and Koppenjan 2000). Second, the analytical perspective must be able to confer agency to corporate actors and focus on interaction patterns between organizations. Third, the analytical framework must be suitable for evaluation and implementation studies. Hence, it must be able to account for and trade-off the creation of value and must thus be cognizant of its normativity. Explicit normativity is a precondition for the following, related requirement: The analytical framework must be theory-enabling, meaning that it must permit the identification of (causal) factors and be able to relate them and their combination to the production of welfare. Fourth and last, the framework must respond and be receptive to qualitative and quantitative methodological approaches.

Scharpf/Mayntz' ACI (Mayntz and Scharpf 1995; Scharpf 1976; 1999; 1994; 1997; 2006) fulfills these requirements better than alternative approaches, such as Feiock's Institutional Collective Action Framework (Feiock 2013) that has been applied in metropolitan and local governance questions (e.g. Kwon et al. 2014) but has rather focused on determining the right policy level for a public task and, for the purpose of this dissertation, emphasizes collaborative risk and transaction costs too strongly. Ostrom's Institutional Analysis and Development Framework (Ostrom 2007; 1990) would have been a highly viable and time-tested alternative, yet the approach has been heavily oriented towards common-pool resources systems, with a greater focus on biophysical conditions (see Ostrom 2011) than what is needed in this dissertation. It is, of course, possible that both cited alternatives could have been made to fit the underlying problem under consideration. Scharpf and Mayntz' approach has, in this sense, been chosen because it is the dominant network- and interaction oriented policy analysis approach in Europe.

The ACI

To explain policy decisions and design public interest-minded institutions, the ACI suggests to analyze the main "variable containers" of "institutional context", "collective and corporative actors", "actor constellation" and "modes of interaction" (see Treib 2015). Taken together, the ACI maintains, these factors enable the coherent assembly of an explanatory chain for policy decisions that result from the uptake of a policy problem into a political system (Scharpf 1997). These analytical containers represent the basic categories for explanatory factors in this project.

Importantly, Scharpf and Mayntz do not conceive of the ACI as a theory, from which concrete hypotheses on the functioning and results of policy-decisions may be derived (Treib 2015, 277) but rather see the ACI as an analytical frame that "directs scientific attention to certain aspects of reality" (Mayntz and Scharpf 1995, 39). To derive hypotheses, additional theory is thus indispensable. As the main dependent variable of this project is "problem-solving capacity", theories are needed that provide suitable independent variables on external workings of corporate actors and relate them consistently to the said problem-solving capacity. The four interrelated theory strands, as discussed in section 1.1 will be resorted to, to "fill the containers" provided by the ACI. Because analytical complexity stemming from a relational research perspective can quickly become overly complex, Mayntz and Scharpf suggest to focus on externally observable organization behavior[8] before investigating the individual level (1997, 62). Resorting to explanations on a micro-level is only necessary if the explanatory power of higher level-explanations do not suffice (also known as Lindenberg's (1991) method of "declining levels of abstraction").

2. The case in context: planning of wind turbine sitings in Switzerland

2.1. Wind energy sitings: an under researched problem of coordination and independence

The Swiss electricity system finds itself in a transformative period (e.g. Bircher 2017; Flatt 2017; Cometta et al. 2016): On one hand, there is the current challenge of market liberalization efforts (Trinkener et al. 2015) to conform with EU law, on the other hand, the climate imperative of needing to heavily reduce the emission of greenhouse gases[9] dictates deep infrastructural revisions and strategic reorientations. Additionally, insecurities about the future direction of electricity market design (energy-only vs. capacity-markets, see Weigt et al. 2018), the all-encompassing digitization of business and of physical processes of power control have led the electricity sector to go into "crisis mode" – with an accompanying lack of vision.

Enter the ES 2050[10], a large-scale energy policy reform project adopted by Swiss voters in May 2017 (BR 2017) that has ambitiously announced a nuclear phase-out by 2035 and prescribed the growth of electricity production from renewable sources. The ES 2050 does not only promote the production of wind electricity by means of a feed-in tariff, it has also mandated an adaptation of spatial planning practices to facilitate construction of RE-production facilities. In this regard, especially the new art. 14 EnG that prescribes cantons to streamline authorization and concession procedures is of large significance. The cantons today have yet to outline new procedures that exhaust the procedural cost-

[8] This understanding stands in contrast to the sociological treatment of institutionalism that rather views institutions as consisting of "[…] symbolic and cognitive elements in organizational environments" (Mayntz and Scharpf 1995, 42). Because of the overarching symbolic focus of sociological institutionalisms, they are not suitable for this project.
[9] Today, the Swiss electricity mix as measured by the consumer (carbon intensity: 169g/CO_2 by kWh, see Gross 2018) generates about 1.2 tons of CO_2 per annum and resident. Only about a tenth of these 1.2 tons is emitted in Switzerland, whereas the rest is "imported", meaning emitted in the producing country but "consumed" in Switzerland (BFE 2017c, Gross 2018)
[10] The ES 2050 includes the full revision of the Swiss energy law (EnG, SR 730), the partial revision of the CO_2-law (SR 641.71), the spatial planning law (RPG, SR 700), the law on water forces (WRG, SR 721.8), the law on nuclear energy (KEG, SR 732.1), the law on electricity (EleG, SR 734), the law on provision of power (StromVG, SR 734.7), the law on road traffic (SVG, SR 741.01) and the law on pipelines (RLG, SR 746.1).

and time-saving potential.[11] In addition, with the new legal provisions, it has become possible to attach the "national interest" label to RE-plants, giving cantonal officers a tool for a clearer balance in the evaluation of competing interests in spatial law procedures (BR 2013; Plüss 2017).

In today's social science literature on RE, there's a bias towards researching the "general-abstract" and the macro scale with a tendency to overlook specifics: E.g., a large part of academic debate is concerned with finding the "right" market coordination mechanism, focuses on regulatory risks influencing investment decision-making for RE-plants (e.g. Bürer and Wüstenhagen 2009; Cardenas Rodriguez et al. 2014; Helms et al. 2015; Masini and Menichetti 2012; Mathews et al. 2010; Wüstenhagen and Bürer 2008; Wüstenhagen and Teppo 2006), empirically studies the overall effect of transition policies on the development of renewables (e.g. Hamburger and Harangozo 2018; Polzin et al. 2015; Carley 2009) or investigates the general social acceptance of renewable energy technologies (Dermont et al. 2017; Ingold and Stadelmann-Steffen 2018; Kammermann and Ingold 2019; Stadelmann-Steffen et al. 2018; Wüstenhagen et al. 2007). Decidedly less scholarly attention has been devoted to low-level or individual-concrete barriers like local administrative obstacles (Müller et al. 2011, for an exception see Stadelmann-Steffen et al. forthcoming). Yet, compared to general-abstract difficulties, these obstacles are equally significant, because they "[…] can have a significant financial impact, especially if they obstruct the early investment-intensive project cycle phases […]" (Müller et al. 2011), meaning the phases of project development, financial closure and construction. In addition to center-staging general-abstract policy, most research has focused on direct and "substantive" energy policy, policy-instruments, and –mixes (Kammermann and Ingold 2019; Ingold et al. 2018), without special attention to spatial planning or administrative energy policy, because of their inherent subnational character and the resulting diversity that makes comparisons difficult. In fact, questions of practical collaboration, such as the influence of competence distributions across governmental organizations, overlapping authority (Fowler and Johnson 2017; Wright 1978), or administrative risks (Noothout et al. 2016) have largely escaped political science scrutiny. To be clear, the energy governance group at the University of St. Gallen has started to take up the issue of describing multilevel governance of the electricity sector in Switzerland (see e.g. Hofmann and Richert 2017; Ebers 2017), but without a comparative focus. Hence, the nexus between spatial planning and energy planning remains underdeveloped (Stoeglehner et al. 2011: 1). Yet, I would add, to develop this link for Switzerland, a procedural focus on administrative federalism is of paramount importance.

The main answer justifying the technology selection of investigating wind turbines rather than geothermal, hydropower or biomass electricity production facilities is the practical need: Art. 2 EnG sets the highest relative goal for wind turbines. To achieve the target, wind electricity (WE) production would need to grow by a factor of 32 compared to 2018, by far the highest growth factor of all RE-technologies. In addition, a WEAP is very complicated, long and costly and could heavily benefit from simplification and greater problem-solving capacity. These are the reasons why in this project, only wind electricity will serve as an illustrative example of procedural administrative federalism while the procedures for

[11] The ES 2050 contains an array of institutionally salient measures designed to reach the aforementioned RE growth targets *for the federal level* (see EnG, EnV, RPG, VPeA and BR 2016 for details).

other RE-production facilities are discarded. Other renewable electricity technologies would not profit as much from an evaluation for the following reasons and are thus out of scope.[12]

The state of research on wind energy in international context can be broadly summarized into four groups of (1) acceptance studies, (2) policy determinants of wind energy growth and (3) legalistic descriptions of procedure. The lack of administrative politics focus can thus be easily derived from this literature categorization. The first group of studies on social acceptance (e.g. Bell et al. 2005; Bidwell 2013; Dütschke et al. 2017; Ebers 2017; Gerber 2018; Gross 2007; Petrova 2013; Wolsink 2007) has thrived, because wind energy has been (and continues to be) controversial for reasons of aesthetics ("Landschaftsverschandlung"), health concerns and the fear of plummeting real estate prices in the immediate surroundings (Ebers and Wüstenhagen 2017, 16ff.). Another major concern raised by many environmental interest groups has been bird and bat protection in view of non-negligible collision rates of volants with turbine blades (see Thaxter et al. 2017 for a recent literature review).

The second group of studies on wind energy has been debating the proper amount of public incentivization to enhance the growth of wind electricity production. The literature has discussed the optimality of support schemes in either country-specific manner (Menz and Vachon 2006; Sangroya and Nayak 2015) or in small-n comparative studies (Breukers and Wolsink 2007). Local ownership in Western Europe (ibid.), feed-in-tariffs and captive consumption in India (Sangroya and Nayak 2015) and an increasing rate of mandatory green power feed-in (Menz and Vachon 2006) as well as central state incentives, population density and wind potential in the US (Schumacher and Yang 2018) have been positively associated with the growth of electricity production from wind. Lüthi and Prässler (2011), in their conjoint choice investigation among 102 European and US-American wind energy developers into regulatory risk factors, find that expected administrative process duration is the third most important factor when deciding upon the siting of a wind energy plant, after enjoying high "legal security" and receiving high "total remuneration" (4883). Stadelmann-Steffen et al.'s (2018) study on Switzerland has demonstrated that developers view long and difficult WEAPs as a major obstacle to more wind energy growth (131).

[12] Concerning photovoltaics, for an installation of solar panels for electricity house owners do not need a construction permit, unless they is not well integrated into an existing building and do not have an apparent power of over 30 kVA (most installations on houses fall well below this border). As there are no visible attempts at concentrating photovoltaics panels to fall within the permit-required range of power, the photovoltaic authorization procedure is consequently out of scope. In the hydroelectric sector that has historically been very large in Switzerland, the problems currently clearly lay elsewhere than in authorization procedures: Raising residual flow rates and renegotiating the water use concessions after escheat ("Heimfall") along with massive retrofitting investments into the generally old hydroelectric infrastructure are currently in the foreground. Moreover, to counter decentralization, the current financial incentive scheme ("KEV") has introduced a lower limit regarding the investment support for smallest hydropower (<300kW), because the legislators feel that the environmental intervention outbalances the net benefit from produced clean electricity (see Art. 24 para 1 lit. b, stc. 2 EnG, Art. 19 para. 4 lit. a EnG, Art. 19 para. 5 EnG). Therefore, it is not expected that there will be substantial pressure on the authorization system to process project authorization requests more effectively. Moreover, the expected growth of about 10 % of capacity to fulfill the ES 2050 target could well be achieved by enlarging existing facilities, a comparatively benign environmental intervention compared to many new small hydroelectric plants elsewhere. Therefore, hydroelectricity is equally out of scope. Regarding the production of electricity from biomass and other renewable sources, authorization procedures are unstandardized and heavily customized to fit an individual project, which is why the possibility of comparative study is severely limited. These additional technologies are thus out of scope as well.

The third group of studies on wind energy has described the conditions, consequences and competences between executive and judicial authorities in legal terms (Klaber 2014; Plüss 2017; on general RE-infrastructure: Müller and Vogel 2012; Lehmann 2012). Especially the balancing of interests (Plüss 2017) and project requirements to receive a building permit (Klaber 2014) have received legal attention. A first legal comparison in tabular form of WE-project requirements based on cantonal law has been published by Zumoberhaus (2018). However, these legal commentaries have spared few considerations on the politics of procedural design and organizational workings involved. In fact, questions of practical collaboration, such as the influence of competence distributions across governmental organizations, overlapping authority (Fowler and Johnson 2017; Wright 1978) or administrative risks (Noothout et al. 2016) have largely escaped these disciplinary texts.

The wind energy authorization procedures (WEAPs) under scrutiny in this dissertation are clearly "wicked", in line with Rittel and Webber's problem formulation[13] (1973): The main source of rules governing WEAPs is the federal planning law (RPG, SR 700). Spatial planning on large infrastructure projects being an intersectional task ("Querschnittsaufgabe") between administrative, construction and energy law, has all the problem facets that command collaboration. The diversity of interests in land-use further requires enough public access vectors and institutional integration capacity for effective problem coordination.

2.2. Administrative federalism in Swiss energy policy

Until the nuclear law in 1959, energy was an exclusive cantonal domain of competence (Sager 2014). In today's energy policy, the distribution of competences is in practice very much a matter of debate (Schaffhauser and Uhlmann 2014, 1729). Even the federal courts have called competence distribution "highly complex" (BGer 1C_36/2011, see also Weber and Kratz 2005, 83). In principle, articles 89 to 91 of the Swiss constitution allocate organizational competences between the various levels of government.[14] The federal legislator is accorded the framework legislation competence ("Grundsatzgesetzgebungskompetenz") regarding the use of domestic and renewable primary and secondary energies, as well as on matters of parsimonious and rational consumption (Art. 89 para 2 Cst., see Schaffhauser and Uhlmann 2014). The federal legislator is further competent in setting and

[13] In Rittel and Webber's (1973) original definition of wickedness, a problem has no definitive formulation, yet as this study focuses on implementation bargaining and problem-solving, rather than policy formulation for which the term was originally conceived, critics of network theory applicability could bring forth that there has already been a "definitive" formulation of the problem as WEAP-policies exist already. To such critics I would answer that the problem might have a formulation in its general form, but if a concrete wind energy project is to be assessed, cantonal leeway of implementation is still large and the nature of the problem is likely to be highly controversial between offices that hand out the authorization decree together. On this concrete project level, based on the diversity of interests that must be accommodated, it can be reasonably assumed that there is no generally accepted problem formulation in evaluating wind energy projects.

[14] The federal law on energy (EnG, SR 730) and its ordinances (SR 730.01-730.6), as well as the federal law on electricity (EleG, SR 734), its ordinances (SR 734.1-7.4.6) and the federal law on electrical power supply (StromVG, SR 734.7) and its ordinances (SR 734.71-734.819.3) present the main source of federal positive law on electrical energy all derive their legality mainly from article 89 Cst, obviously together with other sources. Art. 90 Cst., the second of the constitutional energy policy articles, allocates the exclusive competence to regulate nuclear energy to the federal authorities. art. 91 Cst., the last energy policy article in the constitution, specifies that the federal state is solely competent in matters of electricity transport, but also for liquid or gaseous fuels and propellants. The EnG aims at providing a diversified array of energies in a safe, sufficient, economical and environmental-friendly manner. The EleG dictates safety standards for electrical power installations and the StromVG prescribes rules directed at enabling an efficient, safe and competitive electricity supply market.

controlling efficiency standards, except for buildings. The competence of promoting new energy technologies is also shared (Art. 89 para 3 Cst.). Cantons are particularly ("vor allem") competent concerning the use of energy in buildings. However, neither does this does connote that cantons may only actively set rules on this matter, nor does it found a competence for the federal state (Art. 89 para 4, Schaffhauser and Uhlmann 2014). These constitutional articles lead to a complicated mixture of interdependencies between the involved actors: In practice, various degrees of legislative power (parallel, competing or exclusive etc.) are accorded (see Tschannen 2007). They extension of competence may differ across the subdomains of energy production and distribution or user groups. Additionally, competence demarcations are not only complex "vertically" between levels of government, but also between the private and public sector: According to Art. 6 para. 2 EnG, governments are responsible for framework rules, where in principle, energy supply is a private sector matter.[15]

In principle, cantons are held to implement policy rules set by the federal state (art. 46 Cst.). In the energy policy field, Sager (2014) maintains that whereas the federal state has enacted framework legislation and programs as well as efficiency standards, it has accorded its implementation mostly to cantons and to para-state institutions (739). Notwithstanding this administrative outsourcing, the federal state's administrative role has grown over the years, along with its increasing legislative activity (ibid.). As a consequence, cantons have increasingly voiced their dissatisfaction with the status quo of complicated patterns of shared competences & responsibilities: They lament the number of policy enforcement tasks delegated upon them and have gone as far as requesting the federal authorities to respect the principles of subsidiarity (Art. 3 Cst.). They further decry incongruences between cantonal payments and the resulting benefits ("Fiskaläquivalenz", see KdK 2016; Müller and Vogel 2012). Regarding the federal ES 2050, the cantons were displeased by the lack of inclusion and consultation in the formulation of the strategy, which, in their opinion, has contributed to further reducing their independent margin of action (CH Stiftung 2014). Federal authorities argue to the contrary: they maintain that the envisaged full liberalization of the electricity market in Switzerland[16] needs a regulatory "level playing field" with EU-countries and therefore even an extension of central competences (Trinkener et al. 2015; see also BFE 2015).

To illustrate the non-exclusive, messy and circular nature of practical energy law implementation, let us consider the illustrative example on financial incentive schemes: According to the EnG, cantons may design policy schemes to support and incentivize their population's efficient use of energy and waste heat (Art. 50 EnG) and they may receive funding from the central state to implement it, if it is deemed worthy of support by the federal authorities (Art. 51 EnG). Yet the same law foresees a multitude of renewable electricity technology feed-in incentive schemes ("EIV" / "KLEIV" / "GREIV" / MKF") paid for and implemented by the federal state, Swissgrid (the national grid company, a private stock corporation, where the biggest energy providers in Switzerland are the stockholders) and Pronovo (the program administrator, a Swissgrid subsidiary). What makes governance of the field even trickier is that some cantons are majority owners of energy supplier companies that are Swissgrid shareholders (e.g. BKW).

[15] In practice, many local governments are majority owners of the local power company and financially profit from their entrepreneurial activities (Kohl 2011).
[16] Only the electricity retail sector will be liberalized, not network and grid distribution businesses/organizations.

This example demonstrates that in a field of mixed policy competences, such as energy policy, implementation is functionally required to happen in accordance between administrations of the different levels of government and between public and private actors.

In WEAPs there is no way around administrative coordination or collaboration across governmental levels. Cantons must necessarily be included because the spatial planning law (RPG, SR 700) prescribes that each building must in principle receive a building permit by the canton. In some cantons, the municipalities are accorded this power (JU, NE, TI, etc.), in other cantons it is the duty of the "Verwaltungskreis" or remains with the canton itself (see Zumoberhaus 2018, 7). At the same time, however, the building of electrical infrastructure (>30kvA) requires a permit by the federal inspectorate for heavy current installations (ESTI) in the so-called planning authorization procedure ("Plangenehmigungsverfahren", see VPEA, SR 734.25). This permission is also required to build or change existing power lines of grid levels 1 (380kV-150kV), 3 (150kv-36kV) and 5 (36kV-1kV)[17] to connect infrastructures. This permit summarizes all the other potentially necessary authorizations stemming from federal law requirements, such as, among others, the one prescribed by the Nature and Cultural Heritage Protection Law (NHG, SR 451) or the one indicated by the telecommunications law (FMG, SR 784.1) in case of potential radio disturbances by moving rotor blades.

2.3. WEAPs / CWEAPINs

It is this study's aim to make the complex patterns of interaction between administrative authorities and involved private actors visible, using the example of the wind energy authorization procedures (WEAPs[18]). The actors in this process form a collaborative, project-based organizational network that I will henceforth call "cross-level wind energy authorization procedure interorganizational network" (CWEAPIN): It is labelled "cross-level" because organizations stemming from all three governmental levels are collaboratively involved. It is further labelled "interorganizational" because the procedure requires input by a large amount of individual organizations, where none of the participating organizations has enough power to "go about it alone". CWEAPINs are networks in the sense that they fulfill the definitional criteria of having a semi-permanent structure as well as "[…] the expectation of future dealings" (Scharpf 1997, 137), which reduces individual opportunistic behavior and thus, also lets transaction costs decrease (ibid.).

A WEAP is a complex set of ecological, security and administrative verifications that functions in a stepwise manner, each step dependent on a positive decision in the former step. The federal wind energy concept (ARE 2017) based on the spatial planning law (RPG, SR 700), describes that wind energy authorization procedures are separated into three different phases, the cantonal structure planning (CSP, phase 1), the local land-use planning (LLUP, phase 2) and the construction authorization phase (3). Some cantons also combine phases 2 and 3 to form phase 2+, where both the land-use planning compliance and the construction permission are handed out more or less concurrently.[19]

[17] Wind turbines in Switzerland are mostly connected to grid levels 3 and 5.
[18] I use the phrase « wind turbine siting procedure » synonymously.
[19] The combined phase 2+ will still be analytically separated, as the phases may still not have the exact same duration. For procedural effectiveness, parallel time use is only counted once and then controlled for in the IVs.

Whether the two mentioned intermediary decisions (fixation in the CSP (end of phase 1) and fixation in the LLUP (end of phase 2)) are needed depends on the specificities of the intended location and whether the project size surpasses technical thresholds or not (see ARE 2017; Klaber 2014). In total, five possible different pathways A-E may be triggered (see figure 2 below). Every canton's procedures differ. Their overlap, however, are the strict federal requirements (mainly RPG), which is why the taxonomy that follows is based strictly thereon (see ARE 2017; Meyer and Geissmann 2017).

Pathway A is the longest and corresponds to large-scale projects, with wind turbines larger than 30m in height in cantons that do not combine local land-use compliance with construction permission procedures. Pathway B is for the same categories of wind turbines like A, but happens in cantons that run land-use compliance and construction procedures concurrently. Pathways C and D are for smaller wind turbines (below 30m in height) for which a change of the land-use plan is necessary, either for cantons with combined procedure or not. Pathway E is for very small wind turbines that need no LLUP adaptation. Importantly, the pathways only describe authorization procedures for turbines that require a permit and it therefore does not include the very small, balcony-placed turbines that do not require public authorization.[20]

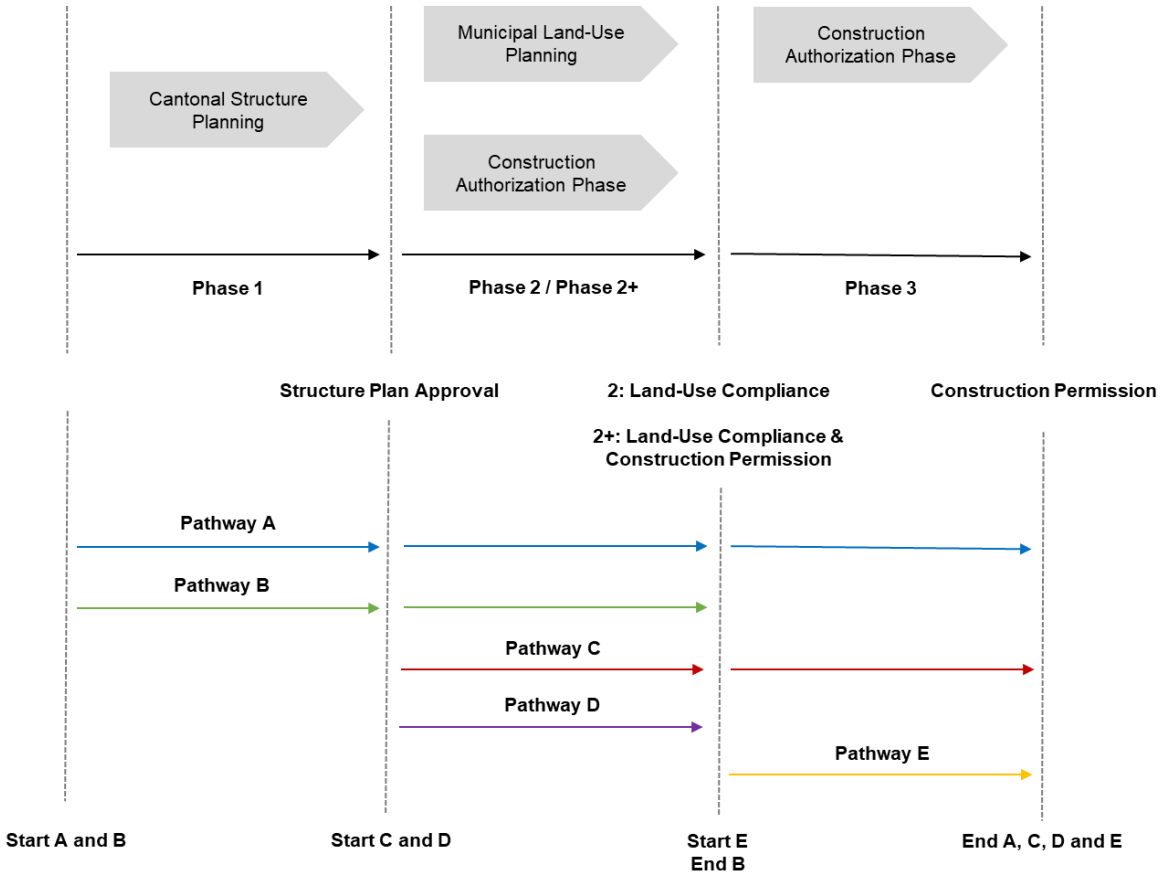

Figure 2: Phases and possible pathways of wind energy authorization procedures

As mentioned, project characteristics and intended location trigger the number of phases and the necessity of applying for special permits. A CSP-fixation is needed if the turbine is larger than 30m (incl. blades). Cantonal authorities may either have identified and fixed areas for WE-projects in the CSP

[20] As a cantonal WEAP-policy example, see Baumann et al. (2018)

before a project entered a WEAP ("positive planning") or the CSP may be revised with the entered WE-project itself. Turbine installations of over 5MW installed capacity require an integrated environmental assessment ("Umweltverträglichkeitsprüfung", UVP). Projected apparent power (incl. that of power lines for grid access) over 30kVA trigger a planning permit procedure certifying the installation's electrical safety ("ESTI-Plangenehmigung"). Additionally, federal aviation security requires an assessment and permission regarding wind turbines as aviation obstacles if their height exceeds a certain limit. The good functioning of a wind turbine might also entail the need to apply for a forest clearance permit (cantonal, federal office of the environment must be heard if the clearance is large). Locational criteria that must be taken into account for the balancing of interests are manifold. Concretely, aside from environmental impacts, wind turbine effects must be balanced with the following federal interests (ARE 2017):

- the proximity to federal grid planning corridors (SÜL);
- military aviation and military equipment (MG, Art. 9 Anlagenschutzverordnung, Art. 66 VIL);
- meteorological instruments (WMO-guideline, Art. 1 MetG);
- radio relay corridors (FMG).

As part of project-compliance with environmental laws, the following impacts of a wind turbine must be taken into account:

- on UNESCO world heritage sites;
- on federal protection inventories (BLN (Art. 5ff NHG, VBLN);
- on ISOS and IVS-objects (Art. 5ff NHG, VISOS, VIVS);
- on forests (Art. 5ff WaG);
- on noise emissions for the nearest inhabitants (Art. 7 and annex 6 LSV);
- on the local landscape (Art. 3 NHG);
- on other protected territories (Ramsar-convention, NHG, JSG, KGSG);
- on local fauna, mostly birds and bats (Art 1., 7. and 11 JSG, Art. 14 and 20 NHV);
- on natural resources (general UVP-tasks).

In practice, even if no UVP is formally necessary, because the project is below the installed capacity threshold, project developers must still confirm to authorities that their project is in line with the applicable laws. An "environmental note" may still be required (BAFU 2009). As environmental reporting is a matter of degree, the taxonomy should, rather than make a categorical difference, include the extensiveness of required environmental impact documentation. A typology of the projects should thus include the project characteristics and the severity of the location's limitations. Moreover, many permits require the planning of compensation measures to counter negative environmental impacts. This is the reason why the extent of compensation measures is included in the typology as well.

Based on the planning thresholds and the locational criteria, a four-type project taxonomy is suggested as depicted in Table 1 below. As many cases are similar at large, but differ only in their details, it does not make sense to differentiate types based on inscrutable detail for reasons of usability and case-membership numbers. There are, logically, 8320 different logical combinations between all of the explained classification categories and attributes. Yet most of these combinations are impossible by federal law requirement or are unrealistic for economic reasons. This taxonomy is also currently being

discussed with wind energy experts from the BFE. Note that the taxonomy is a classification effort for WE-project-types. Within types, pathways that measure the sequence or simultaneity of procedural phases are controlled for with a phase 2+ dummy. The typology dimension of "needed authorizations and compensation" will be measured as an additive index, although the details of weighting and aggregation will depend on insights from the data. It is expected that the category determinants and the index on "needed authorizations and compensation" correlates highly, with 1-L and 2-L projects having the highest amount of points on the index, and 4-SE projects the lowest.[21]

Type	**1-L**	**2-L**	**3-SMR**	**4-SE**
Corresponding Procedural Pathway	*A & B*	*C & D*	*C & D*	*E*
Category determinants				
Project location within "positively planned" territory?	no	yes	-	-
Adaptation of cantonal structural plan (CSP)?	yes	no	no	no
Adaptation of local land-use plan?	yes	yes	yes	no
Regular or exceptional permit procedure?	regular	regular	regular	exceptional
Needed authorizations & compensation				
Federal permits: ESTI security, Aviation Security, protection of waterways	0 - 3	0-3	0 - 3	0 - 3
Cantonal permits: forest clearance	0 - 1	0 - 1	0 - 1	0 - 1
Interest balance & documentation	0 - 12	0 - 12	0 - 12	0 - 12
Extent of required compensation measures	0-4	0-4	0-4	0-4

Table 1: Wind energy project (not procedure!) taxonomy. Explanations of title abbreviation: L = Large; S = Small; M = Medium; R = Regular; E = Exceptional.

3. The dependent variables: Measuring problem-solving capacity

3.1. Defining problem-solving capacity in multi-level settings

In a very recent symposium on multilevel problem-solving (EPA: 5(1), Trein et al. 2019; Thomann et al. 2019) have conceptualized problem-solving capacity as strategies and dealings in a process leading to an output (Scharpf 1997; Héritier 1996), or as the value of the output itself to concerned stakeholders ("outcome", Thomann and Sager 2017a; 2017b). Rather than being exclusive understandings, they differ in focus: Whereas, according to Thomann et al. (2019), process-oriented researchers tend to pay attention to problem-structuring (Hisschemöller and Hoppe 1995), collaborative decision-making (Scharpf 1997), learning and knowledge utilization (Braun and Gilardi 2006) or managing wicked problems (Lodge and Wegrich 2014), outcome-oriented approaches zoom in on the performance, on how well the underlying problem has been solved (Thomann et al. 2019). Whereas policy evaluation studies have mostly concurred with the *outcome* understanding, MLG studies have highlighted the *process* of problem-solving (Irepoglu Carreras 2019).

The present project combines the two views by investigating the effects of "within-process" variables on the outcome as perceived by the relevant stakeholders. It evaluates the explanatory force of process-characteristics within institutional arrangements on administrative output (efficiency) *and* on the

[21] An ANOVA will be employed to test the significance of the fourfold-categorical distinction.

administrative outcome (effectiveness). It thus sees problem-solving capacity as the system ability to perform well in the eyes of concerned stakeholders. It takes welfare-affecting process-variables as independent factors and evaluates their force in relation to problem-solving efficiency and problem-solving effectiveness of decree production.[22] Importantly, *the project conceptualizes problem-solving capacity essentially as a performance measure in a dependent variable*. Possible creation of value *within and during* the procedure is measured as independent variables; the dependent variable is composed of data from WEAP-external sources.[23]

The proposed dependent variables each measure one of the two aspect of problem-solving capacity: The efficiency measure looks at outputs and the effectiveness measure scrutinizes outcomes of the WEAP-decision-making process. The choice of how they are measured is largely normative, as in all evaluations. After defining problem-solving capacity for the specific case of WEAPs (3.2), their operationalization shall be explained in detail (see sections 3.3 and 3.4).

3.2. Dimensions of problem-solving capacity in WEAPs

What are the characteristics of a well-performing[24] CWEAPIN? In theory, a an optimally designed procedure would completely mitigate all administrative and social acceptance risks (terms[25]: Noothout et al. 2016). In practice, the different involved corporate actors and individuals follow different goals and apply different performance criteria. To account for this plurality and find common ground, the following paragraphs discuss the stakeholders' different perceptions of efficiency and effectiveness, assuming their bounded rationality (Scharpf 1997; Simon 1962).

From a planner's perspective, the problem-solving capacity of CWEAPINs is maximized if the WEAP is maximally efficient and minimally legitimate. First and foremost, many developers cite the procedure duration as the main obstacle to successful implementation (e.g. Mr. Aregger's interview in Stadelmann-Steffen et al. 2018, 131). A long duration also increases uncertainty about receiving financial support in the form of feed-in tariffs (Wüstenhagen et al. 2017, 14). Moreover, possible court cases introduce costly delays that make the project no longer financially profitable (ibid., 15). In general, the cost and financial viability of a wind energy project increase with continuing duration of the authorization procedure (Wüstenhagen et al. 2017, 15). In addition to a short duration, procedural simplicity would also be desirable from a developer's perspective, as complexity is ineffective and costly (Ebers 2017; Wüstenhagen et al. 2017). It has further been noted that the high number of authorities involved (Wüstenhagen et al. 2017, 14) increase transaction costs. Ebers writes that developers usually budget 3 to 6 million Swiss Francs for the planning phase of a wind park project for wind measurements, salaries and environmental studies (2017, 14). In case of a repurposing a spatial zone to wind energy harvesting in the local land-use plan, developers also need 51% of municipal votes to continue with the realization of the wind energy project, where developers are in favor of quick voting procedures. In short,

[22] In Klijn et al.'s (2010) terminology, the efficiency aspect denotes the analysis of *"process-outcome"* and the effectiveness aspect treats a *"content outcome"*.
[23] Hence the DV is not calculated as the sum of the value generated within and during the process.
[24] As discussed in section 3.1, the terms "problem-solving capacity" and "performance" are used as synonyms.
[25] Administrative risks designate all "risks stemming from complex permitting procedures, which lead to additional expenses and delays" and social acceptance risks refer to "risks of opposition to wind energy projects from stakeholders" (Ebers 2017, 16).

efficiency for developers is high if there is high procedural speed, procedural simplicity, low costs for them and at least a minimum of voter acceptance of a project (if necessary) that has been obtained with maximum possible speed.

Problem-solving capacity, as viewed by authorities, may be measured by WEAP efficiency, by how well the output and outcomes correspond to voter preferences as well as by the provision of a procedure that permits the transparent and fair integration and balancing of relevant interests. Similar to planners, democratic public authorities have a manifest interest to put taxpayer money to efficient use and in the procedure being proficiently managed and low cost and thus fast and simple. Moreover, the ES 2050 has enacted a shift towards higher weighting of planner preferences in interest balancing (see chapter 2.1). However, public and planner interests differ substantially regarding the integrity of the procedural structure that sets the stage for a high quality interest balancing within a project: Whereas developers would profit from the inexistence of an authorization procedure, authorities are interested in allowing the construction of a "public optimum" of wind turbines. Such an optimal level of provision of wind turbine permits would ideally be fully congruent with the preferences of the concerned voting public. In practice, however, neither the voter group nor authorities have congruent preferences internally: Different public authorities have different opinions on projects and voters are very rarely in unison on topics of optimal energy provision and the use of landscape. Goal alignment[26] on projects thus becomes an empirical question. With respect to the *form* of the procedure, the authorities' goal is again different from a rational planner's: Whereas, again, a rent-seeking planner would prefer to have no WEAP at all, public authorities measure the quality of the general procedure by how well the rules *enable* an optimal societal outcome for a wide variety of types of wind projects.

The voting public and involved NGOs may also have a preference for efficiency, because procedures are partly paid for by taxpayers (voters). Yet, this interest contrasts with the manifest interest in the legitimacy of a project undergoing the WEAP. Both the procedure itself as well as the decision better be legitimate in the voter's and implicated interest group's eyes (Scharpf 1999): Regarding *procedural design*, voters have a clear preference for the existence participation opportunities, transparency and fairness of representation (see Alpiger and Vatter 2015; Vatter 1998; Linder and Vatter 1996). In the perspective of the voting public, a transparent and fair project open to public participation is much more legitimate than the same project lacking these procedural attributes. Similarly, preferences for transparency, participation and fairness may also be attributed to civil society organizations that also may have a say in the WEAP (environmental associations, etc.) because of their right of appeal ("Verbandsbeschwerderecht"). Regarding the output, voters and NGOs view the decision as legitimate if it is in their interest.

Aggregating these three viewpoints of planners, authorities and concerned civil society, two groups of criteria for problem-solving capacity may be distinguished. Crucially, all actors have a stance on all criteria and it is theoretically untenable to exclusively attribute criteria to the stakeholder groups. As explained above, it may however be legitimately argued that stakeholder groups attribute different

[26] To simplify the analytical perspective, I accept the supposition that the interests of public agencies involved in the procedure are congruent with those of the people working for the agency. This suggestion will be tested by asking questions about employees' goal alignment.

weights to different criteria. One group of evaluation criteria center around “efficiency”, which includes (1A) high speed, (1B) low resource intensity (=cost) and (1C) procedural simplicity. The second group of criteria captures the more qualitative dimensions of problem-solving capacity. It contains the dimensions of throughput (2A) and output legitimacy (2B) (Scharpf 1999; 2003; Schmidt 2013). As will be seen, efficiency and legitimacy considerations cannot be separated into exclusive, non-overlapping analytical groups. Problem-solving capacity may thus not be seen as the sum of both groups of criteria. Rather, the two dependent variables that are discussed separately from here onwards present a *difference in emphasis*.

3.3. Aspect I: problem-solving efficiency

The evaluation of efficiency[27] has been central in benchmarking efforts between public authorities engaging in the same or similar programs (Knoepfel et al. 2015, 294). As classical efficiency criteria only measure “doing things the right way” and do not ask if the “right things are being done”, their independent informative value is normally rather limited. Nonetheless, in the present case, I would argue that efficiency is actually a significant component of whether the targets, as set in the ES 2050, are met. Moreover, as planners and authorities also see in efficiency a material problem that impedes the further development of Swiss wind energy (see chapter 3.2), and thus, the measure of efficiency also partly measures whether “the right things are being done”, not only whether “things are done the right way”. Efficiency should thus not be misunderstood as lacking a qualitative aspect.

The three efficiency dimensions, as listed in the preceding section are high speed (1A), low resource intensity (1B) and simplicity (1C). How to measure and combine these three dimensions into a single, valid and coherent measurement? I argue that the speed by which the WE-project has been evaluated measures problem-solving efficiency very well, subsuming the two other components within itself: Speed is not only a goal by itself, it may also serve as a proxy for the fixed costs of planners and public agencies that are almost fully time-dependent. The same goes for simplicity, as it is not unreasonable to see in complexity of procedural requirements a measure of time. The higher the speed of an authorization procedure, the less costly it was for both sides and the less complex it must have been.

Therefore, “speed” seems the most compelling and practical measurement of WEAP problem-solving efficiency just by itself. To measure duration the difference in time between the hand-in of the pre-project to cantonal authorities and the final decision is chosen. Crucially, the duration of the independent variables, especially the control variables that define project type and pathway, is not measured and then summed up to arrive at the dependent variable. In fact, the duration of phases and processes within the main procedure will not be measured. Rather, the duration of the WEAP is treated as a characteristic of the output.

[27] (Knoepfel et al. 2015) differentiate between “productive efficiency” and “allocative efficiency”, where the former sets administrative outputs in relation to implicated resources and the latter relates outcomes to resources (284ff.). Allocative efficiency, an evaluation of whether “things are done right” for the final beneficiaries (society, not only the target group) only makes sense if it has first been established that “the right things have been done” (Knoepfel et al. 2015, 292). Productive efficiency also has this precondition, however, since it relates material costs to the output of an administrative act rather than a normative outcome, arguably less so. Thus, in the following, “problem-solving efficiency” will be equated with “productive efficiency”. For reasons of simplicity, productive efficiency is henceforth simply called “efficiency”.

There is a problem with the conceptual nature of speed, as it has to be measured based on the projects, not on the procedural form that does not have a natural "duration". Aligning with the quantitative research theorem that detects structural correlational factors by internally comparing a large-enough set of cases, it is argued that with enough cases, correlational knowledge from content to procedure may be inferred. Procedural duration and thus, problem-solving efficiency will be measured as the time from the hand-in of the pre-project until the authorization decision, either as the number of days, weeks or months, depending on the composition of the duration data that is received.

3.4. Aspect II: problem-solving effectiveness

As established in chapter 3.2, the more qualitative focus of WEAP-performance may be captured by measuring throughput legitimacy (2A) and output legitimacy (2B). Schmidt (2013) has proposed to use the term "throughput legitimacy" to discuss "the efficacy, accountability, openness and inclusiveness of the governance process" (3). This "brand" of legitimacy is a component of Scharpf's more general "input legitimacy" that views a decision as legitimate if it has been decided "by the people" and therefore corresponds to the concerned community's interest (Scharpf 1999, 6ff.). In contrast to Scharpf's "input legitimacy", Schmidt's (2013) subdimension of "throughput legitimacy" only refers to participation and consultation during established governance processes, not to "responsiveness [of the political apparatus, *author's note*] to citizen concerns as a result of participation" (Schmidt 2013). Concerning "output legitimacy", political decisions may be called "[…] legitimate if and because they effectively promote the common welfare of the constituency in question" (Scharpf 1999, 6). Output legitimacy thus denotes "the effectiveness of […] policy outcomes for the people" (Schmidt 2013). WEAPs may thus be called "legitimate" if they fulfill both goals of having broad and transparent inclusion of concerned voices within the procedure and if the decree (the output) creates value for the concerned community.

In the case of WEAPs, both forms of legitimacy are distinctly observable: Generally speaking, the legitimacy of entering wind energy projects is rather uncontested[28] and public opinion is not engaged on whether a project can enter a WEAP, the focus of public attention lies on participation during the WEAP for or against a specific project. Public engagement for or against a wind turbine may thus conveniently be labelled "throughput participation" and be categorized as "throughput legitimacy". It is concerned with the quality of a within-procedure factor, namely participation. "Output legitimacy", in contrast, is concerned with the value of the effects stemming from the output itself. In the present case, the output is given by the authorization decree and the legitimacy refers to whether stakeholders are satisfied with the decisions it holds.

Before moving on to ask whether legitimacy equals effectiveness, let's first define this project's understanding of the latter concept. Effectiveness measures to what extent the decree has fulfilled the stakeholders' intentions (Power 1997, 50). In the present project, we refer to effectiveness in a rather narrow sense[29] meaning the *degree of goal attainment as perceived by involved stakeholders.* Knoepfel

[28] Only 3% of 1003 respondents in (Ebers and Wüstenhagen 2017) survey are against the further development of wind energy in Switzerland (16).
[29] Broader network system performance aspects, such as the financial viability of the organizational network (Child et al. 2005) are considered out of scope. For example, the financial health of a public management network is rather considered a factor that positively impacts effectiveness than a part of the dependent variable of effectiveness itself.

et al. (2015, 284) distinguish two forms of goal attainment measures: On one hand, “effectivité” (eng. “effectivity/compliance”, ger. “Effektivität”) measures changes in target audience behavior asking whether the policy intervention had an effect, on the other hand, “efficacité” (eng. “effectiveness”, ger. “Wirksamkeit”) measures outcomes within the group of the “final beneficiaries”, meaning all those that could potentially profit from the solved problem. The authors further contend that an evaluation of effectiveness goes beyond the evaluation of effectivity in that an effectiveness requires a *causal reconstruction* of a program’s impacts on social reality, detecting whether there is an effect or not does not suffice[30] (287).

In Knoepfel et al’s (2015) terminology, this project conducts an “extended” effectivity analysis, as its research questions cannot be answered via an experimental research design that would allow a causal inference stricto sensu. Consequently, this project, by running controlled correlative statistics, will not make causal claims of effects. Rather, it will test whether differences in WEAP design lead to changes in goal attainment, as perceived by the stakeholders. Yet the subsequent interpretation of results will contain elements that go beyond the description of existence and magnitude of effect, however, without making causal claims. For this approach, for simplicity reasons, the term “effectiveness” is chosen. This is also in accordance with much of the literature on network effectiveness (Pfeffer and Salancik 1978; Behn 2003; Provan and Milward 1995; 2001; Klijn et al. 2010).

Is a legitimate decision also effective? I argue that the dependent variable of problem-solving effectiveness should only include “output legitimacy” components, not “throughput legitimacy”. Elements of the latter are excluded because throughput legitimacy does not refer to the evaluation of an output and would otherwise be conceptually misplaced as part of a dependent variable that is interested in outputs. This is not to deny that there is public value in throughput legitimacy procedures, for example in enhanced consultation sessions of WE-planners with the concerned municipality, which there is. Hence, throughput legitimacy components must enter the models, but they will do so as independent variables, not part of the dependent variable of effectiveness. The interesting question then will be to what extent greater input and participation opportunities (throughput legitimacy) result in greater problem-solving effectiveness.

Output legitimacy as effectiveness in the stakeholders’ eyes will form the dependent variable of problem-solving effectiveness. It will be measured with two items: ex-post satisfaction and the perception of having achieved a “win-win situation”, as suggested by Koppenjan (2008, 702). Concretely, it will measure whether the respondent was satisfied with the WEAP of the project under consideration and whether, under the actor constellation at the time, all sides were better off than before the decision. The target group for these two survey items are the organizations involved in the WEAP. Both measures will then be combined into an index measuring output legitimacy (IOL). Details have yet to be defined. Affected people that have not participated or objected during the WEAP are excluded from the scope. Potential bias resulting from memory loss or retrospective extenuation or exacerbation in the interview

[30] Practically speaking, an evaluation of effectiveness must however be predated by an evaluation of effectivity and it remains unclear whether the analysis of effectivity should be regarded as a module within an effectiveness analysis or whether it should be an independent pre-analysis.

partners will be countered by giving specific prompts and asking a slightly reformulated question with the same content a second time for robustness reasons.

4. Effects of administrative federalism on problem-solving capacity

This chapter discusses the theory and the ensuing hypotheses, following the ACI's analytical structure. The hypotheses are developed for both dependent variables, as indicated.

4.1. Actor constellation

Conflictuality

The conflictuality of an actor constellation, in combination with the mode of interaction (see section 4.2) is expected to have consequences for the social welfare of the policy network's output (Scharpf 1997, 195ff.). The notion that the cohesion among (groups of) actors influences policy outputs is widely shared in the literature (Fischer 2015b; Robins, Bates, and Pattison 2011; Bressers and O'Toole 1998). For many organizational network theorists, goal alignment has been shown to be conducive to greater performance (Head 2008; Provan and Kenis 2007; Bryson et al. 2006; Huxham 2005; Halliday 2004; Selin and Schuett 2000). Fischer (2015b, 223) writes that low conflict is a necessary precondition of the emergence of possible solutions to a collective problem. Intuitively, to resolve highly conflictual situations, coordination efforts – and thus transaction costs – must be much higher than when the situation presents no conflict of interest, ceteris paribus (Williamson 1993), especially if there is no compensation allowed that would permit the application of Coase's theorem (Scharpf 1993). Consequently, this project hypothesizes that the level of conflictuality of an actor constellation correlates negatively with problem-solving efficiency (subscript a) and problem-solving effectiveness (subscript b).

$H1_a$: The more conflictual the actor constellation, the lower the CWEAPIN's problem-solving efficiency.

$H1_b$: The more conflictual the actor constellation, the lower the CWEAPIN's problem-solving effectiveness.

The conflictuality of the actor constellation will be measured with a survey asking about belief similarity and by a direct question about the conflictive relation between the respondent and a list of other actors (Wasserman and Faust 1994; Ingold and Fischer 2014). The Manhattan distance would be an appropriate SNA-routine that measures conflictuality (Ingold and Fischer 2014). As an alternative, the degree of goal alignment between the various corporate actors will certainly be measured too. Following Lindenberg's (1991) "method of declining abstraction", measurement on the individual-agent level will be aggregated to a corporate-actor-level and only be disaggregated in case the aggregate shows no variance. An additional possibility to capture conflictuality is by the degree of inter-agency trust. In the organizational network literature, trust between members of a network is the most consistent performance-explaining factor (see e.g. Head 2008; Edelenbos and Klijn 2007; Agranoff 2007; Bryson et al. 2006; Halliday 2004; Adler 2001; Selin and Schuett, 2000; Klijn and Koppenjan 2000; Bardach 1998; Lewicki and Bunker 1996; McAllister 1995). In work settings, trust, as "confidence in the face of a risk" (Lewicki and Bunker 1996, 116) is a precondition for the creation of value through coordination (e.g. Scharpf 2000).

Power balance

A second characteristic of actor constellation that influences the welfare of the decision made is power relations between actor coalitions. Fischer (2015b) contends that innovative solutions that are further away from the Status Quo have a better chance of being accepted if a dominant coalition can impose it than if power was equally distributed between actors or their coalitions (222f.). However, this does not mean that the decision has increased welfare for all participants, it just means that less cooperation is needed for an "innovative" decision. As a consequence, stark power imbalances may reduce transaction costs and therefore increase efficiency. Regarding effectiveness, scholars of environmental federalism in Switzerland have regarded power imbalances in the opposite way: a dominant coalition or actor has the power of vetoing decisions, forcing others to formulate a decision closer to the dominant actor's preferences rather than a universally beneficial proposition (Wälti 2001). Wälti (2001, chapter 6) argues that a greater power balance and distributed veto powers increase cooperation, which, by means of a more "mediative" style of negotiations, allow for an opening of the negotiation space to find overall "better" solutions (Scharpf 1997; 1994).

$H2_a$: The greater the power imbalances between actor coalitions, the higher the CWEAPIN's problem-solving efficiency.

$H2_b$: The greater the power imbalances between actor coalitions, the lower the CWEAPIN's problem-solving effectiveness.

Municipal autonomy

A similar line of reasoning may be applied to a subset of power balance considerations: the effect of municipal autonomy on the welfare of the implementation decision. The federal spatial planning policy has accorded some powers directly to the municipality. In principle, on federal projects, they may lodge complaints like concerned private actors or environmental organizations (Wälti 2001, 88), but on cantonal projects, their power differs depending on the spectrum of competences the canton has attributed to them. It is argued here that the more autonomous a municipality may act with regard to siting of wind turbines, the more it may be considered to be powerful and have "blocking power", which in turn, enables a more mediative negotiation style. Like in the general case, this would promote a more mediative style of negotiations, opening up the policy space for "better" solutions.

$H3_a$: The greater the municipal autonomy, the lower the CWEAPIN's problem-solving efficiency.

$H3_b$: The greater the municipal autonomy, the higher the CWEAPIN's problem-solving effectiveness.

Measuring power (im)balances is frequently done with reputational method, where organizational representatives are asked whether they find a list of actors to be influential and whether those actors are among the three most important (Fischer 2015a; Ingold and Fischer 2014; Fischer, Fischer, and Sciarini 2009). Ingold and Fischer (2014) further add a dummy that indicates more power to actors with formal decision-making power (91). Fischer (2015a) then calculates actor power as the sum of its items and coalition power first as the mean of the part-of-the-sum measure and second as the arithmetic average of coalition members (see fn 6, 83 and 97). The special case of municipal autonomy should, in addition, be measured by first, evaluating the different cantons' competence attribution regarding spatial

planning. Second, this measure should be combined with a measure of institutional power. To this end, Mueller's (2015) index of decentralization will be used, with updated data.

Transaction costs

A very frequently discussed factor stemming from the constellation of actors, with a impact on organizational network effectiveness is the amount of transaction costs (Milward and Provan 1998; Williamson 1993; 1985; 1979). Traditional studies on transaction costs have studied aspects of a product and have then tried to determine the optimally corresponding organizational form (market, network, hierarchy, see Shelanski and Klein 1995). In the literature on public management network effectiveness, transaction costs are largely a relative concept that only derives its explanatory force from the comparison of most similar cases.[31] However, transaction costs in economic activity cannot logically be zero, as every economic activity incurs costs of planning, producing, delivery and monitoring (Williamson 1999), what others have called "coordination costs" (Douma and Schreuder 2013; Claro 2004, 27). There must thus be a "saddle point" of an inverted-u relationship between transaction costs and organizational success (Uzzi 1996). If collaboration intensity is seen as the inverse of transaction costs and the inverted u-shape assumption holds, then collaboration intensity is positively contributing to problem-solving effectiveness up to a certain point, beyond which it becomes detrimental. Regarding problem-solving efficiency considerations, the need for zero coordination would be the perfect amount: no required collaboration increases the speed by which an employee may perform his/her activity.

$H4_a$: Higher amounts of transaction costs reduce a CWEAPIN's problem-solving efficiency.

$H4_b$: There is an "optimal saddle point" of transaction costs where both increasing and decreasing transaction costs reduce a CWEAPIN's problem-solving effectiveness.

I propose to measure transaction costs as a number for the entire network (where more involved actors create more transaction costs) and as an average per involved actor, as to make the number comparable across CWEAPINs. The self-established measure proposes to combine the intensity of collaboration (multiplicity) of a collaborative relation with the distance between collaboration partners according to their affiliation with a governmental level. To calculate transaction costs, multiplicity is used in its inverse, because fewer interactions are assumed more intensive per singular interaction than more interactions. The formula[32] calculates the average transaction cost per actor in the network. Importantly, no assumption is made whether task-receiving or task-giving causes higher collaboration costs. The multiplicity of a relation is defined as the average intensity of collaboration between pairs, rounded to the next natural integer.

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[31] For example, the discipline founding texts on organizational effectiveness in networks (Milward and Provan 1998; Provan and Milward 1995) have found that integrated mental health service provision in American cities is more effective than if the service were provided across a fragmented set of organizations.

[32] In an $n \times n$ matrix, $\left(\sum_{i=1}^{n}\sum_{j=1}^{n} T_{ij} = \sum_{m=1}^{k}\left(\frac{1}{m_{ij}} \times c_{ij} \times d_{ij}\right)\right)/n$; T_{ij} represents the transaction costs between i and j, m_{ij} denotes the multiplicity of the line between points i and j, c_{ij} is a dummy that defines the existence (1) or absence (0) of collaboration between the two points i and j and d_{ij} is the distance between points i and j that equals 1 if they belong to the same macro-organization (canton, state, commune) or 2 if collaboration happens between two not belonging to the same macro-organization.

4.2. Modes of interaction

Modes of interaction are the means through which a strategic actor constellation is translated into a policy outcome (Scharpf 1997, 97). In concrete terms, these "modes" represent the rules by which decisions are made and enforced. This evaluation thus explicitly recognizes the rarely measured truism that "not all collaboration is equally valuable to an organization" (Spitz and Ritter 2002). The ACI recognizes that the same interaction might come to different results because decision-making characteristics differ between cantons institutionally and procedurally (see sections 2.3 and 4.3). Luckily, in the present empirical case, a single (without exception known to me) interaction mode dominates: a negotiation procedure within hierarchical structures. Differences in effects of the interaction mode are thus only to be expected from the differences that exist between the modes of interaction of each canton.

In CWEAPINs in Switzerland, for lack of better knowledge, it seems appropriate to use a "mixed-mode" of interaction which Scharpf calls "negotiations in the shadow of hierarchy" (1997, 197). Contrary to most conceptualizations of organizational networks in the interagency collaboration literature that assume the *use of hierarchical direction* in public administration merely because of the *presence of a hierarchical authority* structure, this project does not do so (see chapter 4.2). Rather, it focuses on negotiations within hierarchical authority structures *under the threat of the use of hierarchical direction* ("the shadow of hierarchy", see Scharpf 1997, 197ff.; Lance et al. 2009; Héritier and Eckert 2008; Héritier and Lehmkuhl 2008; Whitehead 2003). Even in a hierarchical authority structure, most policy-work is conducted as interagency horizontal coordination, only using the hierarchical direction in case of a previous negotiation failure. In such a setting, "negotiations will be systematically influenced by the anticipation of a potential decision of the minister" (Scharpf 1997, 198). Second, the difference between "freestanding" negotiations and those against a hierarchical-bureaucratic backdrop are quite large: superiors introduce a "threat point" in negotiations, where participants can credibly claim and defend the superior's position (ibid., 198ff.) in the negotiation space.

In theory, the pure hierarchical mode of interaction is able to "solve" all actor constellations on the conflictuality continuum efficiently from a value production perspective and responsively from a point of view of distributive justice. Regarding the welfare effects of negotiations within a hierarchical setting, "it is to be expected […] that the policy output generated by the nexus of horizontal negotiations among lower-level units will tend to approximate the output that could have been produced by hierarchical coordination" (Scharpf 1997, 200). However, this is only the case if the "informational problem" of treating a problem in the right amount of details at the right hierarchical level (Scharpf 1993, 13; Hayek 1945) and the "motivational problem" that depicts employees as opportunistic rational choice individuals (Scharpf 1993, 11) can be concurrently solved. The "motivational problem", will be treated as a control variable (see goal alignment variable in the actor constellation section 4.1). To test the informational problem, Herbert Simon (1962) proposed the criterion of "near decomposability" that requires hierarchical institutions to be fully nested to be performing in market-equivalence efficiency. This criterion requires officers to collaborate more with their own office than with officers attached to different superiors. Inasmuch as hierarchy is the predominant organizational mode in public bureaucracies in administrative coordination across governmental levels in Switzerland, the effect of hierarchical nesting

shall be tested. As, in my view, this is a transaction cost concern pertaining to efficiency, no hypothesis on effectiveness is formulated.

$H5_a$: The more collaboration patterns are hierarchically nested, the higher the CWEAPIN's problem-solving efficiency.

Measuring the hierarchical nesting of collaboration patterns can easily be done by comparing intensities between agency-internal and agency-external collaboration partners. This is part of the descriptive analysis of collaborative ties as collected by the SNA-survey. This "hypothesis of fit" between de facto and de jure collaboration patterns stems from a variety of scholarly literatures: In addition to the above cited "near decomposability" check as theorized by Simon (1962), the organizational network effectiveness literature (e.g. Provan and Kenis 2007; Donaldson 2001), the interagency collaboration literature (Mullin and Daley 2010; Daley 2009) and the theories on effects of authority overlap (Fowler and Johnson 2017; Eichenberger and Frey 2006; Wright 1978) have conceptualized the issue in a similar vein. Analytically, network subgroup borders may be tested through the analysis of cliques (sub-groups within the network). The difference between rules-in-form and collaboration patterns-in-use may also be tested by checking whether cohesiveness within governmental levels is stronger than between (degree of inter-level cooperation).

Positive and negative coordination

In complex problem-settings, as is the case in WEAPs, there is high saliency of both dimensions of welfare as Scharpf (1997, 126) defines them: The score on (1) value production is high because wind turbines pose a high reward for investors, risks and dangers for flora and fauna, high benefits in terms of geopolitical independence of energy production, as well as political value in terms of cantonal (positive or negative) reputation. Regarding the (2) distributional dimension, the rather high costs are borne by the environment, affected people living in the vicinity of the turbine as well as by planners required to implement compensation measures. In such situations, a "positive coordination" mode would be required to optimally create value. Yet in practice, due to exponentially skyrocketing transaction costs, the negative form of coordination is practiced most frequently. Both coordination forms shall now be explained in detail.

Negative coordination denotes transactions where neither the production of value in an exchange, nor the distribution of value is an object of negotiation (Williamson 1985). They are usually formulated as "take it or leave-it" propositions, where the participant has two options: veto or accept (Scharpf 1997, 125f.). Negative coordination allows participants to block reductions in their own welfare. However, "negative coordination restricts policy choices to solutions that are Pareto-superior to the Status Quo" (Scharpf 1997, 113f.) and it thus does not include welfare increases that could result from a Kaldor-criterion setting, where losers are allowed to be compensated. Negative coordination may even be achieved without actual negotiations, as long as property rights and veto positions of fellow participants are respected (Scharpf 1997, 125). Translated to policy making, the goal of negative coordination "[…] is to ensure that any new policy initiative designed by a specialized subunit within the ministerial organization will not interfere with the established policies and the interests of other ministerial units"

(Scharpf 1994, 39). In terms of transaction costs, these can be kept low in this mode, as they are at a minimum and only rise linearly with the number of actors (Scharpf 1997, 126).

Positive coordination, in contrast, "[…] is an attempt to maximize the overall effectiveness and efficiency of government policy by exploring and utilizing the joint strategy options of several ministerial portfolios" (Scharpf 1994, 35). Rather than focusing on the criterion of Pareto-optimality, positive coordination permits the identification and distribution of gains according to the ambitious Kaldor-criterion. In positive coordination, veto positions are restricted to absolute minima and every policy option may be discussed and modified in detail, not just accepted or refuted. The problem in positive coordination is that it is practically unfeasible because the transaction costs are very high and increase exponentially with the number of participating agencies (Scharpf 1997, 133).

Negative and positive coordination differ in their capacity to produce welfare-efficient outcomes, irrespective of the costs: In positive coordination, losers of a transaction may be compensated, thus opening the negotiation space in which solutions might be found. Negative coordination reduces innovation because only options of the initiator are considered and because the other participants' status quo is treated as given (Scharpf 1994, 39f.). In summary, negative coordination might result in an accumulation of veto positions that are likely to reduce the welfare gains that would be obtainable with positive coordination (ibid.). This is consistent with Fischer's findings (2015b) that a greater power balance between agencies and distributed veto powers lead to less efficient solutions that are closer to the Status Quo. To find a highly welfare-beneficial solution in such a setting would then require the incorporation of elements of "positive coordination" that are very transaction cost intensive but bear the potential to overcome veto positions.[33] Negative coordination without actor veto power significantly reduces transaction costs as no reaction has to be expected from the transaction recipient, (s)he just has to be informed.[34] In reality, it can already be effective (but inefficient) to include elements of positive coordination, because transaction costs would otherwise be prohibitive.

$H6_a$: A higher degree of positive coordination within CWEAPINs reduces their problem-solving efficiency.

$H6_b$: A higher degree of positive coordination within CWEAPINs increases their problem-solving effectiveness.

Measuring the CWEAPIN's network on the positive-negative coordination continuum may be done by calculating a network's embeddedness, or the degree of central integration of an actor in a network, respectively. Embeddedness may be tested in various ways, either on the network, on subgroups of the network or on the actor level (Scott 2017; Wasserman and Faust 1994). On the actor level, it is possible to label the actor's structural position in the organizational network, by the "degree" of an actor (completeness of relations), or e.g. the "betweenness" of the cantonal main office.[35] On the level of the CWEAPIN, the "level of completeness" of the overall graph or the average "degree" of an member-actor

[33] similar to Wälti's (2001) inclusive "mediative style" of negotiations, see section 4.1 on power balance
[34] Hypothesis 4a describes the relation between transaction costs and problem-solving efficiency as in an inverted u-shaped form. It is assumed in hypothesis 6a that full "negative coordination" is the saddle point, less than which would reduce the minimal availability of an agency's service.
[35] to what extent is the main actor a "passage oblige"?

may be calculated (Scott 2017). In this preliminary research stage, the idea is to check all measures and follow up on those that show an intricating result.

Throughput legitimacy

The variables of "throughput legitimacy" (as discussed in section 3.2 and 3.4, see Schmidt 2013) measure whether and how societal acceptance of a specific project affect problem-solving effectiveness and efficiency. How does TL matter for performance? Notice that the question is not about determining success factors for a higher rate of direct voter acceptance of the required zoning change for larger WE-projects, but rather about whether the degree of general legitimacy of a project affects the performance of the procedure as perceived by affected groups (planners, authorities, affected private people, NGOs). The theoretic expectation is that higher legitimacy increases networked performance (Klijn and Koppenjan 2016; Bryson et al. 2006; van Raaij 2006; Börzel and Risse 2005; Klijn and Koppenjan 2000; Human and Provan 2000; Coglianese 2000), by reducing complaints, which should accelerate the WEAP in time and increase satisfaction with the final authorization decision. Legitimacy has demonstrated to be such as strong effectiveness factor that even higher transaction costs may become irrelevant in the face of it (Human and Provan 2000, 360).

$H7_a$: Higher throughput legitimacy of a WEAP increases the CWEAPIN's problem-solving efficiency.

$H7_b$: Higher throughput legitimacy of a WEAP increases the CWEAPIN's problem-solving effectiveness.

In this project, TL is included as an index composed of six variables that indicate the degree of opposition or acceptance of a project. Whereas those people directly affected by the wind energy project may voice complaints, there are further options to file objections and therefore reduce problem-solving efficiency, such as the "VBR" ("Verbandsbeschwerderecht") that induces court filings and direct project challenges in court on the regional, cantonal and federal level. Whether or not the "VBR"-instrument is used is included as a dummy. Court filings are also included as a dummy, where the court levels are attributed different weight. The degree of opposition may also be interpreted as the negative degree of legitimacy-building efforts: if extensive stakeholder dialogues are held before the vote, this is assumed to reduce the degree of opposition afterwards.[36]

The rate of voter project acceptance (see Petrova 2013; Wüstenhagen et al. 2007; Breukers and Wolsink 2007; Bell et al. 2005), is in a necessity but insufficiency relation with the building permit. For pathway A-D, a positive land-use change vote must have necessarily occurred before phase 3 (or 2+) can be started. A wind energy project that is refuted at the voting booth or municipal assembly, must either be abandoned or reintroduced as a modified project into the WEAP. Hence, in implemented projects, voter acceptance has no variation (it must be "yes"). Its variation may stem from the number of times it has been put to vote before reaching popular acceptance. A complementary solution to the problem of analytical necessity is to treat this variable not as binary, but as a matter of degree where 50% are subtracted from the actual percentage of yes-votes. The rate of voter project acceptance is expected to influence problem-solving efficiency and effectiveness by boosting morale and trust in the

[36] This represents a simplification used for quantitative survival analysis: The effect of the degree of legitimacy building and stakeholder engagement is theoretically indeterminate as it prolongs the procedure *before* a vote, but it might save from delays introduced by court rulings and objections *after* a vote.

project and its collaborators (positive feedback-effects). A higher rate of voter project acceptance would "energize" the subsequent remaining authorization procedure. Higher degrees of voter acceptance or refusal will be given "more points" than closer voting outcomes. To arrive at the TL-score the various variables will be weighted and then summed up. Degrees of opposition have a negative algebraic sign and the rate of project voter acceptance a positive one. Weighting and aggregation details will be defined once the data is available. Table 2 below presents the summary of the preceding discussion.

Type	**1-L**	**2-SMR**	**3-SE**
Corresponding Pathway	*A & B*	*C & D*	*E*
Throughput legitimacy index			
(-) Direct complaints (maybe standardized or grouped)	0 - x	0 - x	0 - x
(-) Associations right of appeal (VBR)	0 - 1	0 - 1	0-1
(-) Number of court rulings (regional, cantonal, federal: cantonal and federal court procedures are given a multiple "regional" score, based on their average length	0 - x	0 - x	0 - x
(-) Number of times the project has been unsuccessfully been put to a vote	0-x	0-x	-
(-) Unsuccessful votes: % of yes-votes – 50%	0 to – 50%	0 to – 50%	-
(+) Successful votes : % of yes-vote –50%	50% to 0%	50% to 0%	-

Table 2: Throughput legitimacy variables for quantitative treatment in product C. Explanations of title abbreviations: L = Large; S = Small; M = Medium; R = Regular; E = Exceptional. (-) indicates a negative relation of the variable with TL, (+) a positive one.

4.3. Controls: Institutional Settings

Institutional settings represent the "background conditions" in the ACI that must be controlled for in order to establish comparability. This section presents these conditions that will have to enter the models. No hypotheses are formulated here, except for the measure of "throughput legitimacy" (see preceding section). However, this does not mean these factors are not of substantive interest. They are highly relevant, especially from a practitioner perspective. Moreover, for reasons of space, details of their measurement shall not be discussed here either.

Factor	**Effectiveness relation**	**Efficiency relation**	**Literature cited in**
Cantonal resources spent on wind energy	+	+	Resource munificence argument: Raab et al. 2013; Provan and Milward 1995
Authorities: previous experience with WEAPs	+	+	Jin et al. 2018; Alzahrani and Emsley 2013; Easton and Rosenzweig 2012; Reagans et al. 2005

Planners: previous experience with WEAPs	+	+	Like the previous category “WEAP experience of authorities”
Project input load	inverted u	inverted u	Physical constraint from higher throughput, yet benefit from repeated short-term “handling” of similar issues.
Wind potential	+	+	The existence of higher windspeeds on cantonal territory as a proxy for relevance in a canton (Schumacher and Yang 2018)
Canton allows for combined procedures (phase 2+)	n.a.	+	Substantial time savings expected from combined procedures
WE-Project type	–*	–	See typology in section 2.3. *it is assumed that the larger the project, the more it is probable that affected entities lodge complaints.
Throughput legitimacy	+	–	See typology in section 4.2 on modes of interaction.

Table 3: Institutional control factors. Source: own compilation

5. Research design: products, methods and empirical strategy

The practical workings of administrative federalism in the field of wind energy are analyzed in three different products (A-C). The concentration on the administrative aspects of federalism is given by the choice of procedure to be investigated and by the spotlight on the implementation phase in the policy-cycle. The first and the second product (A and B) answer the first sub-RQ and the third (product C) answers the second sub-RQ. The main analysis is product C, which is why the preceding theoretical build-up focuses on defining and explaining problem-solving capacity, product C’s dependent variable. Products A and B are preparatory in nature, leading the way towards a satisfactory empirical corroboration or refutation of explanatory factors in product C.

Each of the three products also separately deals with the problem of endogeneity inherent in studies on institutions and their effects. The relation between federal structures on one side and independent room of maneuver on the other points in both directions: federal organization (translated to specific designs of organizational arrangements) impacts interaction patterns, but interaction patterns will also affect the revision or stability of federal organization. In the present project, only the impact of organizational arrangements and interaction patterns on federal organization and on its problem solving capacity will be regarded. Effects of the inverted direction are made unproblematic with three strategies: product A is essentially descriptive and makes no causal claims, product B takes external (exogenous) explanatory

variables to explain differences in WEAP-clusters, and product C models problem-solving capacity, an exogenous dependent variable.[37]

	Product A *Sub-RQ I*	*Product B* *Sub-RQ I*	*Product C* *Sub-RQ II*
Inquiries	Survey I on the functioning of WEAPs/ CWEAPINs	secondary data on institutional variation between cantons	Survey II on WEAP-projects and project characteristics
Aim	Describe and compare CWEAPINs	Explain differences between CWEAPINs by forming clusters between similar CWEAPINs	Establish which policy, agency or institutional factors lead to more or less CWEAPIN problem-solving capacity
Method	Descriptive & Social Network Analysis	Cluster Analysis	Event History Analysis (also known as Survival Analysis)
DV	-	Cantonal institutional variation	Problem-Solving capacity: efficiency and effectiveness
Survey item categories	• Actor constellations • Modes of interaction • Controls: institutional settings and actor characteristics	• Cantonal data on municipal autonomy in RPG-matters • Data on specificities of cantonal governance	• Project controls • Project typology classifiers • Throughput legitimacy factors • Problem-solving efficiency • Problem-solving effectiveness
Target group of survey	Participants in CWEAPINs: public officers, planners, NGOs	-	Project managers that have the necessary data: take heads of cantonal main offices as a starting point, then follow up on their recommendations regarding data availability (piecemeal effort very likely)
N	520-600 recipients across all gov. levels: everyone in CH who has worked on WE-projects	26	Data on 120 or more WE-projects of all sizes would be optimal, minimally 80 for validity reasons

Table 4: DessCtrl-Project Research Design Overview. Source: own representation

Regarding problems of causal inference between network effectiveness and policy outcomes, Imperial (1999) cautions that no direct causal link between institutional arrangements (i.e. whether there are low or high transaction costs between administrative actors) and policy outcomes (how well the policy targets are reached) may be expected (458). However, I maintain that causally linking policy effectiveness with the internal performance of institutional arrangements is less problematic in the present case than if the problem to be solved were to address an "administration-external" set of challenges such as a e.g. deteriorating air quality. In our case, the challenge for CWEAPINs is essentially internal, the policy output represents the direct result of internal processes. It is therefore argued in this project that despite Imperial's (1999) caution, a direct co-varying (not causal) linkage may

[37] I would argue that the problem-solving capacity in the case of WEAPs does only negligibly influence interaction patterns, because organizational structures are general-purpose and must fulfill many functions.

be traced from institutional performance (network effectiveness) to the effectiveness of the WEAP policy (policy effectiveness). Table 4 above gives the reader a summary of the envisaged research design.

5.1. Product A

Product A conducts a social network analysis (e.g. Borgatti and Ofem 2010; Scott 2017; Wasserman and Faust 1994) that descriptively illustrates organizational arrangements and their interaction patterns. It will further allow for a judgement of whether the rules-in-form of federal organization are congruent with the rules-in-use of actual administration-interactions. In addition to serving as a baseline of information for the subsequent investigations, it will permit researchers to see whether the three-level structure is actually visible in interaction patterns or whether the interaction patterns reflect a network organizational style that crosses territorial levels and disregards the traditional organizational principle of "near decomposability" (see Scharpf 1997; Simon 1962) that an "efficient" hierarchical organization structure would require.

Product A's aim is to is to deliver an *institutional mapping* that illustrates the reality of networked collaboration and makes its essential pieces visible. Itself a subset of stakeholder analyses (McFadden et al. 2010, 4), an institutional map identifies the significant players and "[…] maps out their relative power, influence and interests in a certain domain […]" (Aligica 2006, 80). It is "[…] a basic tool for achieving an understanding of potential roles of the stakeholders and institutions involved […]" (Aligica 2006, 80). The mapping identifies the relevant actors and characterizes CWEAPINS. As a prerequisite, detailed organizational charts of all 26 cantons corresponding to the time in which WEAP-projects are/were held must necessarily be obtained. To do this, if I do not find them myself on the cantonal archive webpage, I will ask the cantonal "Staatskanzleien" to provide me with this easily available information. It is important that the organizational chart date from the years in which the project underwent the WEAP. The results of product A are threefold: first, social network graphs for every project-network that indicate the multiplicity and density of collaboration between various bureaus of different government levels will be produced. Second, in cantons where there has been more than one WEAP, the project-networks will be aggregated to cantonal CWEAPINs (1 per canton). Third, network-descriptive numbers stemming from network routines (as suggested in the chapter 4 on hypotheses) will be calculated and serve as main network-comparative measures. This will be done for project-networks and for their cantonal aggregates. In addition, a full network aggregate of all cantons will also be presented and its characteristics calculated.

In the SNA, organizations are the vertices (points) and collaboration the edges (lines). Units of analysis are the lower administrative offices of cantons ("*Fachstellen"*), the federal state and the planner/developer companies. Organizational boundaries are strictly based on attributing respondent (employee) to organization (employer). The choice of whom to include and whom to exclude from the mapping will be list-based. The mapping is based on 26 cantonal and a combined adjacency matrices in a directed ("digraph") setting. Collaboration exists or not between two points, it has an intensity and a direction ("task-giving" and "task-receiving"). For a pair of collaborators, there is thus a maximum of four collaborative links that each have varying intensity, but may be statistically reduced to one.

5.2. Product B

Product B first aims to classify interaction patterns in clusters and second, seeks to explain differences between these clusters by cantonal-level data. To reach the former goal, I will perform a cluster analysis based on variations in the previously calculated network routines. This will result in a typology of the cantons on the problem-solving procedure under scrutiny. Building upon the fist, the second step will attempt to statistically explain the clusters by resorting to readily available data that has frequently been used to explain variations in cantonal institutions (Arens et al. 2017; Koller 2013; Linder and Mueller 2017; Mueller 2015; 2011; Vatter 2018; 2014; 2002). Mueller (2015; 2011) provides a particularly promising database on local autonomy in the Swiss cantons.

At this point, it is not quite clear yet, which method of cluster analysis will be used. As the idea is not data reduction, for which Principal-Component Analysis is widely recommended (Costello and Osborne 2005; Preacher and MacCallum 2003), but rather the detection of underlying latent variables, an exploratory or common factor analysis seems recommendable (Preacher and MacCallum 2003; Costello and Osborne 2005). This choice would be further supported by the fact that the project is interested in looking at the CWEAPIN's common variance and seeing what factors impact this limited variance. Unique variance of a case is thus less important (Costello and Osborne 2005, 2). However, it might be beneficial to profit from data reduction capacities of principle-component analysis (see e.g. Vatter and Stadelmann-Steffen 2013). Aside from model use, it will further have to be decided how many factors should be retained and the rotation method to be employed (Preacher and MacCallum 2003, 14). It is clear that because factors might be correlated instead of assumed orthogonal, an oblique rotation method should first be chosen (Brown 2009) and depending on the Tabachnik and Fidell threshold of a factor correlation above or below 0.32, an orthogonal rotation method such as varimax might be more appropriate (if below 0.32, see Tabachnick and Fidell 2014, 646).

5.3. Product C

Product C – this dissertation's main product – evaluates the problem-solving capacity of CWEAPINs by means of the data collected in the previous two products. It asks the infamous "so what?" question on effects of institutional differences on performance in the presence of otherwise practically meaningless typologies. The dependent variables of problem-solving efficiency and problem-solving effectiveness will serve as a proxy for the problem-solving capacity of a canton. Both DVs represent a shift in focus rather than a fully complementary set of non-overlapping measures. Product C analyzes efficiency and effectiveness by means of an interaction-oriented policy study that relates institutional characteristics with policy implementation performance (see Scharpf 1997; Mayntz and Scharpf 1995) in the Swiss context. This is especially important in light of the many federalism reforms of the last decade in industrialized countries that have had efficiency considerations in mind (Braun 2008). The practical aim of this study is to allow policy-makers to critically reflect their current procedural designs.

Problem-solving efficiency

To analyze the impact of various independent variables on problem-solving *efficiency*, the instrument of the event history analysis (EHA) is used. In an EHA, the dependent variable is the so-called hazard rate (or conditional failure rate), a measure indicating the conditional probability that an event occurs at a

particular time (t) (Mills 2011, 2). The hazard rate can vary from 0 (no risk at all) to infinity (certainty of event happening at that time).[38] The occurrence of the event changes the state of a variable: in the present case the event is the decree that decides upon authorization or refusal of the construction permit for wind turbines. The time ("Verweildauer") until the event happens is the duration of the authorization procedure, the main dependent variable denoting problem-solving efficiency. To avoid making assumptions about the distribution of the dependent variable, a semi-parametric[39] cox-model will be employed. The partial likelihood estimation that will be used to estimate the models only use the order of the authorization procedures, not the time-value of the dependent variable itself, which in itself is a loss of information, but should not be a problem with the amount of authorization procedures under scrutiny. Model specifications will further have to include cantonal fixed effects and/or clustered standard errors.

A semi-parametric Cox-model is uniquely suited to the task for two reasons: First, the model offers useful interpretation and transformation possibilities of its estimates. The estimates may be (if they are exponentiated and 1 is subtracted from them, (Mills 2011, 94) interpreted as percentage increases or decreases in risk of the event happening, which is of practical relevance for this project. It will permit to say which factor increase or decrease the risk of receiving a (positive or negative[40]) decree. Moreover, the median (or marginal) effect in terms of survival duration (additional time until the event occurs) of an increase in an independent variable by 1 unit can be estimated. This means that it is possible to estimate the average delays caused by various covariates such as court orders, voting, etc. This, however, is only possible if a distribution of individual survival times is assumed[41] (Bender 2005).

The second reason why Cox-models are particularly fitting is because they can use right-censored data up until the case drops out, instead of discarding an "incomplete" case altogether. This essentially means that all the non-event information until cancellation or until the end of the study can be included in the parameter estimation without needing to be imputed (Mills 2011, 91). This is important for the present case, as WEAPs are frequently cancelled by the planners or owners if negative decisions are expected. It is only rare that negative decisions are actually issued (see footnote 40). WEAPs can thus have four outcomes: Planners either receive an observable positive or a negative decision, they can also be awaiting one or they have might have cancelled their project by themselves. Whereas only the observable decision within the study period directly refer to "fulfilling the event", the other two unobservable outcomes have no events and must be right-censored (see Cleves et al. 2016, 29f.).

Problem-solving effectiveness

The second operationalization of problem-solving capacity, as defined here, is problem-solving effectiveness. This dependent variable will be measured in an "index of output legitimacy" (IOL) that contains two dimensions asking about ex-post satisfaction with the WEAP and about whether the

[38] It has the unit $1/t$(Cleves et al. 2016, 15).
[39] I do not want to use fully parametric models as I do not wish to make the assumption that the model's residuals are normally distributed.
[40] Two models will have to be calculated, one where the event is « positive decree » and another where the event is defined as reception of « negative decree ». However, it is doubtful that enough cases may be found for a «negative decree»-model.
[41] To estimate the baseline survival function based on a Cox-model, the Kalbfleisch/Prentice or Breslow estimator may be used (Xia et al. 2018).

outcome presented a “win-win” situation for all WEAP-participants involved (see section 3.4 and Koppenjan 2008, 702). Because the IOL-scale will most likely be ordinal, an ordered logit or probit model will be appropriate. The set-up of independent variables can essentially be the same as for problem-solving efficiency – with fixed effects across cantons and/or clustered standard errors. Unfortunately, the parametric form of logit-models will require some assumptions, which are difficult to maintain, such as the normal distribution of errors. Like the EHA, ordered logit will also be able to output mean or marginal predicted probabilities.

Conclusion

This project proposes to investigate WEAPs and evaluate CWEAPIN problem-solving capacity, thereby refining theories of administrative implementation in federal Switzerland and delivering a sound statistical basis regarding the establishment of “best practices” for WEAPs. Theoretically, the DessCtrl-project aims at contributing to the neglected field of the federalism literature on its procedural workings, (“how federalism works in day-to-day practice”). Moreover, in combining various strands of academic literatures, including institutional federalism theories, aspects of multi-level governance, elements of organizational network effectiveness and transaction cost economics, as well as literature on the production of welfare in strategic settings, the project permits a broad synthesis of Swiss administrative practices. Such a synthesis is also presented by the project’s methodological approach: an innovative quantitative application of Scharpf/Mayntz’ ACI (1995) and a multi-method, modular approach, where latter analyses build upon the former is suggested. The project’s main social relevance is given by the goal of the ES 2050 that currently seems out of reach and the contemporary climate crisis that requires a fundamental pivot towards local green electricity production.

Nevertheless, various open questions, risks and insecurities remain. The largest challenge stems from the heavy reliance on survey data – a low response rate in the planned surveys could critically hurt the project as it has been sketched in this proposal. Hence, the empirical strategy that will be conceived based on this proposal, will have to provide strategies that reduce the risk of having a low response rate. As it is a large amount of data that has to be collected with surveys / interviews, “reducing questionnaires to the maximum” will present another challenge. As with all data collection instruments, care regarding the validity and reliability of questions will have to be applied. Moreover, lacking in experience, it is hard to estimate how much data collection is “too much” and what is feasible for a dissertation project.

In addition to empirical risks, there are also conceptual problems to be resolved: The largest one, in my opinion, stems from the cross-sectional design of the study. How the plaiting of institutional change across time in the aggregation of project-based organizational networks to CWEAPINs will work is yet unclear. Linking the institutional federalism literature with its empirically observable organizational setting will have to be done better as well. Theoretically, the rather “positivist” understanding of cantons, organizations and institutions will have to be explained more in detail too.

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