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Europeanization of the Swiss Energy System

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Preface

The successful transformation of the energy system requires research that is capable of building bridges. The two National Research Programs (NRP) “Energy Turnaround” (NRP 70) and “Managing Energy Consumption” (NRP 71) of the Swiss National Science Foundation focus on the scientific, technological and socioeconomic aspects necessary for a successful transformation of the Swiss energy system. One of the relevant aspects is the close interdependence of Switzerland with its European neighbors. The energy supply of Switzerland is highly dependent on imports of fossil fuels and combustibles as well as nuclear fuels and electricity, especially during the winter season. Guaranteeing the security of energy supply while at the same time achieving the sustainability objective of decarbonization is a major political challenge that requires close cooperation with supranational authorities (i.e. the European Union), international energy organizations and neighboring countries.

Against this background, the Steering Committee of the NRP 70 and NRP 71 launched two complementary studies aimed at answering the following guiding research questions:

(1) What implications does EU energy policy – including decentralization, decarbonization and digitization – have on the Swiss energy system in terms of the adequacy of existing policy instruments, the actors involved in the implementation of energy policy and the achievement of the objectives of the Energy Strategy 2050? By answering this question, the Steering Committee expected to identify the impacts of Europeanization on national policy issues, how the impacts will be distributed and, whether the Swiss policy instruments implemented to achieve the Energy Strategy 2050 are EU compatible.

(2) Are existing regulatory structures and governance strategies adequate to face the challenges posed by increased harmonization and liberalization? How should governance schemes be redesigned in order to safeguard the political objectives of the Swiss Energy Strategy

2050 and simultaneously accommodate the new and evolving EU energy policies? Prior to the complementary studies in the NRP 70 und NRP 71, there was only a fragmented understanding of what changing EU energy policies entail for the Swiss regulatory landscape. The second research question should close this research gap by studying the relative independence, power and relationships among the new policy actors, such as ElCom and Swissgrid, as well as the effectiveness of the new regulatory structures and divisions of responsibilities.

The two complementary studies have different perspectives. The research group around Prof. Dr. Peter Hettich, University of St. Gallen answers the questions raised comprehensively and competently from a predominantly legal perspective. This approach is complemented with a political science perspective in a profound study under the direction of Prof. Dr. Matthias Finger, Swiss Federal Institute of Technology, Lausanne.¹

The two studies demonstrate that Switzerland is part of Electricity Europe even without EU membership. The pending adoption of the institutional agreement with the EU impedes the conclusion of an electricity agreement. Without such an agreement, the cooperation between Switzerland and Europe will be limited to the technical aspects of the electricity grid – even though Switzerland is a full member of the European Network of Transmission System Operators for Electricity (ENTSO-E). Electricity trading with Europe is an important pillar of the Swiss efforts to increase the flexibility of the supply-side system. The early signing of the electricity agreement between Switzerland and Europe is of utmost importance with regard to grid stability and security of supply.

On behalf of the Steering Committee of the NRP 70 and NRP 71, I would like to thank the authors for their thorough analysis. Special

¹ More information on these projects is available at www.nfp-energie.ch (www.pnr-energie.ch / nfp-energy.ch): Matthias Finger et al., *Die Schweiz und die EU-Energiepolitik* / *La Suisse et la politique énergétique de l'UE* / *Switzerland and EU energy policy*; Peter Hettich et al., *Europäisierung des Schweizer Energiesystems* / *Européanisation du système énergétique suisse* / *Europeanization of the Swiss Energy System*.

thanks are also due to the members of the advisory group from industry and politics, who supported the research work with their expertise. The cooperation between science and practice is a success factor of the NRP as it contributes to the societal relevance of the scientific work supported by the Swiss National Science Foundation.

Prof. Dr. Andreas Balthasar

*President of the Steering Committee of the
NRP 71 “Managing Energy Consumption”*

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The authors thank David Kolcava for his valuable contributions when researching this study and Dr. Merla Kubli for facilitating a synthesis workshop. Furthermore, our appreciation goes to the members of our international advisory board, especially Prof. Andreas Goldthau, PhD, Professor in International Relations at Royal Holloway University of London and Director of the Centre of International Public Policy, for commenting on earlier drafts of this report. We also want to thank Dr. Fabian Joas, Senior Associate EU Electricity Market, Economist and Political Scientist with Agora Energiewende, Jean-Christophe Füeg, Head International Energy Affairs with SFOE, and Imke Luebekke, Head of Unit, EU Climate and Energy Policy, WWF European Policy Office in Brussels.

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St. Gallen, in October 2019

*Peter Hettich, Philipp Thaler, Livia Camenisch,
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Summary

This study examines the impacts of the Europeanization of Swiss energy policy. The main question we seek to answer in this report is not *whether* but *to what degree* and *at what pace* Swiss energy policy becomes europeanized under different scenarios. The focus is placed on necessary adaptations of the Swiss energy governance structure and implications for the achievement of the goals set in Switzerland's Energy Strategy 2050, in particular as far as investments in renewable energy by decentralized producers and by professional energy investors are concerned. The impacts are assessed under the two scenarios "direct Europeanization", based on an institutional agreement and an electricity agreement between Switzerland and the EU, and "indirect Europeanization" without such agreements. The study draws on legal, political, and management sciences to assess the impacts of Europeanization on the Swiss energy transition as well as on public and private actors.

Many physical links connect the Swiss and the European energy infrastructures. These links will remain in operation for the time being and they enable, first of all, cross-border flows of electricity and gas, both of which contribute to the security of energy supply in Switzerland.

The European internal energy market is still not fully integrated and does not rest on a harmonized energy policy. However, the internal energy market is evolving, having reached a high degree of formalization of its institutions and regulations. At the time of writing, Switzerland participates – to varying degrees – in European bodies that coordinate cross-border flows of energy as well as in commercial platforms that facilitate cross-border trading of electricity. The high degree of formalization of the internal energy market, as well as ongoing discussions related to Brexit, limits the scope for carve-outs and tailor-made bilateral agreements. For Switzerland, the main obstacles to conclude an electricity agreement are the pending adoption of the institutional agreement as well as the adoption of some controversial elements of

the European *energy acquis*. Although the EU considers ambitious renewable policies as a prerequisite for the electricity agreement, the European regulations on renewable energy probably will not be formally included in the electricity agreement; this limits the impact of Europeanization with regard to the goals of the Energy Strategy 2050.

To further develop the Swiss energy system, there are ways forward with and without an electricity agreement. In either scenario, it is important that Swiss actors adapt to changing patterns of access to EU institutions and markets. An electricity agreement provides clear guidance on how to develop Swiss energy governance, and it provides legal security regarding the commercial terms of trade with the EU. Without an electricity agreement, the elements of European energy governance need to be assessed on a case-by-case basis to determine their potential contribution to secure electricity supply and to the goals of the Energy Strategy 2050.

Recommendations in a scenario with an institutional agreement and an electricity agreement

An electricity agreement enables “market coupling”, a mechanism facilitating cross-border trade of electricity. We expect market coupling to benefit actors engaging in cross-border trade, e.g., larger utilities and large pump storage plants. Because of its leveling effect on wholesale prices and enhanced cross-border trading opportunities, market coupling might redirect investment flows in Switzerland to lower-cost generation sources (hydropower and solar), resulting in less diversification of the Swiss renewable energy mix. Combined with support schemes that expose investors more to electricity price risk, this would benefit less expensive energy sources and sources which are easier to implement in terms of permitting. However, prospective imbalances in renewable energy generation, even with a strong tilt towards hydro and photovoltaics, are less of a concern with efficient cross-border trade. The proper balancing of the energy system will be easier with full market integration, providing relief for Swissgrid.

The institutional agreement implies that the electricity agreement will require compliance with EU Guidelines on State aid for environmental

protection and energy, which restricts the choice of permissible support instruments for large-scale renewable producers. Even with an electricity agreement, an exclusive promotion of Swiss generators is possible; however, by 2023, the European Commission may introduce an obligation to offer a small portion of financial support to foreign producers. Regardless of this possible obligation, large-scale electricity generation plants may be supported only by market-responsive regimes like green certificates or feed-in premia (whose size is preferably determined by auctions). In particular, some of the current support measures for large Swiss hydropower plants conflict with European state aid rules. Although these support measures will phase out soon anyway, Swiss cantons want to preserve legal possibilities for the creation of new federal hydropower support schemes if needed in the future to achieve the targets of the Energy Strategy 2050. For small-scale renewable producers and local renewable energy communities, EU law provides for exemptions from the competitive allocation of financial support and for relief from competition. Most of the Swiss support measures for small renewable generators are compatible with European law. Even after the general phase-out of direct subsidies, the current structure of grid charges provides indirect financial incentives for prosumers; these indirect incentives remain permissible under European law.

An electricity agreement will likely enhance the opportunities of Swiss key actors to shape European energy governance by formalizing or securing their roles within important European bodies (ElCom observership in ACER, Swissgrid in ENTSO-E, and SFOE in bodies of the European Commission and the Council). Although Switzerland will still not enjoy the same formal position as EU member states, its increased formal access will provide it with more opportunities for shaping European energy policies. Still, coordination among Swiss key actors (SFOE, ElCom, and Swissgrid) will be important for turning access into influence. In addition, Swiss influence will continue to rely on informal contacts, technological know-how, and the structural power arising from its important transit function for European electricity flows.

Recommendations in a scenario without an institutional agreement and an electricity agreement

Without an electricity agreement, we expect conditions of trade to deteriorate over time, most likely leading to less cross-border trade than in a scenario with an agreement, to inefficiencies in the European and Swiss electricity system, and to (relatively) higher wholesale prices in Switzerland. To the extent that higher electricity wholesale prices in Switzerland translate into higher electricity retail prices for Swiss consumers, this might create disadvantages for energy-intensive industries and vulnerable consumers. In other countries, increasing electricity prices, whether they are causally related to energy policy or not, have led to controversial political debates. A similar development in Switzerland could create challenges for the social acceptance of the Energy Strategy 2050. However, higher prices might also create incentives to reduce electricity consumption and to deploy higher-cost generation and storage technologies.

In addition, Switzerland is likely to be increasingly excluded from European energy governance bodies. The process of exclusion has already started, but assessments of how severe it might become differ. This uncertainty is due to the fact that decisions on future access of third countries like Switzerland are highly political and dependent on developments in the context of Brexit. Formal access points of Switzerland that may be put at risk include ACER, ENTSO-E, and forums under the European Commission. A loss of formal access will render the physical management of the Swiss electricity grid even more challenging and it will reduce Swiss capacities for electricity imports. Only the continuing physical interdependencies between the Swiss and EU electricity grids as well as informal channels of influence (e.g., the Pentilateral Energy Forum) may still provide Switzerland with some limited, yet increasingly instable influence.

In this scenario, Swiss regulatory structures need to be shaped to the needs of the Swiss energy system. In particular, there will be a need to diversify the domestic mix of generation and flexibility sources. Legis-

lators will need to create incentives for a balanced portfolio of electricity generation technologies, with sufficient options to invest in domestic storage and to market flexibility. Looking at flexibility, the Federal Council has proposed draft provisions, which are subject to parliamentary debate and a referendum and which provide room for enhancement. Sector coupling is not an issue in the pending reforms, but might gain importance in a scenario without an electricity agreement. Even in the EU, there is still a debate on whether energy-only markets create sufficient incentives to invest in generation capacity. Nevertheless, the Federal Council keeps pursuing the goal of a fully liberalized energy-only-market, although its benefits on overall welfare are unclear in a situation without an electricity agreement. To shield their domestic electricity industry from the pressure of fully liberalized markets, many European countries have created capacity mechanisms, such as strategic reserves. Switzerland, in contrast, disposes of large potential import capacities, which makes it difficult to establish capacity mechanisms in line with European law; nevertheless, the EU might be inclined to agree to a “storage reserve”. Without an electricity agreement, national security concerns gain more weight and additional options might be needed to create a “storage reserve” that is sufficient, as tentatively envisaged by the Federal Council. A well-designed replacement for the current support schemes might alleviate concerns about declining domestic production and, concurrently, provide incentives to invest in renewable energy. Regarding the buildup of (system-serving) storage capacity, the structure of grid charges may provide decisive incentives to invest; today, however, such incentives for building storage are limited to pump storage plants.

Regardless of an electricity agreement, and in the light of the phase-out of financial support for Swiss renewables that will happen in due time, achieving the objectives of the Energy Strategy 2050 requires improving framework conditions for investing in capacity. Serving as a source of inspiration, European rules on streamlined permitting procedures and regulatory predictability could lower the perceived policy risk for investments in Swiss renewable generation and hence reduce

the financing cost of Swiss renewable projects. However, Swiss multi-level governance poses challenges in implementing such changes, in particular regarding planning permits. The conditions for Swiss small-scale renewable producers could be further improved (in line with EU law) by enabling and encouraging them to sell their electricity to a wider range of actors through peer-to-peer trading and power purchase agreements (PPAs). Promoting self-consumption may significantly foster investments in small-scale solar generation by Swiss homeowners. Two measures included in European law can be implemented in this regard: network tariffs that do not discriminate against battery storage and a widening the definition of self-consumption.

Remarks on data and methods

This report has been compiled between May 2018 and April 2019, and it was revised in June 2019. The analysis rests on academic and media sources, public and legal documents as well as on 33 semi-structured interviews with 35 interviewees (a list of interviewees is provided in Annex II) and a survey of 750 Swiss homeowners interested in investing in a solar PV system for their house, that was conducted in December 2018. The implications of the two scenarios (with vs. without an electricity agreement) were developed in a model building workshop that involved all authors of the report. The report takes into account data and information available at the end of March 2019. All legislative acts of the Clean Energy for all Europeans Package are considered in this report in their final and officially published version. However, the Electricity Regulation as well as parts of other legislative acts will only enter into force at a later point. An advisory board has been established to accompany this study (details provided in Annex VII). The authors shared the draft final report with the group led by Prof. Matthias Finger, who was conducting a parallel study on the same topic, and drafted a joint summary on the impact of Europeanization on the Swiss energy system that draws from conclusions of the two parallel reports.

1. Concepts of Europeanization and Multi-level Governance

Swiss energy governance takes place in a multi-level system that comprises the federal, cantonal, and municipal levels (Thaler et al. 2019). The federal level sets national energy and climate targets and creates important framework conditions, in particular for the electricity sector. It decides on the electricity market design, provides financial incentives in support of the energy transition, shapes the development of the transmission grid, and is in charge of most of the foreign energy policy of Switzerland. The cantons have extensive regulatory competences as far as the energy consumption of buildings and sites for renewables are concerned. Moreover, they are owners of cantonal utilities. The municipalities implement cantonal regulations, they can provide incentive schemes for renewables and energy efficiency, and oftentimes they own municipal utilities. A distinctive feature of Swiss energy governance is direct democracy: referenda and initiatives serve to legitimate strategic decisions, such as the phase-out of nuclear energy, but socioeconomic and urban-rural cleavages play an important role in shaping their outcomes. The distribution of competences across government levels and differences in policy preferences across cantons and municipalities imply that Swiss energy governance is subject to tensions and requires some coordination, but also provides sandboxes for innovative energy policies and mutual learning regarding policy design. It is therefore not the Confederation, but progressive cantons and municipalities that set the pace of the energy transformation.

Multi-level governance (MLG) is a political science concept referring to the distribution of authority across different government tiers, including supranational, national, provincial, and municipal levels (Hooghe/Marks 2003). Recent scholarship has also considered governance beyond the public sector, i.e., through private and hybrid actors (Newell et al. 2012). Multi-level governance helps to describe who has decision-making authority, who can influence decisions, and

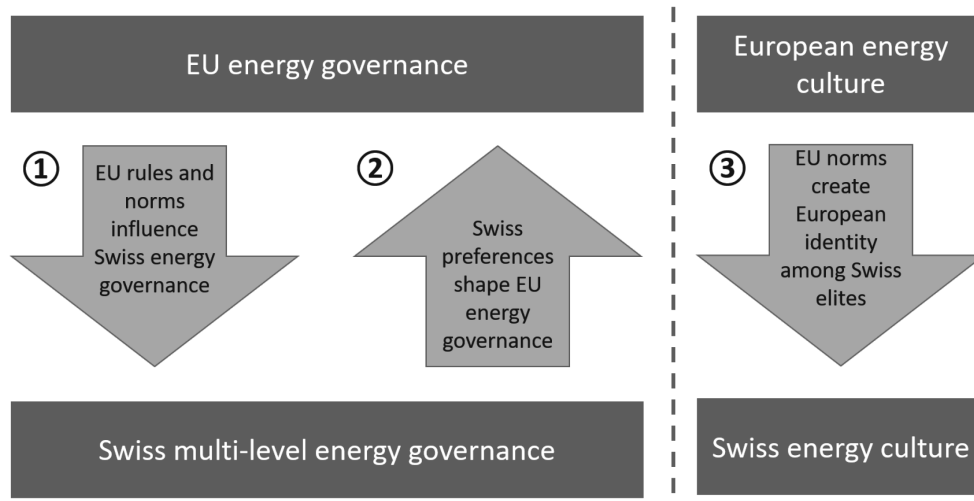
how. Researchers have analyzed both vertical channels of influence between governance levels and horizontal linkages between different actors on the same level (cf. Stephenson 2013: 829). They have paid particular attention to veto points (Scharpf 1988, 2006), softer channels of influence like learning (Egan 2009; Zito/Schout 2009), and coordination mechanisms (Kern/Bulkeley 2009; Strebel 2011). In the energy field, multi-level governance has proven a useful concept for analyzing both domestic energy politics (Ohlhorst 2015; Smith 2007) and their interaction with the supranational level (Jänicke/Quitow 2017).

The European Union (EU) has emerged as a new (at this point informal) level on top of Swiss multi-level energy governance. European and Swiss decisions on energy governance mutually influence each other because of the physical interconnectedness between Switzerland and neighboring EU countries. The result is typically referred to as “Europeanization”: a growing entanglement of EU and national levels of governance. With unprecedented deepening of European integration following the Maastricht Treaty in 1992, EU scholars sought to capture the reciprocal dynamics between European and member state levels of policy-making (Börzel 2002; Knill/Lehmkuhl 2002). Since then the focus has extended to EU accession countries (Featherstone 2003) and the immediate neighborhood (Schimmelfennig/Sedelmeier 2005; Gawrich et al. 2010; Börzel 2011; Subotic 2011) as well as specific (regulatory) policies (Graziano/Vink 2007: pt. 4). Regarding Switzerland, however, systematic analyses of Europeanization processes are rare until today (some of the few examples include Fischer 2003, 2005; Jegen 2009; Papadopoulos 2008). This is a serious shortcoming because Europeanization adds further complexity to the energy governance system—even for non-members like Switzerland. The multi-level governance perspective employed in this report helps to disentangle this phenomenon and to explore the multi-faceted relationship between Swiss and EU levels of energy governance.

In this report, we limit ourselves to three mechanisms of Europeanization (Figure 1). These mechanisms reappear in the literature (cf. Olsen 2002; Featherstone/Radaelli 2003; Wong 2005) and help to understand the Swiss context of multi-level energy governance. Accordingly, Europeanization can be triggered by the following mechanisms:

1. A top-down process of national adaptation, whereby formal and informal rules, procedures, and norms of the EU policy process cause a reorientation of national politics and policy-making (Ladrech 1994: 69). Addressees of this mechanism can be EU member states, causing “central penetration of national systems of governance” (Olsen 2002: 923), as well as non-members, such as Switzerland, causing an expansion of EU rules and practices beyond EU territory (Lavenex/Schimmelfennig 2009; Olsen 2002: 924).
2. A bottom-up and horizontal process of national projection, whereby domestic preferences, models, and ideas are uploaded to the supranational level or transferred to other national levels (Bulmer/Burch 2001). At the EU level, this mechanism typically leads to the development of new institutions or policies (Olsen 2002: 923).
3. A top-down process of identity reconstruction, whereby elites (i.e., key actors who shape the sector, including decision-makers, public officials, and influential private and non-governmental stakeholders) become socialized into reorganizing their own perception of territoriality and peoplehood (Borneman/Fowler 1997). Domestically, this mechanism can lead to an increased feeling of ‘Europeanness’ among these elites (e.g., promoting the perception that the energy transition is a shared challenge) that is not necessarily found among the population (e.g., Hooghe 2003).

Figure 1: Three mechanisms of Europeanization



Source: Authors

The research undertaken for this report focuses on top-down and bottom-up processes of Europeanization in energy governance (mechanisms 1 and 2). These mechanisms emphasize how preferences, rules, and norms travel from one level to another, shaping institutions and policies. They are not mutually exclusive but can develop in parallel and affect one another. The report examines how EU energy legislation and technical standards influence – or do not influence – the Swiss energy landscape (federal, cantonal, and municipal energy policies as well as the electricity sector). Moreover, the analysis considers where and how Swiss federal institutions and major private actors can exert influence on EU energy policies (formal and informal influence, coordination of work and interests) and vice versa. To contextualize our observations, we consider physical and economic interdependencies as well as sociopolitical aspects. In addition to the Europeanization of energy governance, we briefly discuss the Europeanization of Swiss energy culture (mechanism 3). This mechanism highlights changes in the perception of the Swiss energy system because of a reorientation of elite identities. Timewise, our analysis considers the status quo as well as expected changes with and without an electricity agreement (for a historical analysis, see van Baal et al. 2019: 3-17).

Given the high degree of physical network interconnectedness of the Swiss and EU electricity network, this report starts from the assumption that some extent of Europeanization is taking place, irrespectively of the successful conclusion of the electricity agreement. With such an agreement, we expect a dominance of ‘direct Europeanization’, originating from the requirement for Switzerland to implement a considerable part of the EU’s *energy acquis*. Without such an agreement, we still expect ‘indirect Europeanization’, meaning that rule harmonization will become necessary to effectively govern the complexities associated with network interconnectedness (like, e.g., cross-border trade of electricity). The main question we seek to answer in this report is therefore not *whether* but *to what degree* and *at what pace* Swiss energy policy becomes europeanized under different scenarios. Nevertheless, we observe that many aspects of the energy transformation will neither be part of the electricity agreement nor of the *energy acquis*. In our opinion, it is crucial to recognize and preserve some of these “gaps” since they provide room for regional and local initiatives and experiments.

2. Europeanization of Swiss Energy Policy

This section discusses top-down processes of national adaptation to EU energy legislation (Europeanization mechanism 1). At the time of writing this report, two important parameters of the study have not been settled: 1. The draft electricity agreement between Switzerland and the EU is not public. 2. The draft market design for Switzerland (proposed in the revised Stromversorgungsgesetz [rev. StromVG]) has not passed parliamentary deliberations. For Switzerland, however, the electricity agreement will mainly be an obligation to implement the European law as it is, with limited carve-outs laid down in the agreement (e.g., grandfathering of certain subsidies). Further, we expect that the finalized electricity market design will not require fundamental amendments if the electricity agreement is adopted.

The electricity agreement will encompass some of the latest legal developments in the EU, even though negotiations were started on the basis of the third internal energy market package. An important focus of the contracting parties will be market access and security of supply. Consequently, the agreement will lay down rules on cross-border electricity trading, on the use of the Swiss transmission grid, on harmonized safety standards, on market access, on Switzerland's participation in various committees, and on compliance with the Regulation on wholesale Energy Market Integrity and Transparency REMIT (SFOE 2012b; Hettich et al. 2015: 8). At some point, the Directive on the promotion of the use of energy from renewable sources (RE Directive) was also part of the negotiations (SFOE 2012b; Federal Council 2013: 7582). Today, it appears that the implementation of the RE Directive will probably not become a part of the electricity agreement. At present, the guiding principles on environmental protection, competition, and state aid are laid down in the institutional agreement, which the Federal Council published on January 16, 2019. According to the provisions of the institutional agreement, the electricity agreement will need to adhere to the same state aid rules that are applicable in the EU.

The agreement will neither encompass the gas market nor energy performance in buildings (e.g., heating and cooling). As these issues are left to autonomous Swiss legislation, we do not address them in detail.

2.1. Promotion of Renewables

The aim of this section is to discuss the possible influence of the EU policies for renewable electricity generation on Swiss energy policy. In the EU, the promotion of renewable energy generation is guided by the RE Directive as well as by state aid rules, both of which leave considerable leeway to member states to implement various promotion schemes. Since the RE Directive will probably not become a part of the electricity agreement, Switzerland will not be bound by these European rules, but might make use of them as a source of inspiration. Nevertheless, the pending institutional agreement implies that Switzerland must comply with EU Guidelines on State aid for environmental protection and energy. European state aid rules, considering the detailed guidelines issued by the European Commission, provide a rather strict framework for support mechanisms for renewable energy generation. However, the European Court of Justice, in a landmark decision issued on March 28, 2019, has ruled that the German promotion scheme does not constitute “state aid” according to European law². Taking this very recent development into account, Switzerland – by adopting many elements of Germany’s promotion scheme – might retain considerable autonomy when implementing subsidy regimes for renewable energy generators. Still, the specific consequences of this decision remain unclear at this point, and our interviewees were unable to make predictions on this issue.

Hereafter, we first illustrate key aspects of EU support policies for renewable energy (2.1.1.); then we discuss regulatory gaps and mutual influences between EU and Swiss regulation (2.1.2.). This section will therefore address concerns about the compatibility of existing and

² Bundesrepublik Deutschland v Europäische Kommission, ECJ C-405/16 of 28 March 2019.

currently discussed Swiss policy instruments designed to achieve the renewable energy goals formulated in the Energy Strategy 2050 with EU law. The table in Annex III summarizes the main findings of this section.

2.1.1. European Policies for the Promotion of Renewables

The EU has recently agreed on a new target for renewable energy generation: The Renewable Energy Directive (RE Directive), which entered into force in December 2018³, sets a binding EU-level target of at least 32% share of renewable energy in gross final energy consumption across the electricity, heating and cooling, and transport sectors by 2030 (Art. 3 RE Directive). Member states are required to draft National Energy & Climate Plans outlining how they will meet the new targets. The directive contains a clause for a possible upward revision of this target by 2023. Measures to achieve the renewable energy target in the electricity sector in the EU include:

- a) National financial support schemes (Art. 4-6 RE Directive), subject to EU state aid rules for environmental protection and energy (State aid Guidelines) and differentiated between large- and small-scale generators;
- b) A regulatory framework that promotes local renewable energy communities (Art. 22 RE Directive);
- c) Measures to reduce the administrative burden and provide certainty on the length of permitting and grid connection procedures (Art. 16-17 RE Directive);
- d) A regulatory framework that empowers self-consumption of renewable electricity (Art. 21 RE Directive).

³ The RE Directive is part of the EU Clean Energy Package (European Commission, 2016c) and has entered into force on 24th December 2018. Member states will have to transpose the new elements of the Directive into national law by the end of June 2021 (Art. 36 para. 1 RE Directive).

a) National Financial Support Schemes

The compatibility of national financial support schemes with state aid guidelines is evaluated by the European Commission on a case-by-case basis.

EU rules differentiate between large-scale (>1 MW⁴) and small-scale electricity generation plants (<1 MW). As far as large plants are concerned, EU rules expose them to market price signals and envisage a competitive allocation of financial support. More specifically, financial support to large-scale generators should be market-responsive and granted by means of an open, transparent, and competitive procedure. Among EU member states, the most popular solution to achieve this is through sliding or fixed market premia (i.e., a system where a direct payment is granted in addition to market revenues⁵) whose level is determined by a competitive tendering procedure (i.e., an auction). An alternative solution is granting financial support by way of green certificates (i.e., a quota system). Both solutions, contrary to a feed-in system, expose investors to electricity price signals and electricity price risk, hence impacting on the financing costs of renewable capacity, although to different extent (see below, 3.3.1.).

Regarding the promotion of small-scale renewable energies (<1 MW), the new EU law introduced exemptions from competitive procedures and market-based support for small-scale plants, demonstration projects, and local renewable energy communities that run small-scale

⁴ According to the Guidelines on State aid for environmental protection and energy, aid may be granted without a competitive bidding process to plants that operate within certain thresholds (small-scale versus large-scale plants). The threshold for this exemption is set at 1 MW (and 6 MW or 6 generation units for wind energy; recital 127 State aid Guidelines). The threshold may be lowered with the planned revision of EU state aid rules.

⁵ More specifically, under a market (or “feed-in”) premium scheme, electricity from renewable energy sources is typically sold on the electricity spot market and producers receive a premium on top of the market price of their electricity production. Fixed market (or feed-in) premia are set at a constant level independent of market prices. Sliding (or “floating”) market premia are calculated on a continuous basis as the difference between (technology-specific) market prices (usually averaged over a certain period of time, e.g., one month) and a predefined reference tariff level; if market prices are higher than the reference tariff level, no premium is paid.

plants. This principle was introduced to ensure that these actors participate on an equal footing with professionally-run large generators (recital 16 et seq., 26 RE Directive). Hence, non-market-based financial support schemes, including feed-in tariffs or one-off investment grants, are still possible for small-scale renewable generators under the new EU rules.

The RE Directive introduces a predictability and stability principle for financial support (Art. 6 RE Directive). More specifically, it introduces an explicit ban to retrospective policy changes that undermine the economic viability of existing projects that already benefit from support: the level of support may be adjusted ex post only according to objective criteria made clear in the original design of the support scheme. Moreover, member states shall publish a transparent schedule anticipating the expected allocation of support for a 3-year horizon.

As a rule, support should be granted on a technology-neutral basis, although justified limitations to specific technologies are foreseen (Art. 4 para. 5 RE Directive; recital 126 State aid Guidelines). EU-compatible support schemes probably need to be opened on a limited basis to foreign-based projects. By 2023, the RE Directive foresees an evaluation to assess the need to introduce an obligation for member states to open participation in their support schemes to producers in other member states. An obligation of opening 5% of the support schemes for foreign-based projects by 2025 and 10% by 2030 is therefore possible (Art. 5 para. 5 RE Directive).

b) Local Renewable Energy Communities

The regulatory framework for renewable energy communities is subject to the Electricity Directive (hereafter ED), which sets rules for an entity called “citizen energy community”. Local renewable energy communities should be clearly distinguished from traditional energy companies according to the RE Directive (cf. recital 71 and Art. 2 (16) RE Directive). They own and develop RE projects and share the energy that is produced by community-owned installations among their

members. Energy communities can also engage in electricity distribution (i.e., they can own, rent, or purchase their own electricity distribution network), aggregation, storage, energy efficiency services, charging services for electric vehicles and they can provide other energy services to their shareholders or members (Art. 2 (11) lit. c ED). They should be controlled by shareholders or members that are natural persons, local authorities, including municipalities, and SMEs located in the proximity of the RE projects owned and developed by the community; they should allow open and voluntary participation (Art. 2 (11) lit. a ED) and be constituted as not-for-profit organizations (i.e., have environmental, economic, or social community benefits for their members as their primary purpose rather than financial profits; Art. 2 (16) lit. c RE Directive; Art. 2 (11) lit. b ED). As mentioned above, member states can design ad hoc support schemes for communities (Art. 22 para. 7 RE Directive); however, no exemptions from charges or levies are foreseen for local renewable energy communities, especially when they use the public grid to transfer energy among their members (Art. 22 para. 4 lit. d RE Directive).

c) Administrative Burden and Permitting

Measures to reduce the administrative burden and permitting uncertainty for RE project developers include the establishment of a single contact point (“one-stop-shop”) to coordinate the entire administration process (including building, repowering, operating, and grid connection permits; Art. 16 RE Directive). The contact point should also provide an online manual of procedures for developers of renewable energy production projects. Permitting should not exceed 2 years (extraordinary circumstances could warrant an extension by one additional year) if capacity is above 150 kW; it should not exceed 1 year (extraordinary circumstances could extend by one additional year) if capacity is below 150 kW or in case of repowering of existing renewable energy plants. However, judicial appeals or other proceedings before a court may extend the duration.

d) Regulatory Framework empowering Self-Consumption of Renewable Electricity

As mentioned above, the promotion of renewable energy in the EU also includes a regulatory framework that empowers self-consumption of renewable electricity (i.e., prosumers). More specifically, the new RE Directive regulates the deployment of decentralized production aimed at renewables self-consumption (power generation “behind the meter”) and the Electricity Directive regulates principles for the charging of network costs on households and low-voltage consumers. Key provisions are the following:

1. Right to be a renewables self-consumer (Art. 2 (14) and 21 para. 1 and 2 RE Directive): Consumers should be allowed to 1) install technologies to produce electricity within their own premises⁶ for their own consumption, 2) (self)-consume the electricity they produce, 3) install storage systems and store the electricity they produce, and 4) sell self-generated renewable electricity. The right is not limited to households, but for non-household renewables self-consumers (e.g., small businesses), those activities should not constitute their primary commercial activity. Self-consumption could apply to different assets owned by the same consumer at different locations (loosening the principle that generation and consumption of electricity must be behind the same grid connection point), if permitted by the member state.

2. Right to be jointly acting renewables self-consumers (Art. 2 (15) and 21 para. 4 RE Directive): People living in the same building or multi-apartment block can self-produce and share renewable electricity produced on their site or sites between themselves. A third party can manage the installation and/or own it. There is no need to be configured as a micro-grid. The adjacency rule holds as jointly acting renewables self-consumers shall be located in the same building or

⁶ The premises should be within confined boundaries, unless explicitly allowed by the member state (Art. 2 para. 14 RE Directive). No specific reference to the use of the public grid is included.

multi-apartment block. Hence, the new EU rules exclude so called “virtual net metering” schemes which would allow electricity generated by solar panels on one roof to be credited to the bills of people in other buildings.

3. Right to peer-to-peer trading (Art. 2 (18) and 21 para 2 lit. a RE Directive): This refers to the sale of renewables self-consumers’ excess production of renewable energy by means of a contract with pre-determined conditions governing the automated execution and settlement of the transaction. No geographical limit is foreseen and there is no need for the trading peers to be independent from the public grid (e.g., to be connected by a micro-grid). Peer-to-peer trading can be conducted with or without a certified third-party market participant, who acts as an aggregator.

4. Right to be part of a power purchase agreement (Art. 2 (17) and 21 para 2 lit. a RE Directive): This means that the renewables self-consumers have the option to sign a contract with a legal or natural person for directly selling their excess production of renewable energy. No geographical limit is foreseen and there is no need for the counterparties to be independent from the public grid (e.g., to be connected by a micro-grid).

5. Reduced administrative and permitting procedures (Art. 16-17 RE Directive): With a capacity smaller than 10.8 kW, a renewables self-consumer shall be able to connect to the grid 1 month after notifying the Distribution System Operator (DSO), unless the DSO rejects the grid connection. A rejection must be based on justified safety and technical incompatibility grounds and it must be communicated within a limited period of time after the notification. Renewables self-consumers should benefit from a short predetermined time length of the permitting procedure (max. 1 year, possibly extended by an additional year under extraordinary circumstances) and from an ad hoc single administrative contact point to coordinate the entire permit granting process.

6. Exemption from grid charges and fees for self-consumption (recital 69 and Art. 21 para. 3 lit. c RE Directive): Limited to installations

smaller than 30 kW, as a general principle, renewable electricity individually produced and consumed within the same premises should not be subject to any fees and grid charges. Self-produced energy exempted from levies and grid charges also includes kWh stored in a battery located within the same premises. The 30 kW limit means that many renewable energy systems installed on non-residential buildings (e.g., a solar system installed on a farm roof) are unlikely to benefit from this indirect subsidy (as they are usually larger than 30 kW). Limited exemptions from this rule are foreseen⁷.

7. Market-based compensation for excess electricity sold to the grid (Art. 21 para. 2 lit. d RE Directive): Renewables self-consumers shall get paid for what they produce and feed back into the grid, and compensation for excess electricity sold to the grid should reflect its market value and may include a premium for the long-term value for the environment and society. Cost-reflective and non-discriminatory network charges could be applied to excess electricity sold to the grid to ensure that prosumers contribute in an adequate and balanced way to the overall cost sharing of the electricity system when electricity is fed into the grid. These provisions imply, first, that feeding excess electricity into the grid for free is not permitted. Second, they allow remuneration indexed at the wholesale market price, where some risks are transferred from the energy utility to the prosumer. Third, they leave room for a fixed top-up for positive externalities (fixed feed-in premium model). Fourth, they exclude the implicit remuneration of fed-back electricity at the retail price; in other words, the RE Directive is not compatible with “net metering of self-generation”⁸:

⁷ Namely: 1) in case the member state has other (alternative) efficient support schemes in place with non-discriminatory and effective access and the economic viability of the project is not undermined; 2) starting from December 2026, if the overall share of self-consumption installations exceeds 8% of a member state’s total electricity capacity installed, the national regulatory authority may perform a cost-benefit analysis through an open, transparent and participatory process; if the results of this analysis demonstrate that this creates a disproportionate burden on the long-term financial sustainability of the electric system, or that it creates an incentive exceeding what is objectively needed to achieve cost-effective deployment of renewable energy, and that such burden or incentive could not be minimised by taking other reasonable actions (Art. 21 para. 3 lit a and b RE Directive).

⁸ As defined in European Commission (2015b:10): “Net metering is a regulatory framework under which the excess electricity injected into the grid can be used at a later time to offset

excess electricity fed back into the grid cannot be used to offset consumption during times when onsite renewable generation is absent or not sufficient.

8. Principles for the charging of network costs on households and low-voltage consumers (Art. 18 Electricity Regulation [hereafter ER]): An increasingly important factor for the economic attractiveness of renewables self-consumption (Interview 27) are the principles for the charging of network costs on households and low-voltage consumers (incl. connection charges, charges for the use of the distribution and transmission networks, charges for related network reinforcement). As will be further discussed in 2.2.1, at the European level, the Electricity Regulation does not harmonize network charges to the extent initially intended by the European Commission. National policies for distribution tariffs are currently not coordinated and not harmonized in the EU. The general principle seems to be that network charges should not create disincentives for self-consumption and should not discriminate against energy storage.

2.1.2. European Influence on Swiss Policies for the Promotion of Renewables

The Swiss legislator has set ambitious targets (“Richtwerte”) for the buildup of new and the maintenance of existing renewable generation capacity (Art. 2 Energiegesetz [EnG]). Despite these targets, production and investment subsidies for new renewable capacity will phase out starting from 2023 (Art. 38 EnG). Until 2022, Swiss large hydro power producers (>10 MW) are eligible to benefit from a “market premium” that compensates for the difference between production costs and market prices (Art. 36 EnG).

The proposal for a new electricity market design (rev. StromVG) does not extend the financial support for renewable energies beyond the

consumption during times when their onsite renewable generation is absent or not sufficient. In other words, under this scheme, consumers use the grid as a backup system for their excess power production“. The applicable billing period can extend from one hour over long periods of time (e.g., one billing period) or one year.

planned phase-out deadline. However, it introduces two new measures that could indirectly support domestic renewables, especially large-scale ones: a storage reserve and the obligation to supply consumers with a minimum share of domestic renewable electricity, unless they explicitly opt out and switch to another power mix.

Should the Swiss legislator decide to approve these two measures and/or introduce new rules for the promotion of renewable energies, they would have to be designed in line with the EU Guidelines on State aid for environmental protection and energy, in particular in case of a ratification of the institutional agreement and the electricity agreement (see already today the obligations of Art. 23 para. 1 (iii) FTA). In addition to state aid rules, the Swiss regulation needs to be consistent with the prohibition of quantitative restrictions on imports or measures having equivalent effects (Art. 13 para. 1 FTA).

To our knowledge, the RE Directive is not likely to become a part of the electricity agreement that is currently under negotiation, hence Switzerland will not be bound by these European rules. However, even without an agreement, following the new European rules on renewable energies can avoid future regulatory conflicts and Switzerland might make use of them as a source of inspiration. The compatibility of the existing and proposed Swiss policies for the promotion of renewables with EU law is assessed below.

a) Support Measures for large RE Producers

Swiss measures currently in place to promote large hydropower plants (market premia) conflict with EU State aid Guidelines and the new EU rule for the promotion of large-scale renewables⁹, as they are not market-responsive and not set in a competitive manner. A different treatment between hydropower and wind power would also require justification to be compatible with the technology neutrality principle set

⁹ The definition of small- and large-scale producers is different in Switzerland and in the EU, which may impact Swiss law in case of an electricity agreement.

out in the RE Directive (Art. 4 para. 5 RE Directive). The recent landmark decision by the European Court of Justice¹⁰ on the German renewable support scheme could help to overcome this conflict, but the consequences of the decision are still unclear at this point, and our interviewees were unable to predict the effects of the decision. The conflict between EU State aid Guidelines and financial support for Swiss large hydropower plants is a matter of concern for Swiss cantons, who would like to have hydropower subsidies protected in the electricity agreement (as reported also by van Baal et al. 2019: 14-15). Although Swiss support measures for hydropower will phase out soon anyway, Swiss cantons want to preserve legal possibilities for the creation of new federal hydropower support schemes if needed in the future to achieve the targets of the Energy Strategy 2050 (Interview 13). The cantons are concerned that the limitation to ten years for support schemes under EU law (recital 121 State aid Guidelines) does not match the much longer timeframes for investments in hydropower and that EU decisions taken on a case-by-case basis create legal uncertainties. Moreover, the monitoring and enforcement of state aid raises institutional and constitutional questions (Interview 13).

As far as the existing support measures for RE other than hydropower are concerned¹¹, the long waiting list for support and uncertainty around the time needed to receive the support do not seem to be in the spirit of the EU rules on transparency, predictability, and stability of support (recital 29, Art. 4 and 6 RE Directive). However, there is no legal obligation to implement support schemes in the first place; thus, the financial stability principles foreseen in the RE Directive may also be seen as indicators of good energy governance.

Another indirect support measure for RE in Switzerland is priority-of-dispatch. Swiss grid operators are obligated to purchase electricity from renewable energy generators (Art. 15 para. 1 EnG) and the Swiss regulation foresees priority dispatch for RE generation facilities with

¹⁰ Bundesrepublik Deutschland v Europäische Kommission, ECJ C-405/16 of 28 March 2019.

¹¹ For a discussion on the Swiss guarantee of origin certificates and the related implications on this market in case of no agreement see van Baal et al. 2019: 15.

capacity <3 MW or a yearly production of maximum 5000 MWh net of any self-consumption (Art. 15 para. 2 EnG). Moreover, when allocating network capacities, electricity from RE, in particular from hydropower, takes precedence over electricity from other sources (Art. 13 para. 3 lit. c StromVG). The Swiss priority-of-dispatch rule may conflict with the new EU rules stating that Transmission System Operators (TSOs) shall only give priority to RE generation facilities with an installed capacity of less than 400 kW (Art. 12 para. 2 lit. a ER) and then dispatch the rest of power generation according to market-based, transparent criteria¹². An adjustment of Swiss regulations on priority-of-dispatch for newly commissioned renewable generators may be necessary to comply with the new EU rules.

Turning to proposed measures, the Swiss legislator provides for two additional indirect support measures for RE in the proposal for the new electricity market design (rev. StromVG). The first one, and at the same time one of the major changes in the market design, is a last resort storage reserve for energy (Art. 8a rev. StromVG), which shall complement the energy-only market and act as an insurance in unforeseeable critical shortages (Federal Council 2018c: 29 et seq.). The planned storage reserve will be technology-neutral and procured through regular, competitive tenders; physical grid connection to the Swiss grid will be the requirement to participate in the tenders. Depending on the exact design, the storage reserve may be assessed as state aid (for domestic hydropower plants) within the meaning of the EU rules. Still, the Swiss storage reserve might comply with EU state aid rules, as long as the positive effects of the reserve outweigh distortions of competition. Objections by the Commission are rather unlikely, as two strategic (capacity) reserves in Belgium and Germany have just recently been approved (European Commission 2018a).¹³

¹² For power generating facilities commissioned as from 1 January 2026 the threshold is set at 200 kW (Art. 12 para. 5 ER). Power generating facilities using renewable energy sources or high efficiency cogeneration which have been subject to priority dispatch prior to the entry into force of the ER shall continue to benefit from priority dispatch until the generation facility is subject to significant modifications (Art. 12 para. 6 ER).

¹³ The mechanisms approved in Belgium and Germany are technology-neutral, envisage competitive tenders and exclude foreign capacity from participation. The limitation of the storage reserve to storage connected to the Swiss electricity grid may be justified on the

However, a definite statement is not possible as the approved mechanisms are not limited to storage but also include generation facilities and demand response.¹⁴ Furthermore, both of the approved reserves are temporary and will be removed when the underlying market issue is solved; a similar termination may be necessary for the Swiss reserve¹⁵. Moreover, if the Commission assessed the storage reserve as a capacity mechanism, Switzerland would need to clearly identify and quantify security of supply risks addressed by the reserve – also taking into account Union-wide resource adequacy assessments (recital 43 et seq. ER)¹⁶. These legal uncertainties might be resolved by a waiver in the electricity agreement.

The other proposed measure is the arrangement that the standard electricity product in the basic supply is based on domestic and – essentially or solely – renewable energy (Art. 6 para. 2 rev. StromVG). According to the Federal Council, this is a contribution to the promotion of RE consistent with the EU's state aid regulation (Federal Council 2017c: 49). For this proposed measure to fully comply with EU rules, the Swiss legislation might only need to marginally amend it by allowing consumers to switch away from the default power mix more than once a year (Federal Council 2018c: 49). Even if the exclusion of foreign electricity from the basic supply were to be regarded as a trade barrier, the restriction could still be assessed as justified considering the ECJ's jurisdiction on nationally limited quota models¹⁷. Moreover, the exclusive promotion of Swiss installations is currently possible under the new EU rules for renewable energy (RE Directive), although by 2023 the European Commission may introduce an obligation to

same reasons (in both cases the Commission assessed the exclusion of foreign capacity to be justified due to the fact that in the extreme situations, in which the reserves are triggered, the import capacity will already be fully exhausted (European Commission, Germany Final, N 92, 125 f.; European Commission, Belgium, N 132).

¹⁴ In the sector inquiry on capacity mechanisms in 2016 no capacity payments were found dedicated solely to storage capacities (European Commission 2016b: N 289).

¹⁵ No. 121 of the State Aid Guidelines states that the Commission authorizes aid schemes for a maximum period of 10 years. After this period, measures should be re-notified if maintained (the ER contains a similar regulation regarding capacity mechanisms in Art. 21 para. 8).

¹⁶ Cf. Chapter 3.2.2.1. and 3.9.2. of the State aid Guidelines.

¹⁷ Ålands Vindkraft AB v Energimyndigheten, ECJ C-573/12 of 1 July 2014.

open a small portion of support to electricity from renewable sources of foreign producers¹⁸.

Finally, applying the RE Directive to Switzerland would require streamlining permitting procedures by introducing mandatory permitting deadlines and 'single points of contact' to guide applicants through the whole permitting process (Art. 16 RE Directive); however, procedural rights and multi-level governance in Switzerland might be an obstacle for the implementation of such provisions (Thaler et al. 2019: 4). Especially in the case of wind projects, centralization of location decisions by the federal government would probably not be backed by the cantons and the population, while limiting planning and approval procedures to the municipal level would make supra-regional coordination more difficult (Thaler et al. 2019: 4). Most probably, concentrating permitting procedures for energy projects at the federal level will require a constitutional amendment.

b) Support Measures for small RE Producers and Prosumers

The choice of the support instrument for small-scale renewable generation units (i.e., investment grant) currently in place in Switzerland until 2022 is compliant with new EU rules on financial support for small renewable producers (Art. 4-6 RE Directive). However, the long waiting list for support and the uncertainty of the timing of the grant might not conform to the spirit of the EU rules on transparency and predictability of support.

Despite the phase-out of production and investment subsidies in the forthcoming years, the Swiss legislator did not connect the amended electricity market design with a new support mechanism for small-scale production of RE. There are, however, implicit support measures for small RE producers and prosumers still in place in the revised StromVG, which in general should not conflict with EU rules.

¹⁸ With a view to a 5% opening by 2025 and a 10% opening by 2030 (Art. 5 para. 5 RE Directive).

First, Swiss grid operators are obligated to purchase electricity from plants using renewable energies (Art. 15 para. 1 EnG). As far as small producers are concerned, this does not conflict with the new EU rules on power generation dispatching that foresee priority of dispatch for renewable plants below 400 kW (as discussed above). Major conflicts are also not expected regarding the new EU rules that require the introduction of a prosumer's right to receive a compensation for excess electricity fed into the grid that reflects the market value of electricity and may remunerate its long-term systemic, environmental, and societal value (Art. 21 para. 2 lit. d RE Directive). Swiss regulation obligates grid operators to pay an appropriate price for RE electricity produced in generation facilities with capacity <3 MW or a yearly production of maximum 5000 MWh net of any self-consumption (Art. 15 para. 1 lit. a and para. 2 EnG). The way how these prices are computed is slightly different from the EU rule: in Switzerland, the remuneration is determined taking into account the purchasing costs of the grid operator (Art. 12 Energieverordnung [EnV]; Federal Council 2017b).¹⁹

Second, Swiss regulation indirectly incentivizes prosumers as it de facto exempts them from grid charges and levies on renewable electricity individually produced and consumed within the same premises. This is due to the fact that, by federal ordinance (Art. 18 para. 3 Stromversorgungsverordnung [StromVV]), grid costs and levies for small consumers have to be predominantly charged by means of a consumption-based network tariff (i.e., through a volumetric rate applied to each kWh withdrawn from the grid)²⁰. This provision in-

¹⁹ ElCom clarified in a statement in 2016 that the remuneration must be oriented towards market-oriented subscription prices for grey electricity purchased at the same time at the same supply point (ElCom 2016b: 2). According to the Federal Council, the revision of the EnV in 2018 tends to lead to a higher minimum remuneration (Federal Council 2017b).

²⁰ As prosumers have a statutory right to receive any desired amount of electricity from the grid at all times (Art. 6 para. 1 StromVG) and have the right to feed their surplus power into the distribution grid free of charge (Art. 6 para. 4 StromVG), Hettich/Walther (2015) as well as Distribution Systems Operators (DSOs) argue that prosumers participate only to a partial extent in the effective costs they cause to the distribution network and hence benefit from an (indirect) subsidy that can be regarded as a cross-subsidization by other users of the distribution network (i.e., people who do not own real estate).

creases the profitability of self-produced electricity compared to electricity from the grid²¹. The current Swiss charging system is in line with the new EU rules on self-consumption; the latter are less generous in that they limit exemption from grid charges and levies for electricity produced and consumed within the same premises to renewable systems below 30 kW (Art. 21 para. 2 lit. a (ii) RE Directive). For reasons of equity and efficiency, the structure of Swiss grid charges will most likely be amended towards a higher capacity component (Art. 14 para. 3^{bis} rev. StromVG), thereby reflecting a causality principle (“Verursachergerechtigkeit”) in grid cost charging rules (Federal Council 2018c: 32 et seq.)²². This proposed regulatory change is not expected to conflict with the new EU rules (Art. 21 RE Directive) as it does not lead to discriminatory or disproportionate charges for renewables self-consumption²³; according to the Federal Council, the proposed increase in the capacity component would not undermine the economic viability of self-consumption (Federal Council 2018c: 32 et seq.). The new EU rules for self-consumption (Art. 2 (14) RE Directive) also tend to make self-consumption more attractive by explicitly allowing member states to loosen the definition of self-consumption (e.g., by extending it beyond confined boundaries to include, for instance, different assets owned by the same consumer at different locations); a widening of the definition in Swiss regulation is already suggested in Art. 14 para. 2 rev. EnV.

Third, Swiss legislation gives prosumers the right to feed their surplus electricity into the distribution grid free of grid charges (Art. 6 para. 4 StromVG). In this regard, the new EU rules require that prosumers contribute in an adequate and balanced way to the overall cost sharing of the electricity system when electricity is fed into the grid (Art. 21 para. 6 lit. f RE Directive). However, there is no explicit obligation to charge prosumers for the electricity fed back into the grid. In fact, it may even be seen as discriminatory in the meaning of Art. 21 para. 2

²¹ It contributes to generate electricity cost savings from prosumers in the range of 300-700 CHF/year for a single-family house (against a total investment cost of about 15'000-20'000 CHF; source: <https://www.energieschweiz.ch/page/de-ch/eigenverbrauch>).

²² Cf. chapter 3.3.1. below.

²³ It is also in line with the developments in EU member states, cf. chapter 3.3.1.

lit. (i) RE Directive to charge renewables self-consumers for their excess electricity fed back into the grid, as it is the general rule in Switzerland that network charges are paid by final consumers and not by electricity producers.

Fourth, Switzerland allowed “group self-consumption” (Eigenverbrauchsgemeinschaften, EVG, now redenominated Zusammenschluss zum Eigenverbrauch, ZEV, and described in Art. 17-18 EnG) in 2017, earlier than the EU did. In fact, the concept of “jointly acting renewables self-consumers” has been introduced in EU law for the first time in December 2018 by the new RE Directive (Art. 21 para. 4). EU rules for group self-consumption are rather loose, requiring member states only to entitle self-consumers to act jointly if they are located in the same building or multi-apartment block and to arrange sharing of renewable energy that is produced on their site or sites between themselves (Art. 21 para. 4 RE Directive); major incompatibilities with the regulation concerning ZEV are not visible.

Finally, the proposal for the revised StromVG describes at length the possibilities of new business models for decentralized RE production in a fully liberalized market (e.g., digital platforms connecting decentralized RE producers and consumers; Federal Council 2017c: 86 et seq.). However, the draft legislative text does not contain specific rights granted to prosumers and local energy communities. Applying the new EU rules to Switzerland might require some legal reforms to explicitly allow renewable energy generation and electricity sharing without intermediation of energy utilities in the form of local energy communities, peer-to-peer trading, and power purchase agreements (PPAs), which are only possible to a limited extent under the current Swiss legal framework. In particular, at this point of time, peer-to-peer trading is already exercised as part of a pilot project (Quartierstrom project in Walenstadt²⁴). The Quartierstrom project goes beyond “group self-consumption”, as electricity consumers living in different buildings trade electricity among themselves. For this pilot project, SFOE and ElCom have agreed on a reduction of network charges for

²⁴ <https://quartier-strom.ch/>.

electricity purchased from a neighbor as long as the same network level is used (Interview 26). In contrast, EU law does not require exemptions from charges or levies for local renewable energy communities, especially when they use the public grid to transfer energy among their members. If the Swiss electricity market is liberalized in the future, peer-to-peer trading becomes possible; however, prosumers engaging in peer-to-peer trading would most certainly be regarded as electricity suppliers and therefore be subject to the according regulation (e.g., rules on balancing groups).

Apart from the obligation to connect end customers to the electricity grid and the purchase obligation regarding RE electricity from small RE generation facilities (Art. 5 StromVG and Art. 15 EnG), Swiss legislation does not foresee special ad hoc procedures for grid connection of small renewable generation units. There are also slight legal uncertainties on building permitting for building-scale solar PV systems (Thaler et al. 2019: 3). Applying the new EU rules to Switzerland would require some streamlining of permitting (Art. 16 RE Directive) and establishing a simple notification procedure for grid connection of small distributed renewable generation units (Art. 17 RE Directive). As mentioned above, the implementation of such provisions in Switzerland might be problematic due to constitutional constraints and the plurality of actors involved.

2.2. Market Design

2.2.1. Network Access and Network Charges

As a basic principle of EU and Swiss law, grid charges shall be transparent, cost-reflective, non-discriminatory, non-distance related, and they shall take into account the need for network security (Art. 14 para. 1 ER; Art. 14 and 15 StromVG). The right of access for third parties to transmission and distribution systems on a non-discriminatory basis is a principle of EU and Swiss regulation (Art. 32 ED; Art. 13 para. 1 StromVG; for the effect of this principle on households see below,

2.2.4). In Switzerland, small consumers are currently not entitled to choose their electricity supplier. A legal amendment to liberalize the electricity market is pending; liberalization is a precondition to any electricity agreement with the EU. Since retail and wholesale prices do not seem to be correlated to a great extent, retail customers (in particular households) might not profit much from full market liberalization (for more detail and further references see Hettich et al. 2015: 31 et seqq.; van Baal et al. 2019: 38).

Most of the rules on network charges in the EU and in Switzerland are largely similar or compatible. EU law contains several guidelines on network charges, which will be amended by the Clean Energy Package.²⁵ The Electricity Regulation clarifies that access charges include charges for connection to the networks, charges for use of networks, and, where applicable, charges for related network reinforcements. It outlines that these charges shall not create disincentives for self-generation, self-consumption, and participation in demand response. (Future) Swiss legislation on network costs seems consistent with the EU rules. Both require that the charges applied by network operators for access to networks shall take into account the need for network flexibility and the actual costs (Art. 18 para. 1 ER; Art. 15 para. 1 StromVG; Art. 15 para. 2 lit. d rev. StromVG); they seek a tariff, which supports overall system and energy efficiency through price signals (Art. 18 para. 2 ER; Art. 14 para. 3 lit. e StromVG). The EU regulation excludes costs supporting unrelated policy objectives from network charges (Art. 18 para. 1 ER); in this regard, it is unclear to what extent charges and contributions to the community (“Abgaben und Leistungen an Gemeinwesen”, Art. 14 para. 1 StromVG) would still be permissible.

²⁵ In the future, network tariffs shall be applied in a way which does not discriminate between production connected at the distribution level and production connected at the transmission level (Art. 18 para. 1 ER). As network tariffs are paid by final consumers and not by generators, Switzerland is not affected by this new regulation. The same holds true regarding the new rule that network charges for final customers shall account separately for the electricity fed into the grid and the electricity consumed from the grid (Art. 15 para. 2 lit. e ED).

Today, many European countries structure network charges by combining kilowatt-hour and kilowatt rates with a base price. The introduction of kilowatt rates and expansions of base prices on lower voltage levels are subject to discussions in many European countries (Vettori et al. 2015: 61). Therefore, the planned increase of the kilowatt rates in the grid usage tariff in Switzerland (Art. 14 para. 3^{bis} rev. StromVG) is in line with current developments in EU member states and with EU rules (Art. 21 RE Directive). As for now, the Commission recognizes the wide variety of tariff structures across the EU in its impact assessment and it has refrained from harmonizing distribution tariff structures and methodologies (European Commission 2016d: 164, 171). A proposal to empower the European Commission to adopt delegated acts concerning the establishment of network codes in the area of "harmonised transmission and distribution tariff structures and connection charges including locational signals and inter-transmission system operator compensation rules" has been dropped in the course of the negotiations on the Electricity Regulation.²⁶ However, after trilogue negotiations, the Commission and the Council agreed that ACER "shall provide a best practice report on transmission and distribution tariff methodologies while taking account of national specificities"; the Agency's recommendation shall be taken duly into consideration by regulatory authorities when approving or fixing (the methodologies of) transmission or distribution tariffs (Art. 18 para. 9 et seq. ER). Currently, the impact of this framework on Swiss tariff structures is probably small.

Although the settlement on a best practice report on tariff methodologies by ACER shows a slight movement towards more guidance for tariff setting, the methodology for the development of distribution tariffs in Switzerland would not be affected by the application of the new EU rules. Among other things, the ER suggests that "Distribution tariffs shall be cost-reflective taking into account the use of the distri-

²⁶ Cf. Art. 55 para. 1 lit. k of the Proposal for a Regulation of the European Parliament and of the Council on the internal market for electricity (recast) COM/2016/0861 final/2 - 2016/0379 (COD) and Art. 58 ER.

bution network by system users including active customers. Distribution tariffs may contain network connection capacity elements and may be differentiated based on system users' consumption or generation profiles." Time differentiated network tariffs may be introduced where smart metering systems have been implemented (Art. 18 para. 7 ER). The draft of the revised StromVG contains a comparable rule (Art. 14 para. 3^{bis} lit. b rev. StromVG).

The Electricity Regulation prohibits positive and negative discrimination in network tariffs against energy storage and aggregation (Art. 18 para. 1 ER). As storage has not been subject to EU legislation until now, there is no consistency in the way storage is treated in the member states. Consequently, different regulations exist on whether storage should be subject to network charges or not; some countries even charge storage with both consumer and producer tariffs (European Commission 2017a: 16; DNV GL 2017: 70; Vettori et al. 2017: 65). According to the Commission, network charges for storage facilities should be "appropriately structured" (European Commission 2017a: 25). In Switzerland, solely pump storage plants are exempted from network charges (Art. 4 para. 1 lit. b in combination with Art. 14 para. 2 StromVG). In contrast to an announcement of the Federal Council in 2016 (Federal Council 2016c), the rev. StromVG does not introduce equal treatment of different storage technologies. The StromVV clarifies that anyone purchasing electricity for the purpose of storage is, with regard to this purchase, considered a final consumer, unless the electricity is used for operating pumps in pump storage plants (Art. 2 para. 3 rev. StromVV). In the extreme, double charging may occur: Network fees would be raised for the first time when storage is loaded, as loading would be treated as an exit point ("Ausspiesepunkt") in the meaning of Art. 14 para. 2 StromVG, and for the second time when electricity is fed back into the grid and discharged to end consumers on different premises, who get charged with network fees too (Art. 14 para. 2 StromVG; cf. Walther 2019: 28 et seq.). This differentiation between electricity storage facilities and pump storage plants in Switzerland may be problematic with respect to the EU's prohibition of discrimination in network tariffs against

storage.²⁷ However, at this point in time, storage in general – and pump storage plants in particular – is treated very differently within the Union regarding network charges (EASE 2017: 4; Vettori et al. 2015: 65). Although the Clean Energy Package brought some clarity particularly regarding the definition of storage (Art. 2 (59) ED), the question to what extent (pump) storage facilities should be subject to network charges has not yet been answered in the EU (EASE 2017: 4). However, the prohibition of discriminatory practices may be interpreted as an indication towards uniformity of network charges across national markets and storage technologies.

2.2.2. Electricity Price

The latest legislative proposals in the EU and in Switzerland regarding the regulation of electricity prices point in the same direction. In its Energy Union Strategy, the Commission seeks to phase-out regulated prices below cost; member states are encouraged to establish a roadmap for the phasing-out of all regulated prices (European Commission 2015: 12). Consequently, the Electricity Directive wants electricity suppliers to be free to determine the price at which they supply electricity to customers (Art. 5 para. 1 ED). Exceptions exist regarding energy poor or vulnerable household customers (Art. 5 para 2 ED). Public interventions in the price setting may also be applied for the supply of electricity to household customers and to microenterprises for the purpose of a transition period to establish effective competition and market-based retail pricing of electricity (Art. 5 para. 6 ED). Amongst many other criteria these interventions shall be limited in time and they shall not lead to direct cross-subsidization between customers supplied at free market prices and those supplied at regulated supply price (Art. 5 para. 4 and 7 ED).²⁸ In Switzerland, the rev.

²⁷ For more details regarding the discrimination against storage facilities compared to pump storage plants by the revised StromVV, see Walther 2019: 33 et seq.

²⁸ The European Commission initially proposed that public interventions shall only be possible for energy poor or vulnerable household customers and that after a transition period of five years they may only be applied if “it is strictly necessary for extreme urgency” (Art. 5 para. 4 of the Proposal for a Directive of the European Parliament and of the Council on common rules for the internal market in electricity [recast] COM/2016/0864 final/2 -

StromVG seeks to abolish regulated electricity tariffs for household customers. However, electricity prices in basic supply (“Grundversorgung”) will still be subject to regulation: they must be fixed for one year, need to be uniform for end customers with similar consumption characteristics, and appropriate regarding comparative market prices (Art. 6 para. 3 rev. StromVG). As European law allows public interventions in the price setting under certain conditions during a transition period, the Swiss price regulation can be designed in accordance with EU law. However, once an end date for regulated prices has been set (and an electricity agreement has been reached), such a price regulation may become impermissible.

In the EU electricity market, wholesale prices differ from one bidding zone to another. The configuration of these bidding zones is regulated in the CACM Guideline (Art. 32 et seqq. GL CACM). As the Commission considers this guideline as deficient (European Commission 2016d: 59, 113), the Electricity Regulation requires a bidding zone review to be carried out, stressing that bidding zone borders shall be based on structural congestions in transmission networks and that bidding zones shall not contain such congestions (Art. 14 para. 1 and 3).²⁹ A first edition of the bidding zone review with five different configurations has already been published (ENTSO-E 2019b).

2.2.3. Unbundling

The overall goal of Swiss and EU unbundling regulations is the same: to ensure that there are no cross-subsidies between network operation and supply activities (Art. 37 para. 1 lit. f ED; Art. 10 para. 1 StromVG). To reach this goal, the Third Energy Package of the EU

2016/0380 [COD]). The final version of the ED does not state a specific transition period. However, it instructs the Commission to submit a report to the European Parliament and to the Council by the end of 2025 on the implementation of this Article for the purpose of achieving market-based retail pricing of electricity, if appropriate together with or followed by a legislative proposal including an end date for regulated prices (Art. 5 para. 10 ED).

²⁹ The final decision on whether to amend or maintain the bidding zone configuration lies within the power of the relevant member states or their designated competent authorities, based on a proposal of all TSOs participating in the review (Art. 14 para. 6 ER).

contains three different options for unbundling on the transmission level: ownership unbundling, implementation of an independent system operator (ISO), or an independent transmission operator (ITO; Art. 9 para. 8 ED). The Swiss transmission system operator Swissgrid may be assessed as an ITO, as the former integrated electricity suppliers are now the shareholders of Swissgrid (Art. 18 para. 4 StromVG). With an electricity agreement, more restrictive regulations regarding the shareholder structure as well as the independence of the staff and management may need to be implemented (cf. Art. 48 ED). However, there are concerns that a complete exclusion of representatives of electricity suppliers from the TSO's board and management may lead to a loss of expertise (Interview 15).

On the distribution level, EU law requires that the legal entity, organization, and operation of DSOs is separated from activities not related to distribution (Art. 26 para. 1 Electricity Directive). Member states can decide, however, to waive this requirement for integrated electricity companies serving less than 100'000 connected customers (Art. 26 para. 4 Electricity Directive). Swiss legislation only requires a separation in accounting (Art. 10 para. 3 StromVG). Thus, a small number of 9-11 DSOs would need to unbundle their distribution grid from other (supply and generation) activities. Since the threshold of 100'000 customers is calculated on the group level, some DSOs, which might serve only a few thousand customers, would need to unbundle as well (Interview 1, 19). The weight of this regulatory burden depends on the specific corporate structure and on the degree of compliance to current informational and accounting unbundling (Interview 12, 20). Regarding the small number of DSOs which would be affected by legal unbundling, representatives of the Swiss electricity industry question whether the threshold of 100'000 customers is proportional (Interview 19). Also, there is hardly any empirical evidence that strict unbundling increases welfare (for more detail and further references see Foehse 2014: 174 et seq.)

As a consequence of unbundling, TSOs and DSOs in the EU are largely banned from ownership of storage facilities (Art. 36 and 54 ED). The

Clean Energy Package positions energy storage as a service to be provided by third-parties rather than by TSOs and DSOs. In Swiss law, neither the current nor the rev. StromVG contain limitations regarding the ownership and operation of storage facilities. This might be problematic regarding accounting and informational unbundling, as the transmission of electricity generally causes market transactions. More stringent unbundling requirements for network operators are therefore being discussed in academia and within the federal offices (see Walther 2019: 40 for further references).

In contrast to many smaller utilities, municipal utilities have consistently supported an electricity agreement. The reason is that many municipal utilities have investments abroad to fulfill renewable energy targets set by the municipalities that own them. Problems with these investments might arise if the electricity agreement is not signed and Switzerland is shut out of the European electricity market.

2.2.4. Role of Final Consumers

The Clean Energy for All Europeans Package seeks to improve the conditions for consumers (European Commission 2016c: 3), meaning that they shall be entitled to smart meters, transparent bills, easier switching conditions, tools to manage their energy consumption, and to offer demand response (European Commission 2016c: 10). Today, all customers within the EU have the right to choose their supplier of electricity (Art. 33 para. 1 Electricity Directive). In Switzerland, full market liberalization is part of the revised StromVG, which is subject to parliamentary debate and an optional referendum (Federal Council 2016b).³⁰ The full liberalization of the Swiss electricity market for households and other small consumers is a requirement for the conclusion of an electricity agreement with the EU.

³⁰ At present, final consumers with an annual electricity consumption of less than 100 MWh may not choose their supplier yet (Art. 6 para. 2 and 6 StromVG).

At this point of time, the Swiss electricity market has not been liberalized and the electricity agreement with the EU has not been concluded. In the context at hand, EU rules would require:

- Household customers and small enterprises may not be charged fees related to switching (Art. 12 para. 2 ED; Council 2018b: 97). The Swiss legislation is in general consistent with this rule (Art. 13a para. 2 rev. StromVG)³¹;
- Consumers with smart meters need to be entitled to dynamic electricity price contracts (Art. 11 para. 1 ED).³² As the end-customer market is planned to be liberalized in the revised StromVG, and as the rollout of smart meters has already been started with the new StromVV, the new EU Regulation is not expected to lead to fundamental changes in the Swiss legislation³³;
- DSOs will have to define standardized products for the services procured ensuring effective participation of all market participants including renewable energy sources, demand response, energy storage facilities, and aggregators (Art. 32 para. 2 ED);
- Final customers offering demand response through aggregation must be allowed to participate in all electricity markets alongside generators in a non-discriminatory manner (Art. 17 para. 1 ED).

³¹ "Small enterprise" means an enterprise which employs fewer than 50 persons and whose annual turnover and/or annual balance sheet total does not exceed EUR 10 million (Art. 2 para. 7 ED).

³² In particular, EU regulation requires that consumers are entitled to dynamic price contracts with at least one supplier and with every supplier that has more than 200'000 final customers. All suppliers shall be enabled to offer dynamic electricity price contracts.

³³ At the moment, the end-customer market in Switzerland is not liberalized and therefore final customers do not have the possibility to conclude dynamic price contracts with their suppliers; electricity prices for end customers are regulated according to a cost-plus regime. Furthermore, most customers are not yet equipped with a smart meter. In the next ten years, 80% of the existing measuring devices must be replaced by smart meters (Art. 8a and 31e StromVV).

2.3. Cross-Border Trade and Congestion Management

The free trade agreement between Switzerland and the EU and WTO law protect the free cross-border trade of electricity as a good (cf. Hettich et al. 2017: 113 et seqq., 144 et seqq.). While electricity physically flows freely across Swiss borders, Swiss energy companies are excluded from European market coupling and thus from an important mechanism that facilitates cross-border electricity trade. The European Network Codes, which have been established by ENTSO-E and which enable market coupling, prevent Switzerland from participating in the respective markets and platforms as long as its national law does not implement the main provisions of the *electricity acquis* and there is no electricity agreement between the EU and Switzerland (Art. 1 para. 4 GL CACM; Art. 1 para. 6 GL EB; Art. 1 para. 4 GL FCA). This affects Swiss market operators and Swissgrid when trying to participate in day-ahead and intraday market coupling as well as in the balancing market. At least, Switzerland may participate in electricity balancing if its exclusion leads to unscheduled physical power flows via Switzerland endangering the system security of the region (Art. 1 para. 6 GL EB).

A recent example for the exclusion of Switzerland from flow-based market coupling is the Cross-Border Intraday Market Project (XBID) launched in summer 2018. EU legislation does not allow Switzerland to participate in this project until an electricity agreement has been signed. The Flexible Intraday Trading System (FITS) – the preceding trading mechanism in which Switzerland participated – had to be suspended (RTE et al. 2018).

2.3.1. Market Coupling and Congestion Management

An electricity agreement with the EU would allow Switzerland to participate in European market coupling (intraday, day-ahead) and in balancing markets, thereby enhancing its control over electricity flows (Interview 12, 15). The adoption of European Network Codes would

not lead to negative consequences for Switzerland (Interview 15).³⁴ Switzerland would be able to shape decisions that concern its interconnectors, to reduce unscheduled flows, to increase the stability of its electricity grid, and to gain market access. This path would be consistent with the present role of Switzerland as a major transit country for electricity (Interview 24).

Without an agreement, the Swiss electricity sector fears several negative impacts in the longer term. It notably expects rising transaction costs, higher import electricity prices, and more instability in the system. A major problem is that Switzerland would not be in full control of its 41 interconnectors and would continue to suffer from unscheduled flows from abroad. These unscheduled flows are expected to increase massively from 2020 onwards, which will require costlier stabilization measures. The situation at the Swiss-Italian border is particularly critical (Interview 15, 24). Phase shifters, however, are not perceived as a viable long-term solution for this problem given the physical integration of the Swiss electricity grid (Interview 24).

It is noteworthy that a permanent exclusion of Switzerland from market coupling would have serious implications also for Italy, which relies on electricity imports via the Swiss electricity grid. At present, the Swiss electricity infrastructure enables Italy to participate in European market coupling, while Switzerland itself is excluded from it (Interview 24). Both from technical and political perspectives, this paradoxical situation is not very sustainable and can only be of a transitional nature. This is underlined by the fact that ElCom, even in the face of a deteriorating relationship with the EU, managed to find an interim agreement with regulators in Central West Europe on measures to reduce unplanned electricity flows through Switzerland in the winter 2018/19.

³⁴ It is feared that the application of the Network Code on requirements for grid connection of generators would obligate electricity producers to retrofit older power plants and therefore cause large investments (Interview 19). However, it is also argued that these concerns are unfounded due to relatively long implementation periods (Interview 15).

Finally, the situation without an electricity agreement may also cause institutional problems: from a technical viewpoint, the electricity grid cannot be operated based on different (EU and Swiss) regulations. This would imply a gradual adoption of Union law even without an electricity agreement. The extent of the adoption of European law is therefore subject to continuous evaluations by ElCom (Interview 15).

2.3.2. Balancing Markets

European balancing markets differ significantly from one country to another due to historic national specificities. This barrier for integration hinders cross-border trade (European Commission 2017b: 17). The Guideline on Electricity Balancing (GL EB) therefore defines a framework for technical, operational, and market rules for a European cross-border balancing market, whereas the technical framework necessary for the development of cross-border balancing markets is stipulated in the System Operation Guideline (GL SO).

Currently, Swissgrid actively participates in the projects TERRE³⁵ and MARI³⁶ and is an observer to PICASSO³⁷. Swissgrid's participation in these projects is at risk as long as no electricity agreement is concluded (Swissgrid 2017: 8; Interview 15). However, the Guideline on Electricity Balancing contains an exclusion clause, according to which Swissgrid may participate in balancing platforms without an electricity agreement, if the exclusion of Switzerland may lead to unscheduled physical power flows via Switzerland endangering the system security of the region (Art. 1 para. 6 GL EB). More specifically, ACER generally agrees with the all TSOs assessment that the full participation of Switzerland in the European balancing market could help to remove pos-

³⁵ Trans European Replacement Reserves Exchange, the implementation project for the exchange of replacement reserves (RR) (Swissgrid 2017: 8).

³⁶ Manually Activated Reserves Initiative, the implementation project for frequency restoration reserves with manual activation (mFRR).

³⁷ Platform for the International Coordination of Automated Frequency Restoration and Stable System Operation, the implementation project for automatic Frequency Restoration Reserves (aFRR).

sible congestion problems in the Swiss network and increase the efficiency of Swiss cross-zonal capacity calculation and allocation as well as the overall operational security in the region. However, ACER also stresses the importance of Switzerland implementing all requirements of the Guideline on Electricity Balancing and other related provisions, which are needed to ensure a level playing field between the Swiss TSO and market participants and the Union TSOs and market participants (ACER 2018: 2). The participation of Switzerland in the balancing market will be decided by the Commission based on the aforementioned opinions of all TSOs and ACER (Art. 1 para. 7 GL EB). It is suspected that the Commission will delay this decision until the negotiations on the electricity agreement are terminated. An exclusion of Switzerland from the platforms for the exchange of balancing energy affects the grid operators regarding the purchase of balancing electricity as well as the electricity producers with regard to the sale of electricity balancing products. It is also conceivable that only Swissgrid, but no Swiss electricity producers, could be admitted to participate in these platforms (Interview 15).

2.3.3. ITC-Mechanism and LTCs

The Swiss regulation for the calculation of costs occurring from cross-border network use has been designed in conformity with EU law (Federal Council 2004: 1637; A-721/2013 of 21 February 2014, E. 5.7).³⁸ Only cross-border capacities allocated by means of market-based procedures lead to compensation payments (Spielmann 2016: N 15). Because capacities for some supply contracts (those concluded before 31 October 2002) and deliveries from specific hydro-electric power plants located at the Swiss border are allocated on a priority basis (Art. 17 para. 2 StromVG), the costs coming with these cross-

³⁸ On the EU level, TSOs receive compensation from the Inter-Transmission System Operator Compensation fund (ITC-fund) for costs incurred as a result of hosting cross-border flows of electricity on their networks (Art. 13 para. 1 Electricity Regulation; Annex A 1 GL ITO). As Switzerland is not an EU member, Swissgrid had to conclude a private contract, the Inter-Transmission System Operator Compensation-Agreement (ITC-Agreement), with the other TSOs of ENTSO-E regarding international transit cost compensation.

border transactions are not compensated. Furthermore, these long-term contracts (LTC) run contrary to the EU principle that network congestion problems shall be addressed with non-discriminatory market-based solutions, which do not involve a selection between the contracts of individual market participants (Art. 16 para. 1 Electricity Regulation).³⁹ This notably concerns contracts Swiss electricity suppliers have concluded with France (Interview 19; DEA 2018: 1; ElCom 2018b), in which the electricity to be delivered and the required border capacity were bought together. These LTCs are treated preferentially regarding the allocation of capacities in the cross-border transmission network (Art. 17 para. 2 StromVG). This conflicts with current EU regulation, which determines that interconnection capacity and electricity are allocated together through implicit auctions (recital. 13 GL CACM). Initially, the priority treatment was subject of the negotiations between Switzerland and the Union regarding a bilateral electricity agreement. According to the ESPEC-S, a suitable solution consistent with EU law has already been found (ESPEC-S 2016: 8325 et seq.).⁴⁰

Apart from LTCs, the unscheduled electricity flows caused by flow-based market coupling are also not covered by the ITC fund. The additional capacity caused by the implementation of flow-based market coupling amounts to approximately 30%. With the implementation of the Clean Energy Package, this amount may rise to 50-60%. Until now, the compensation of these additional electricity flows through the Swiss grid has not been sorted out yet. The electricity agreement is supposed to solve this problem (Interview 15). As the Electricity Regulation defines implicit and explicit auctions as the only way to allocate capacity, it is reasonable to assume that the Swiss regulation, which – from a purely legal point of view – presently allows capacity

³⁹ The new regulation even emphasizes this principle by deleting the word “preferentially” in the legal text: “Network congestion problems shall ~~preferentially~~ be solved with non-transaction based methods [...]” (cf. Art. 16 para 1 Electricity Regulation; Art. 16 para. 1 ER).

⁴⁰ According to van Baal et al. 2019: 15, a *proposition commune* with the European Commission has been found on this topic, essentially meaning that the LTCs currently in place will be allowed but must not be renewed once they have expired.

allocation using market-based procedures other than auctions, will need to be specified accordingly (Art. 16 ER; Art. 17 para. 1 StromVG). Furthermore, Swissgrid will not be allowed to limit the volume of interconnection capacity to be made available to other market participants in order to solve congestion in the Swiss network (Art. 16 para. 8 ER).

2.4. System and Generation Adequacy (Security of Supply)

“Security of energy supply” is not a well-defined term (Walther 2014: 127). The SFOE deems energy supply as secure if a sufficient and continuous supply of the demanded energy is always guaranteed – taking into account economic efficiency and environmental sustainability (SFOE 2012a: 7). In Switzerland, the energy industry as well as the Confederation and the cantons are obliged to take precautions to ensure a stable and sufficient energy supply within their spheres of competence (Walther 2014: 127; Scholl 2009: 62).

In European legislation, “security of electricity supply” is defined as the ability of an electricity system “to guarantee the supply of electricity to customers with a clearly established level of performance, as determined by the Member states concerned” (Art. 2 (2) Risk-preparedness Regulation). This definition indicates that EU member states are relatively free to set their specific level of supply security. This is underlined by the rules concerning capacity mechanisms: The necessary level of supply security of a member state is indicated by the “reliability standard”, which is set by the member state. However, the evaluation of sufficient security of supply must be based on a methodology established by ENTSO-E and approved by ACER (Art. 25 para. 2 in combination with Art. 23 para. 6 and 7 and Art. 27 ER).

2.4.1. Short-Term Security of Electricity Supply

The Clean Energy Package contains a Regulation on risk-preparedness in the electricity sector aiming to ensure that all member states implement appropriate and coordinated measures regarding electricity crises prevention and management (recital 4 and 6 Risk-preparedness Regulation).⁴¹ Based on national and regional crisis scenarios, member states shall establish national risk-preparedness plans containing not only national but also regional (and, if in place, bilateral) measures to ensure that crisis situations with a cross-border impact are prevented and properly managed (Art. 10-12 Risk-preparedness Regulation). The new regulation introduces cooperation obligations in the event of an electricity crisis; member states shall act and cooperate in a spirit of solidarity (Art. 15 para. 1 Risk-preparedness Regulation). Where technically possible, member states shall offer each other assistance by means of coordinated measures of their choice. The necessary technical, legal, and financial arrangements for the implementation of such measures shall be agreed on before assistance is offered (Art. 15 para. 2 et seq. Risk-preparedness Regulation).

The new regulations on risk-preparedness show a tendency towards more coordination and cooperation between member states in crisis situations. Without an electricity agreement, it can be assumed that Switzerland will not be included in the coordinated measures set in the national risk-preparedness plans. Assistance in case of an electricity supply crisis will – for now – depend on the goodwill of Switzerland's neighboring states. Furthermore, it must also be expected that Switzerland will not be involved in the short-term (week-ahead to day-ahead) and seasonal adequacy assessments which will be carried out to detect possible adequacy-related problems (Art. 9 Risk-preparedness Regulation).

⁴¹ The Regulation defines "electricity crisis" as "a present or imminent situation in which there is a significant electricity shortage, as determined by the Member States and described in their risk-preparedness plans, or in which it is impossible to supply electricity to customers." (Art. 2 (9) Risk-preparedness Regulation).

2.4.2. Long-Term Security of Electricity Supply

According to a study on system adequacy in Switzerland, the demand for electricity can almost always be satisfied by a mixture of local production and European imports (thereby including nuclear and fossil electricity). Reduced production capacity in neighboring countries may lead to an increase in critical supply situations in Switzerland; therefore, the developments in the European electricity system impact the Swiss supply situation (SFOE 2018c: 73). Furthermore, a study by Swissgrid concludes that the security of electricity supply is not endangered until 2025 (Swissgrid: 21 et seq.). These findings are based both on the assumption of sufficient import capacity and on cross-national support in case of national shortages. However, flow-based market coupling is supposed to be expanded to the CORE region in 2019. For Switzerland, an expansion of flow-based market coupling leads to inefficient capacity allocation; to newly assess the border capacities, Switzerland needs to wait for the results of flow-based market coupling. Still, the import capability of Switzerland is likely to decline (Interview 15). As an interim solution for this winter, ElCom announced on March 28, 2019 that it had agreed with regulators in Central West Europe on the possibility to reduce trading with France, which should help to manage network stability in Switzerland.

This suggests that the conclusion of a bilateral electricity agreement improves Swiss supply security through strengthening and facilitating cross-border trade; however, it does not eliminate all concerns regarding security of electricity supply. Supply security depends not only on trade and market access but also on physical factors like the availability of generation and interconnector capacities (Interview 20). Swiss production capacity is not sufficient to cover the national demand for electricity throughout the whole year (Interview 19). Switzerland's potential import capacity, however, is large in relation to its internal electricity market as well as compared to other European states. The Swiss electricity system is therefore rather designed to trade electricity and – although grown historically – suitable for the current needs for a flexible dispatch of capacity (Interview 19). As

these physical factors would not be changed by an electricity agreement, discussions on the implementation of mechanisms ensuring supply security are likely to continue, regardless of the outcome of the ongoing contract negotiations. ElCom therefore suggests to continue producing a substantial part of the electricity in Switzerland during winter months (ElCom 2018a; ElCom 2018e: 14 et seq.; ElCom 2018f: 1); a challenge due to the decommissioning of nuclear power plants.

The EU does not interfere into its member states' decisions regarding generation technologies. As mentioned above, the revised StromVG includes the implementation of a storage reserve. To create more and sufficient incentives for winter production, ElCom suggests using further instruments and measures, which need to be implemented into the revised StromVG (ElCom 2018f: 1). The current amount of domestic electricity generation in the winter season could also be maintained after the decommissioning of the Swiss nuclear power plants by using gas power plants (as discussed in Federal Council 2013: 7633).

Storage Reserve: The Commission allows different capacity mechanisms, such as capacity markets and strategic reserves, in order to reach RE production goals and to ensure security of electricity supply in transitional phases. The conformity of the planned Swiss storage reserve with European state aid rules depends on its exact design (Federal Council 2017c: 29 et seq.). Most EU member states have some sort of capacity mechanism in place, which has been approved by the Commission.⁴² However, the Commission's approval is without prejudice to the need for these measures to comply with the future sectoral EU legislation when it becomes applicable, including the Electricity Regulation, which will apply from 1 January 2020 (European Commission 2018).⁴³ If classified as a capacity mechanism and if technically feasible, the storage reserve would need to be open to cross-

⁴² Among others, the market-wide capacity mechanisms in Italy and Poland, and capacity mechanisms specifically promoting demand response in France and Greece have just recently been approved by the Commission (European Commission 2018a).

⁴³ The Commission proposed to include into the Electricity Regulation a definition of "strategic reserve" as a capacity mechanism in which resources are only dispatched in case day-

border participation of (directly connected) capacity providers of EU member states in order to be in line with EU legislation (Art. 26 para. 1 and 2 ER). Technical feasibility could maybe be denied based on the argument that, in the scarcity situations in which the storage reserve is triggered, import capacities will already be exhausted.⁴⁴

Even if the storage reserve is designed in line with the relevant European laws, it remains questionable if this measure is sufficient to ensure electricity supply. When designing the storage reserve, the temptation of market participants to include the storage reserve into their calculations should also be taken into account (Kratz 2018: 12). Furthermore, (limited) pumped-storage hydropower would not only be used for the storage reserve, but it is also the most important provider of balancing energy (Interview 15).

Gas power plants: Regarding backup power plants, the Federal Council mentioned in its dispatch to the Energy Strategy 2050 that after the nuclear plants have been shut down, the electricity demand may be met, if necessary, by gas combined power plants (Federal Council 2013: 7594, 7633). Power plants are only eligible to participate in a capacity mechanism if their emissions are below 550 gr CO₂/kWh (Art. 22 para. 4 ER [with temporary exceptions regarding already existing generation capacity]).

Investment permits on strategic infrastructure: In Switzerland, an extension of the Federal Law on the Acquisition of Real Estate by Foreign Nationals ("Lex Koller"), restricting the purchase of real estate by persons abroad, to strategic energy infrastructure – namely hydroelectric power plants as well as electricity and gas networks is currently

ahead and intraday markets have failed to clear, TSOs have exhausted their balancing resources to establish an equilibrium between demand and supply, and imbalances in the market during periods where the reserves were dispatched are settled at the value of lost load (Art. 2 para. 2 lit. v of the Proposal for a Regulation of the European Parliament and of the Council on the internal market for electricity (recast) COM/2016/0861 final/2 - 2016/0379 (COD)). This proposed amendment would have significantly restricted the use of strategic reserves in EU electricity markets. It has been deleted in the trilogue negotiations; the final Electricity Regulation does not contain a definition for the term "strategic reserve".

⁴⁴ Cf. for this argument fn. 13.

being discussed (Badran 2016).⁴⁵ Difficulties regarding the consistency of such a limitation with EU law are not expected, as political agreement on a comparable EU framework for screening foreign direct investment has just recently been reached.⁴⁶

2.4.3. Gas and Oil

To our knowledge, gas and oil are not part of a possible electricity agreement with the EU. Therefore, it may here simply be noted that – although there are some interactions between Swiss and European authorities⁴⁷ – a profound difference exists between Swiss and European legislation regarding the general rules of the gas market, especially with respect to network access and unbundling requirements.⁴⁸ The drafting of a Gasversorgungsgesetz (GasVG) is part of the Federal Council's legislative programme for 2015-2019 (Federal Council 2016a: 1222). According to the SFOE, which is already working on a draft bill, the GasVG shall be in compliance with the applicable EU standards (SFOE 2017a). Consequently, the Swiss gas market would need to be liberalized so that all customers are free to choose their gas

⁴⁵ Both the Environment, Spatial Planning and Energy Committee of the Council of States (ESPEC-S) and of the National Council (ESPEC-N) have endorsed the initiative. Whether legal instruments shall be established to regulate foreign ownership of energy infrastructure is going to be evaluated (ESPEC-S 2018).

⁴⁶ This framework encourages international cooperation on investment screening policies, and reaffirms that member states keep the last word whether a specific operation should be allowed or not in their territory. According to a press release by the Commission, 14 member states currently have investment screening mechanisms in place (European Commission 2018g).

⁴⁷ By issuing a risk assessment and finishing preventive action and emergency plans for gas, the SFOE provided a basis for a closer cooperation with the Gas Coordination Group, a European forum to discuss supply issues (SFOE 2016: 12 et seqq.; 22 et seqq.). Although the regulation under which these plans were created was repealed by the new Gas Supply Regulation, the plans remain in force until the new plans are adopted for the first time (para. 63 Gas Supply Regulation).

⁴⁸ Broadly speaking, EU regulation requires the same unbundling levels in the gas as in the electricity sector (Art. 9 and 26 Gas Directive). Regarding network access, all customers are free to purchase gas from the supplier of their choice (Art. 37 para. 1 (c) in combination with Art. 2 (28) Gas Directive). In Switzerland, the gas market is hardly regulated (Rohrleitungs-gesetz, RLG). There is no specific regulation regarding network access, with Art. 13 RLG and the Cartel Act providing broad guidance as well as an industry accord ("Verbändevereinbarung").

supplier, and the gas suppliers would need to unbundle. The liberalization of the Swiss gas market may cause new risks due to a lower shielding of investments, especially when looking at the technical infrastructure (Walther 2014: 130; SFOE 2012a: 19).

2.5. Emissions Trading System

Switzerland and the EU have agreed to link their Emission Trading Systems (ETS agreement). If the Council of States follows its commission, the linkage can be implemented on January 1, 2020. As both systems are largely compatible regarding the inclusion of industrial facilities, there are only two major changes in the Swiss ETS because of the linkage. First, aviation will be included in the Swiss ETS in line with the main principles of the EU ETS (Annex IB ETS Agreement; Art. 19 E-CO₂-Act). Second – although not explicitly stated in the ETS agreement – fossil fuel thermal power plants, which are at present subject to full compensation of their CO₂ emissions under Swiss law, will also be included into the Swiss ETS.⁴⁹ The regulations concerning the full compensation of fossil fuel thermal power plants (Art. 22 et seqq. E-CO₂-Act) will probably be repealed (Federal Council 2017: 424, 440 et seq.). However, compensation is maintained insofar as the operators of installations producing electricity do not receive free emissions rights but need to buy them in auctions or on the secondary market (Federal Council 2017: 417; Art. 23 para. 4 E-CO₂-Act). This law would also apply to future gas power plants in Switzerland, which would have to participate in the Swiss ETS and buy emission rights (Federal Council 2017: 265). Apart from these changes, the agreement does not change the conditions of mandatory participation in the Swiss ETS;

⁴⁹ According to the (E-)-CO₂-Act, companies in specific categories with high greenhouse gas emissions (namely companies pursuing at least one of the activities listed in Annex 6 of the CO₂-Ordinance) are obligated to participate in the Swiss ETS. The Federal Council lists the relevant facilities in Annex 6 of the CO₂-Verordnung, to which fossil fuel thermal power plants will be added if the E-CO₂-Act enters into force (Federal Council 2017a: 325).

Annex 6 of the CO₂ Ordinance stays applicable, requiring that all companies engaging in at least one of the listed activities must participate in the ETS (Art. 2 and Annex I ETS Agreement).

The ETS agreement will be developed further as the Swiss and EU ETS are going to be adapted on a regular basis regarding international agreements such as the Paris Agreement. The Paris Agreement has been signed by both Switzerland and the EU, committing to reduce their GHG emissions by 50% and 40%, respectively, by 2030 compared to 1990 levels (Latvian Presidency 2015: 1; Switzerland 2015: 1). As the Swiss ETS will be oriented towards the EU ETS also for the time after 2020, amendments of the EU ETS regarding, for example, the available quantity of emission permits will likely be adopted in the Swiss ETS (Federal Council 2017: 420 et seq.).

2.6. Interim Conclusions

Negotiations for an electricity agreement were started based on the EU's third internal energy market package; although the draft agreement is still not public, we expect it to take into account the recent developments in European energy law (Clean Energy Package). Some features of the electricity agreement are still under negotiation (state aid, unbundling of DSOs, full market liberalization); however, unsolved institutional matters are the main obstacles for the conclusion of any agreement regarding market access. At the time of writing, the adoption of the draft institutional agreement by the Federal Council, the Federal Parliament and the electorate is still pending.

In the EU, the promotion of renewable energy generation is guided by the RE Directive as well as by state aid rules, both of which leave considerable leeway to member states to implement various promotion schemes. Since the RE Directive does not seem to be part of the electricity agreement anyway, Switzerland will not be bound by these European rules, but might make use of them as a source of inspiration. Nevertheless, the pending institutional agreement implies that Swit-

zerland must comply with EU Guidelines on State aid for environmental protection and energy. European state aid rules, considering the detailed guidelines issued by the European Commission, provide a rather strict framework for the subsidization of renewable energy generation. Still, as a recent landmark decision by the ECJ on Germany's promotion scheme shows, there are various possibilities to provide renewable energy investors with support. Large-scale electricity generation plants may be supported by market-responsive regimes like green certificates or auctions. Small-scale renewable energy generation may still be shielded from competitive pressure by providing, for instance, investment grants. However, as our study shows (see below, 3.3.), financial incentives for investors in renewable energy are less important than reliable framework conditions as well as streamlined planning and permitting procedures.

An electricity agreement would require Switzerland to fully liberalize its electricity markets, thereby providing small consumers with an option to freely choose their electricity supplier as well. Even without an electricity agreement, the Federal Council has recently introduced proposals to liberalize electricity markets. Moreover, an electricity agreement would require Switzerland to further unbundle large DSOs, which the Federal Council has refrained to do, for now. Because European law provides the EU's member states with some leeway in shaping their grid charges, today's cross-subsidization of prosumers in Switzerland would still be possible even with an electricity agreement.

Probably the most relevant feature of the electricity agreement is the inclusion of Switzerland in the EU's internal market for electricity, thereby facilitating cross-border trade of electricity by enabling "market coupling". Market coupling makes cross-border trading more efficient, helping some producers of electricity, in particular Swiss pump storage plants, to market their precious flexibility. We expect market coupling to entail some specialization in Switzerland's electricity generation portfolio, thereby profiting hydropower and solar power plants. Without an electricity agreement, we expect the terms of trade to deteriorate, most likely leading to lower cross-border exchanges of electricity, reduced import capacities, and higher wholesale prices for

electricity in Switzerland. A balanced and powerful portfolio of electricity generation technologies and sufficient options for storage will be more important, which needs to be discussed as an issue when drafting the new market design. Higher electricity prices in Switzerland will help to promote even expensive generation and storage technologies, but, if translated into higher retail electricity prices, they might also hurt energy-intensive industries and vulnerable consumers.

Even with an electricity agreement, Switzerland and the EU's member states remain responsible to take precautions to promote their security of electricity supply. In this regard, Switzerland must not rely solely on imports, but also seek to maintain a minimum domestic generation capacity, in particular during the winter season. Some European countries shield their domestic energy industry from competition by specific designs of their capacity markets. Switzerland, however, disposes of large potential import capacities, which is why it will be difficult to establish traditional capacity markets in line with European law. The EU, nevertheless, might be inclined to agree to the creation of a "storage reserve"; depending on the design of this reserve, a carve-out in the electricity agreement might be needed.

3. Europeanization and Swiss Actors

This section discusses bottom-up as well as top-down processes of Europeanization with regard to Swiss actors. Bottom-up preference projection by Swiss actors onto the European level (Europeanization mechanism 2) goes beyond traditional lobbying as it aims at having a seat at the tables of European governance institutions. More informal lobbying strategies often complement these efforts. Section 3.1. takes a closer look at three key Swiss actors (SFOE, ElCom and Swissgrid; see also van Baal et al. 2019: 23, 30), their formal and informal channels of influence, and the coordination among these actors. Section 3.2. complements this analysis with a focus on other relevant Swiss stakeholders, such as cantons and communities, Swiss DSOs, and interest groups, and their coordination with key actors. The central theme of these two sections is that, although Switzerland is not a member of the EU and therefore does not have any formal representation in EU institutions, Swiss actors have found various formal and informal ways to influence technical and political decision-making at the European level. However, the status quo cannot be taken for granted: the (non-)conclusion of an electricity agreement with the EU can significantly alter Swiss access to European forums and thus the capacity to upload its preferences. Section 3.3. discusses how top-down dynamics of Europeanization on Swiss energy policy (Europeanization mechanism 1) can impact renewable energy investment decisions by professional and retail investors. The analysis presents various positive effects of this kind of Europeanization for the achievement of the renewable energy goals that were formulated in the Energy Strategy 2050 and set forth in the EnG. Finally, section 3.4. briefly discusses signs of top-down European identity reconstruction among Swiss elites (Europeanization mechanism 3).

3.1. Key Swiss Actors

In this section, we examine bottom-up preference projection of key Swiss actors onto the European level (Europeanization mechanism 2).

3.1.1. Swiss Federal Office of Energy (SFOE)

The **Swiss Federal Office of Energy (SFOE)** leads the Swiss delegation in the negotiations of an electricity agreement with the EU. Beyond these negotiations, it represents Swiss interests vis-à-vis the European Commission as well as in related bodies, such as the European Electricity Regulatory Forum (Florence Forum). The SFOE, together with the Federal Council and the Federal Department of Foreign Affairs (EDA), is also involved in the representation of Switzerland on the intergovernmental level. This includes the participation in informal meetings of EU energy ministers and bilateral contacts with EU member states.

European Commission: The European Commission is a key actor in EU energy governance. It develops proposals for energy legislation for adoption by the European Parliament and the Council. With respect to technical standards, it assesses and redrafts Network Code proposals adopted by ACER and ENTSO-E before sending them into the comitology process. Alternatively, it can adopt such standards in the form of guidelines without comitology (Interview 14, 15)⁵⁰. The European Commission also coordinates and monitors the implementation of EU energy law by the member states. Within the Commission, the Directorate-General for Energy (DG ENER) is responsible for energy-related matters, including the negotiations on an electricity agreement with Switzerland.

The SFOE has good, yet potentially instable access to the European Commission. In the context of the negotiations on the electricity

⁵⁰ This process changes with the adoption of the Clean Energy Package. Network Codes will be adopted as delegated or implemented acts. The development of Network Codes, until now carried out by ENTSO-E following a mandate in the Third Energy Package, will involve several stakeholders (including DSOs).

agreement, it has regular exchanges with DG ENER. Swiss officials describe their relations with DG ENER as good and consider the present commissioner (Cañete) a constructive partner (Interview 1). They think that DG ENER has recognized the importance of Switzerland for integrating Italy into the internal market for electricity. They further hold that this is why DG ENER is ready to grant exceptions to Switzerland on well-justified grounds (e.g., perhaps a transitional period for unbundling) (Interview 1). Yet, these constructive relations face three limitations. First, a small and shrinking number of officials in DG ENER is familiar with the Swiss dossier (Interview 8, 15). The future relationship thus becomes vulnerable to fluctuations in Commission officials. Second, the EU internal market relies on a strong set of legal principles. The Commission is not willing to compromise on these principles (Interview 7, 8). Third, decisions on the future institutional access of Switzerland will be taken on higher levels of the Commission. These levels are likely to anticipate or reapply principled political decisions made in the context of Brexit (Interview 7, 8). These limitations imply that the room for Switzerland to find pragmatic solutions with the European Commission outside of formal agreements is very narrow.

The electricity agreement is likely to affect the relations between SFOE and the European Commission. Its conclusion might require further exchanges on implementation aspects and thereby facilitate access to the Commission. By contrast, its non-conclusion would probably lead to a further downgrading of the Swiss dossier within the Commission and thereby decrease Swiss access (Interview 7).

Electricity Coordination Group (ECG): The Electricity Coordination Group (ECG) is a Commission expert group that coordinates the implementation of electricity policies with cross-border impacts. The group comprises energy authorities and national regulatory authorities of EU member states as well as representatives of ACER and ENTSO-E. Its role is reinforced in the Risk-preparedness Regulation that sets out a framework for an effective monitoring of security of supply in Europe via the ECG (recital 6 and 34). It puts the ECG in charge of ensuring, in collaboration with ACER, the coherence between the risk-

preparedness plans of member states (Art. 18 Risk-preparedness Regulation). Switzerland presently does not have regular access to the ECG. This is unlikely to change without an agreement, since an invitation depends on the goodwill of the Commission. So far, the Commission has refused to invite Switzerland, arguing that the negotiations on the electricity agreement would have to be concluded first. More recently, the Commission sent signals to invite Switzerland to the ECG even before the conclusion of negotiations, if Switzerland fulfils the Commission's expectations on the institutional agreement which would be regarded as positive sign to successfully conclude the electricity agreement. At the same time, Brexit may play a role: In the case of a "hard Brexit", the Commission could be inclined to strictly exclude the UK and other third countries from the ECG without an agreement. In the case of a "soft Brexit" or a revocation of Art. 50, the Commission could be more open to pragmatic solutions and invite Switzerland even without an electricity agreement. With an agreement, Switzerland may gain access to the ECG (Interview 10).

European Electricity Regulatory Forum (EERF or Florence Forum):

The Florence Forum is a venue for discussing issues related to the EU's internal market for electricity and cross-border electricity trade. The importance of the forum has somewhat decreased in the past, especially because the European Commission and ACER have come to use it to distract attention from controversial issues (Interview 10, 22). The broad membership of the forum comprises government representatives and national regulatory authorities of EU member states and selected third countries, TSOs, market parties (electricity traders, consumers, network users, etc.), ACER, CEER, and ENTSO-E. Switzerland participates through the SFOE and ElCom, in particular when forum meetings serve to prepare formal EU decisions (Interview 10). We have not come across indications of likely changes in access with or without the electricity agreement. Without the agreement, exclusion cannot be ruled out though.

Council of Ministers: The Council is, together with the European Parliament, the main decision-making body of the EU. It takes important intergovernmental decisions on major parts of EU energy policy and

legislation. Depending on the issue under discussion, the Council meets in different configurations. Each configuration consists of the responsible ministers from the 28 EU member states. Council meetings are prepared by the Council preparatory bodies. In energy, member state representatives usually begin their discussions at the technical level of the Energy Working Party. These discussions continue on the political level of the Committee of Permanent Representatives (COREPER), which prepares the formal decision. The final vote is then taken by ministers in the Council configuration responsible for energy issues, the Transport, Telecommunications and Energy Council (TTE). Informal meetings of energy ministers organized by the Council Presidency once every six months take place outside of the official Council hierarchy.

Switzerland does not have any access to meetings in the Council hierarchy that formally contribute to the EU's legislative process. This means an exclusion from many technical and political discussions shaping the future content of the EU *energy acquis*. However, Switzerland receives occasional invitations to informal, technical meetings of energy attachés. Moreover, based on early contacts with the incoming Council Presidency, Switzerland usually receives invitations to the informal meetings of energy ministers (Interview 10). The Federal Councilor (or SFOE) uses this opportunity for political exchange with EU member states. Because of time constraints, the discussions have a rather general, political character. The present scope for uploading Swiss interests on the level of the Council is thus very limited.

It is not entirely clear yet to what extent an electricity agreement with the EU would grant Switzerland access to the Council. Switzerland demands presence in the forums of the Council hierarchy whenever changes to the *energy acquis* are discussed that could affect Swiss energy legislation. A Swiss observer status seems possible on relevant issues, such as electricity trading, at the technical working party level (Interview 12). Participation is less likely on the political level of COREPER and the Energy Council. Without an agreement, exclusion will continue and, in the worst case, might even extend to informal meetings.

Electricity Cross-Border Committee: The Cross-Border Committee discusses and adopts regulations in the comitology process. This procedure applies to the Network Codes prepared by ENTSO-E, ACER, and the European Commission. The Cross-Border Committee is presided by the Commission. It comprises representatives of the EU member states and the countries of the European Economic Area (EEA). The latter have an observer status without the right to vote, but presence is often more important than voting rights (Interview 8, 9). Switzerland presently does not have access to the Cross-Border Committee. The electricity agreement might grant it an observer status similar to that of EEA countries.

3.1.2. Swiss Federal Electricity Commission (ElCom)

The **Swiss Federal Electricity Commission (ElCom)** is the independent federal regulatory authority in the electricity sector. It is responsible for monitoring compliance with the StromVG and EnG (ElCom 2018a). As the competent authority to monitor electricity supply security in Switzerland, ElCom also regulates issues relating to international electricity transmission and trading. For this purpose, it coordinates its activities with foreign regulatory authorities and represents Switzerland in the relevant committees (Art. 22 para. 5 StromVG).

ACER: The European Agency for the Cooperation of Energy Regulators (ACER) is an agency of the EU based in Ljubljana, Slovenia. Launched in 2010, it formally brings together the energy regulators of EU member states (Regulation 713/2009). ACER is equipped with regulatory powers and its working groups are integrated into the Union's institutional hierarchy. It coordinates the work of national regulatory authorities and participates in the creation of European network rules. Decision-making in ACER forums follows the principle of an escalation ladder. Debates usually begin in informal ad-hoc task forces, pass through one of the three working groups (electricity; gas; market integrity and transparency) and are finalized in the Board of Regulators. Following discussions at task force and working group level, it is up to the ACER Director to decide which elements of these

discussions to present as a draft to the Board of Regulators. Although this process does not require consensus, ACER usually consults the national regulatory authorities (NRAs) and seeks a majority behind its draft. This is due to the fact that decisions in the Board of Regulators are taken by a two-thirds majority (Interview 5, 6).

ElCom has observer status in some forums of ACER. Following the conclusion of a Memorandum of Understanding in 2015 (MoU; ElCom 2015: 5; recital 25 Regulation 713/2009), it can participate in the electricity working group and the electricity working group's task forces. Full ACER membership is a prerogative for EU member states, which are fully bound by ACER decisions. Therefore, like the regulators of Norway and the Energy Community, ElCom does not participate in the Board of Regulators and has no access to the Board of Appeal as well as the dispute settlement mechanism (Interview 1, 5, 6, 8, 10).

The main benefits of ElCom's observership in ACER include participation in discussions and access to information. While the latter bears significant added value (ElCom has the same access to information as NRAs from EU member states), ElCom's influence in ACER is subject to different interpretations. Swiss interviewees highlighted the importance of contributing to technical discussions among European regulators and the strategic value of having some influence on the development of European energy regulation, such as the Network Codes (Interview 1, 5). Several officials stressed that the impact of individual regulators is determined by their ability to shape discussions ahead of a vote rather than by the formal right to vote and that ElCom performs well in this regard (Interview 1, 5, 8, 12). On the contrary, an ACER official described ElCom's influence in the work of the agency as very limited. In carrying out its tasks to pursue the European interest, ACER reportedly takes national specificities of EU members into consideration, but generally not those of Switzerland. Moreover, ElCom reportedly lacks a tradition of long cooperation in ACER. Capacity or technical knowledge, which are qualities that underpin Swissgrid's influence in ENTSO-E (see section 3.1.3.), arguably play a minor role at the regulatory level (Interview 6).

Observership in ACER entails several disadvantages compared to full membership that have affected ElCom's performance. Non-participation in the Board of Regulators significantly limits its influence on European energy regulation. Moreover, ElCom reportedly lacks regular information on the agenda and on opportunities for input in working group and task force meetings (Interview 6). ElCom also lacks access to the Board of Appeal – even when directly affected by ACER decisions. Increased cross-border trade of electricity flows that will require redispatching actions across Europe, including in Switzerland, provides an illustrative case in this context.⁵¹ To calculate these flows, capacity calculation regions (CCRs) had to propose a methodology under the Capacity Allocation and Congestion Management (CACM) guideline. However, this guideline, which has been co-designed by ACER, explicitly excludes Switzerland from both CCRs that surround it (CORE CCR and Italy North CCR) and thus from market coupling. In light of this non-cooperation, already today increased cross-border electricity flows entail extra costs and result in security of supply problems for Switzerland (Dierks 2019, Interview 15). As an observer in ACER, Switzerland had no legal means to challenge this decision (Interview 5, 6, 15, 18). With Switzerland's exclusion from the CCRs, the EU and ACER have introduced a political dimension into energy regulation. Art. 1(4) of the CACM guideline explicitly states that Swiss participation in capacity calculation is subject to an agreement between Switzerland and the EU. Moreover, when the Italy North CCR proposed to include Switzerland in their capacity calculation methodology, the European Commission immediately alerted the NRAs of this region to remove Switzerland. Although TSOs may pursue cooperation under private law instead (see section 3.1.3.), these examples reveal political pressure and clear links to the electricity agreement (Interview 6).

An electricity agreement would increase the access of ElCom to the work of ACER (Hettich et al. 2015: 40; Hettich/Rechsteiner 2014: N

⁵¹ Among others, the increase in cross-border flows is a consequence of Art. 16 ER, which obliges TSOs to allocate 70% of the physical capacity for cross-border trade.

58). Most likely, it would expand the current form of cooperation, including:

- Participation of ElCom in all working groups and task forces. This would ensure access to all discussions at the technical level and potentially more influence (Interview 3, 6, 8, 12).
- Access to ACER's Board of Appeal and the dispute settlement mechanism. This would provide more opportunities to challenge ACER decisions that counter Swiss interests, for instance, regarding membership in CCRs (Interview 5, 6). In addition, other legal possibilities for Switzerland to challenge EU decisions are part of the negotiations of a framework agreement. The conclusion of a framework agreement may thus create additional appeal bodies for Switzerland (Interview 15).
- The provision of REMIT data and information about conspicuous trade practices and behaviors. ElCom has previously sought to enhance exchange with ACER in this respect (ElCom 2016a: 44).

In the context of NRAs from EEA members getting access to the Board of Regulators without voting rights (conditional on implementation of Regulation No 713/2009; see Decision of the EEA Joint Committee No 93/2017), participation of ElCom is not completely unthinkable (Breitenmoser/Weyeneth 2014: N 738; Hettich et al. 2015: 40; Meister 2012). This issue is, however, highly political and even high-level interviewees were reluctant to voice an opinion (Interview 1, 6, 8, 10, 12).

Moreover, an electricity agreement would also imply obligations. Since ACER is based on legal cooperation, future decisions may become legally binding for Switzerland (Interview 5, 8). Under the scenario of a growing European dimension for national energy markets (e.g., triggered through increased cross-border electricity flows), the relevance of ACER and its powers vis-à-vis EU member states and third countries bound by its decision may further increase (Interview 18).

Without an electricity agreement, the European Commission may ask ACER to exclude ElCom from its forums (Interview 6, 12). Comparable exclusions from EU agencies already exist in other policy fields, for example the Swiss exclusion from the EU regulatory agency for telecommunication, the Body of European Regulators for Electronic Communications (Berec), due to a missing framework agreement (Mäder 2019). Nevertheless, in energy, a minimum level of cooperation is likely to persist to ensure the necessary coordination for security of supply (Interview 5).

CEER: The Council of European Energy Regulators (CEER) is a non-profit organization for voluntary cooperation between European national energy regulators. It consists of 36 members and 7 observers. Unlike ACER, CEER is not integrated into the EU's institutional hierarchy, has no regulatory powers, and plays no role in implementation. Organized in a bottom-up structure, it advocates certain policies and, in doing so, assists and complements the work of ACER (Interview 4). Since 2012, ElCom has observer status in CEER. It can therefore attend the general assembly, participate in all working groups, and join other activities (ElCom 2012a; ElCom 2012b: 29). Observership entails no voting rights, yet decisions are usually taken by consensus (Interview 4). In 2016, ElCom assessed its involvement in CEER as modest (ElCom 2016a: 49), which may be unproblematic because issues of key relevance for regulators are usually discussed in ACER (Interview 5). Since CEER has no formal link to the EU, ElCom's observership is likely to be unaffected by the conclusion or non-conclusion of an electricity agreement.

Risk preparedness: In case of an electricity agreement, either ElCom or SFOE would be in charge of carrying out the tasks set out in the regulation on risk preparedness (Art. 3 para. 1 Risk-preparedness Regulation). The main task of the competent national authority is to establish a risk-preparedness plan consisting of national and regional measures (Art. 10 para. 1 Risk-preparedness Regulation). Today, ElCom already produces reports on the security of electricity supply based on its legal mandate (ElCom 2018c: 5). Regarding the drafting of a risk preparedness plan, ElCom would need to cooperate with the

competent authorities of the EU member states in the region concerned (Art. 12 para. 2 Risk-preparedness Regulation). ElCom would also be subject to evaluation and information obligations in the context of an electricity crisis (Art. 14 and 17 Risk-preparedness Regulation).

3.1.3. Swissgrid

The Swiss transmission system operator (TSO) Swissgrid is the most important technical voice of Switzerland in Europe (Interview 24). It has a legal mandate to cooperate with foreign TSOs and to represent Switzerland's interests in the relevant committees (Art. 20 para. 2 lit. e StromVG). In line with this legal mandate, Swissgrid is a full and founding member of the European Network of Transmission System Operators for Electricity (ENTSO-E). In addition, it is a party to regional operational agreements with TSOs from Continental Europe. The (non-)conclusion of an electricity agreement will likely affect the ability of Swissgrid to represent Swiss interests on the European level.

ENTSO-E: The European Network of Transmission System Operators for Electricity (ENTSO-E) focuses on technical cooperation among 43 TSOs from 36 countries and on the preparation of secondary legislation for adoption in the EU comitology process. The third internal energy market package formalized the mandate of ENTSO-E. It now comprises three main areas: (1) to promote the completion of the internal market for electricity; (2) to facilitate cross-border trade and network development; and (3) to ensure the secure and reliable operation of the European electricity transmission system (Art. 4 Electricity Regulation; Art. 4 para. 1 Articles of Association). In the Clean Energy for All Europeans legislative package, the role of ENTSO-E is explicitly specified to serve the European good rather than individual TSO interests (Art. 28 para. 2 ER). Because ENTSO-E is also mandated to contribute to the integration of the growing amount of electricity from renewable sources, its importance will further increase in the future (Interview 18).

The work of ENTSO-E is highly relevant for Swissgrid and the management of the Swiss transmission grid. The main task of ENTSO-E is to develop draft Network Codes for the operation of the European electricity grid as well as cross-border network and market integration issues with initial guidance from ACER (Art. 6 para. 9 and Art. 8 Electricity Regulation). ACER reviews each draft Network Code and, if satisfied, recommends it for adoption via comitology. The comitology process involves the European Commission and the Electricity Cross-Border Committee composed of EU member state representatives (Interview 8)⁵². Even though the formal role of ENTSO-E is only preparatory, most of its drafts are adopted without major changes in the regulatory process and have implications for Switzerland (Interview 14). Decisions on cross-border capacity allocation and electricity balancing, for instance, may influence the amount of unscheduled flows and the import capacity of the Swiss electricity grid (Interview 15). Another task of ENTSO-E is the development of a ten-year network development plan. This plan forms the basis for identifying priority cross-border infrastructure projects (Projects of Common Interest, PCIs) that are eligible for cross-border cost allocation. In the long run, it thereby influences the role of Switzerland in the European electricity grid (Swissgrid 2015: 63, 161). On a more general level, membership in ENTSO-E facilitates cooperation between Swissgrid and other European TSOs.

The electricity agreement between Switzerland and the EU would secure and further enhance the strong position of Swissgrid in ENTSO-E. Already today, Swissgrid is an influential member of ENTSO-E taking part in all relevant bodies and recognized to deliver good technical work (Interview 10, 12, 18). For example, Swissgrid was very active and influential in the development of several Network Codes (Interview 8, 14). With an electricity agreement, Swissgrid may also obtain voting rights in ENTSO-E on further network codes and future revisions of existing codes (Interview 10, 15). So far, the lack of voting rights has not curtailed Swiss influence because consensual decision-

⁵² For a visualization of the Network Code development and adoption process, see Elia (2019).

making based on expertise and reasoned argumentation prevails (Interview 8, 15, 18). However, for issues that only attract the attention of a limited number of TSOs with voting rights, future Swiss votes might be able to tip the balance (Interview 15). The secured representation of Swissgrid would presumably enable it to shape technical decisions in ways that consider Swiss interests. Ideally, these decisions would contribute to reducing the amount of unscheduled flows as well as to increasing the stability and import capacity of the Swiss electricity grid.

Without an electricity agreement, the prevalence of political over technical arguments can put the membership of Swissgrid in ENTSO-E at risk. On the one hand, technical arguments speak against an exclusion of Swissgrid. Swissgrid and the other TSOs largely share the same interests regarding security of supply and cross-border flows of electricity (Interview 11, 12). Moreover, the EU cannot complete its internal market for electricity without Switzerland. This is because Italy legally does not have to implement the flow-based market coupling (Art. 20 para. 3 GL CACM) and might choose not to do so due to large electricity flows across the Swiss-Italian border (Interview 15, 16, 24). These considerations seem to guide the current positions of ENTSO-E and DG ENER (Interview 1, 18). The existing physical interdependencies are thus a source of Swiss bargaining power. Because of this structural power and Swiss plans for further market liberalization, some view Swissgrid's participation in ENTSO-E as virtually guaranteed (Interview 1).

On the other hand, political arguments suggest a much gloomier picture. It is not self-evident that third countries like Switzerland can participate in ENTSO-E without an electricity agreement (Federal Council 2015; Interview 3, 12). Formally, ENTSO-E can exclude a member or suspend its participation if the member state is under no legal obligation to apply the Electricity Regulation and/or the Electricity Directive (Art. 12 para. 3 Articles of Association). In practice, ENTSO-E has never made use of this right, even when member states were late in the implementation of European law (e.g., Commission 2013; Commission 2014b). Politically, however, the future participation of

Swissgrid primarily depends on what position the European Commission would take after a failure of the electricity agreement. The Commission is likely to follow a more principled political rationale rather than technical considerations of DG ENER (Interview 8, 15). It may come to use Swiss ENTSO-E membership as a bargaining chip or re-apply decisions it might have taken by then on the future status of British TSOs in the context of Brexit (Interview 12, 15). A milder solution than full exclusion would be to downgrade Swissgrid to an observer. In short, there is a substantial risk that Swissgrid will either be excluded from ENTSO-E or that its status will be downgraded markedly.

An exclusion from ENTSO-E would greatly reduce Swissgrid's influence on the European level and render its cooperation with foreign TSOs more difficult. If excluded, Swissgrid would have to rely on regional or bilateral operational agreements with neighboring TSOs (these agreements would be contracts governed by private law) to address cross-border issues (Interview 15). While technical cooperation is unlikely to die off, it would certainly become much more complex and less efficient (Interview 12, 15, 17). Neighboring TSOs would always fear to violate EU laws by such agreements (Interview 15). Moreover, a downgrade to an observer status would imply a loss of influence. The only present observer in ENTSO-E, the Turkish TSO TEIAS, just has access to certain working groups and may not take part in committee, board, and assembly meetings (ENTSO-E 2019a). Opportunities for an effective representation of Swiss interests would thus shrink.

Operational TSO agreements: Swissgrid also cooperates multilaterally with TSOs from Continental Europe through instruments under private law. First, the Synchronous Area Framework Agreement for Central Europe (CE SAFA) is an example for a private contract among TSOs. Fulfilling requirements of the System Operation Guideline, it supersedes and replaces the 2005 Multilateral Agreement Operation Handbook, a comprehensive collection of technical standards for the operation of the interconnected grid of the Regional Group Continental Europe (Interview 15, 18). The CE SAFA was signed by TSOs of the

Regional Group Continental Europe and ENTSO-E and came into force on April 14, 2019. Swissgrid was able to negotiate a special Swiss clause that enables Swissgrid to be included in certain operational coordination processes related to the secure operation of the Continental European Electricity System. Even though the Regional Group Continental Europe operates under ENTSO-E, the SAFA itself is a private contract among TSOs (ENTSO-E 2019c; Interview 15). Second, the Common Grid Model (CGM), which is currently also under development, is another example for a cooperation instrument under private law (Interview 18). The CGM is a joint dataset of TSOs that describes the characteristics of the European power system for the purpose of coordinated capacity calculation (recital 4 and Art. 2 para. 2 CACM GL). To ensure the participation of Swissgrid in this development, TSOs have concluded a private contract (Interview 15). Third, Swissgrid's involvement in Capacity Calculation Regions (CCRs) also illustrates the relevance of instruments under private law. CCRs are geographic areas in which coordinated capacity calculation is applied. Swissgrid has contributed to capacity calculation proposals in the Italy North region (APG et al. 2018: 3). It currently attempts to formalize its participation through a private contract with the involved TSOs (Interview 15). Fourth, Swissgrid holds shares in companies that carry out legal mandates in the EU area, such as the Regional Security Coordinator (RSC) TSCNET Services. RSCs provide forecasts of electricity flows and grid stability and they issue recommendations for a common system for security measures to the TSOs of their capacity calculation region (recital 6, Art. 3 para. 2 (89) and Art. 76 GL SO; Interview 11; TSCNET 2019)⁵³. Swissgrid also holds direct shares in the Joint Allocation Office (JAO), which organizes cross-border capacity auctions, and indirect shares in the European exchange for power spot trading EPEX SPOT (Interview 15). This shareholding contributes to an increased anchoring of Swissgrid in Europe. It is mainly the first three instruments though (CE SAFA, CGM, and CCRs) that

⁵³ The TSOs decide individually whether or not to follow the recommendations of the RSC and they remain responsible for maintaining the operational security of their control area (para. 7 GL SO). The RSCs are subordinate to the TSOs and they do not have any decision-making powers (cep 2017: 2).

serve as potential fallback options for Swissgrid in case of an exclusion from ENTSO-E.

Cooperation with other TSOs under private law could help Swissgrid to get a grip on unscheduled flows, possibly even without an electricity agreement between Switzerland and the EU (Interview 15). Swissgrid has developed proposals that would revise present capacity calculation methods taking into account the congestion on Swiss physical grid elements. It is still uncertain how these proposals will make it into the SAFA, CGM, and CCRs. With respect to the latter, Swissgrid has not yet gained access to the Core region, which is particularly relevant as it includes France and Germany (Interview 15). Another major uncertainty concerns the compatibility with European law. Without an electricity agreement, the European Commission will closely monitor the compatibility of these activities with EU law (Interview 8, 15). If these fallbacks turn out to be unavailable, Swissgrid would have to aim for bilateral agreements with neighboring TSOs. Compared to multilateral agreements, bilateral agreements tend to have a more limited scope and they can be less effective. With the Clean Energy Package, the participation of Swissgrid in the new Regional Coordination Centers (RCCs) is also unclear at present.

3.1.4. Informal Channels of Influence

Influence on European energy policy is not only exerted via formal channels, such as participation or voting rights in EU bodies, but also through various informal channels for interest promotion. A key characteristic of informal channels is that their utilization is usually not dependent on EU membership. This makes them particularly attractive for third countries, such as Switzerland. Informal channels would likely gain in importance, in case Swiss actors lost access to certain venues (e.g., Swissgrid in ENTSO-E).

Informal collaboration with EU-members: Switzerland seeks close informal collaboration with EU member states to promote its interests in the energy sector. Close bilateral relations offer a certain de-

gree of influence on EU energy policy without representation in official bodies. The approach has been most fruitful with countries that share Swiss concerns because of geographical proximity or similar structural characteristics. For example, the neighbors Austria, France, Germany, and Italy have expressed support for Switzerland's participation in the definition of EU energy policy (Interview 3, 12). Particularly Italy has been an advocate in this regard. One reason is that the security of supply for Italy and the success of Italian flow-based market coupling depends on Switzerland due to the large amount of cross-border electricity flows (Interview 13). Swiss actors have also repeatedly voiced interests related to European electricity regulation via Luxembourg. Here, collaboration has been rooted in similar structural characteristics of the two countries and Swiss offers to share knowledge of the electricity market, e.g., through Swissgrid (Interview 3). Finally, collaboration is also promoted at the technical level, for example, between ElCom and the regulators of surrounding countries (Interview 5).

Energy Attachés: On the political level, exchange with the neighbors is mainly facilitated through numerous informal contacts with Energy Attachés and their counterparts in the ministries. Usually, these officials are helpful and share valuable information with their Swiss colleagues on a regular basis. For instance, Swiss officials meet the German or Austrian attachés approximately every two weeks; at times, they invite each other to dinner at their private homes. Being part of the 'Brussels bubble', the intensive professional and personal exchange of diplomats at working group level often leads to friendships (Interview 12). Scholars have widely researched this phenomenon. A key finding is that such intensified relationships facilitate socialization effects that can range from a greater awareness of the other's concerns to the creation of a quasi-common identity (Checkel 2003, 2005; Juncos/Pomorska 2006).

The main value of these contacts is that Switzerland gains indirect access to EU dialogues on energy issues. Attachés of like-minded neighbors and their colleagues are broadly in favor of Swiss electricity market integration. Colleagues from more distant countries without an

immediate interest in Switzerland still tend to share information from the Council working groups and on national positions. This flow of information is efficient. Reportedly, there have been cases when foreign attachés spontaneously contacted their Swiss counterpart with information relevant for Switzerland (Interview 12).

There are also reports that other attachés intervene in the Council in support of Swiss interests. However, this is limited to cases in which they do not identify conflicts with overriding (national or European) interests. Since such conflicts can quickly arise, the issue of Switzerland is rarely raised in the Council. Especially the big neighbors, such as Germany and France, usually consider other topics on their agenda more important than Switzerland (Interview 12).

A similar process is reported between Swissgrid and the neighboring TSOs. The representatives of these TSOs in Brussels and in the various decision-making processes in the EU also maintain a close relationship with their counterparts in Swissgrid, leading to frequent information exchanges and even consulting on upcoming decisions that will have an influence on Switzerland (Interview 15).

Pentalateral Energy Forum: The Pentalateral Energy Forum (PLEF) is a leading format for cooperation on energy issues outside of the EU institutions and bodies. It aims at promoting regional cooperation in electricity market integration and security of supply. In 2005, the PLEF was established as a voluntary form of cooperation by the Ministers of Energy of Belgium, France, Germany, Luxembourg, and the Netherlands. Two years later, a Memorandum of Understanding (MoU) formalized the cooperation among the countries' national ministries, NRAs, TSOs, power exchanges, and market parties platform, with close involvement of the European Commission (PLEF 2007). In 2011, Switzerland joined the PLEF as an observer and Austria joined as a full member.

Political Declarations, signed in 2013 and 2015, and a second MoU in 2017 established the PLEF's current organizational form (PLEF 2013, 2015, 2017). It is best understood as a hybrid consisting of top-down as well as bottom-up elements. A Ministerial Conference serves as the

governing body and sets the global objectives. It provides the forum with both a political umbrella and leverage. Ministerial meetings are prepared and assisted by a Committee of Coordinators. At the same time, a wide range of officials and stakeholders from the member countries carry out the bulk of the forum's coordination work. Dialogues take place in so-called Support Groups, which are comprised by experts and market players on an ad hoc basis. The non-political setup at the working group level structures most discussions along economic rather than political interests (Haas 2017; Interview 11). A small secretariat provided by the Benelux Union ensures the daily functioning and continuity.

The main reason for the PLEF's significance and influence stems from its long tradition of cooperation to facilitate dialogue and agreement on energy issues, especially increased cross-border flows. Its regional rather than Europe-wide perspective emphasizes similarities of interests among neighboring countries and the benefits of solving common challenges (e.g., the implementation of market coupling). Often, rules that eventually become part of the EU's *energy acquis* are first elaborated and tested within the regional context of the PLEF. For instance, PLEF cooperation and discussions with the Commission have reportedly influenced the Clean Energy Package in areas such as market coupling, generation adequacy assessments, capacity mechanisms, risk preparedness, and flexible short-term markets (Interview 11).

For Switzerland, participation in the PLEF is important. It provides access to first-hand information and – through the bottom-up organization of the Support Groups – opportunities to influence EU energy policy that are unavailable to non-members in formal EU bodies (Hofmann et al. 2019). The Commission regularly joins meetings and listens to positions, argumentations, and interpretations of the PLEF members, including Switzerland. Switzerland's observer status in PLEF is linked to its non-EU membership. It prevents Switzerland from joining certain discussions which are reserved to EU members. Regarding all other issues, however, it has the same rights as full members and is a very active player with considerable influence. For instance, reflecting its expertise and knowledge in the area, Switzerland is co-chairing

Support Group 3 on flexibility and short-term markets (Interview 11). Swiss influence also benefits from the flexible PLEF framework that promotes intense dialogues and decision-making by consensus. Ad hoc Support Groups, in which Swiss actors are widely represented (including experts from Swissgrid, ElCom, the energy sector, the SFOE, and the Energy Counselor at the Swiss Mission at the EU), are conducive to finding agreement (Interview 12).

Recently, the PLEF has become more important for Switzerland. The forum was crucial in reaching the recent interim solution among NRAs on how to deal with unscheduled flows resulting from the exclusion of Switzerland from market coupling. In Support Group 1, Switzerland was able to negotiate a temporal solution with France for the unscheduled flows in Winter 18/19. This solution was accepted by all PLEF NRAs. The involvement of national ministries, TSOs, and NRAs helped to find this short-term solution, but talks about a permanent solution are ongoing (Interview 11, 15). The PLEF also becomes more important as Swiss participation in other coordination bodies, such as ENTSO-E, is being called into question. In contrast to these bodies, the PLEF operates informally and fully independently of the EU. Swiss participation is therefore neither a legal problem nor can a potential exclusion be exploited by the EU for other interests (Interview 12). The conclusion of an electricity agreement between Switzerland and the EU would render a full membership of Switzerland in the PLEF possible (Interview 11).

The PLEF has made important contributions towards the integration of the European electricity market. Despite its achievements, it has remained separated from the EU's Energy Union initiative. Whether or not the forum will eventually be integrated into the EU framework is an open question. Nevertheless, there is growing indication that the EU is bandwagoning with the forum's initial idea to regionalize coop-

eration also on the political level. The creation of regional energy forums through the Clean Energy Package⁵⁴ has been indicative of this development. At the same time, regions change in terms of their geographic scope. In this context, the scope of the PLEF does not fully fit the grid regions and some market regions anymore, undermining its function as a testing ground. Both trends – the Europeanization of the PLEF’s main tasks and the change of regions’ geographic scope – may well pose an existential threat to the future of the PLEF. Without the PLEF, Switzerland would lose a key framework for regional cooperation. The electricity agreement could make up for this loss, if it ensured Swiss participation in the EU’s future forums for regional cooperation.

3.1.5. Coordination among Swiss Key Actors

Coordination among Swiss public and private actors is essential to push for Swiss interests in European energy governance. Coordination includes collaboration in day-to-day business, information sharing, streamlining of interests, and agreeing on joint aims. Individual actors may lack access to relevant policy venues, voting powers, or information. A well-functioning coordination will help to maximize the benefits of access to European institutions that an electricity agreement would grant Switzerland. Coordination would also remain important if the electricity agreement failed, but it would be unable to compensate for the likely loss of institutional access.

The core of the present coordination among Swiss actors is the triangle of ElCom, SFOE, and Swissgrid. These three key actors hold trilateral meetings on a political level and there is a regular exchange on a technical level. Coordination works well if these actors pursue common interests. An example of successful Swiss coordination is the EU Electricity Balancing Guideline adopted in 2017 (Interview 12). The three key actors developed a common position and advocated it

⁵⁴ In the Commission’s legislative proposal these forums were labelled Regional Operational Centers (ROCs). They were renamed to Regional Coordination Centres (RCCs) in the legislative process.

through various channels: Swissgrid in ENTSO-E and in bilateral contacts with other TSOs; ElCom in the ACER Electricity Working Group; and SFOE in the Pentalateral Energy Forum and in bilateral contacts with France and Germany. These efforts shaped some provisions of the guideline in ways that reflect Swiss interests. They notably allow Swissgrid to participate in European balancing platforms if its exclusion endangers grid stability in the region (Art. 1 para. 6 GL EB). Both ENTSO-E and ACER opined that this condition was fulfilled, whereas a decision of the European Commission is still pending (Interview 15). Swiss actors are thus able to shape EU electricity regulation through coordinated participation in mostly technical discussions—at least up to the point where more principled, political considerations take upper hand.

Coordination problems among Swiss key actors arise where interests or their interpretations differ. Some tensions exist between Swissgrid and its regulator ElCom. Swissgrid (and largely also SFOE) pursues a European approach to grid operation, whereas ElCom takes a national perspective on market issues and security of supply. Specific conflicts concern the extent to which Swissgrid can address relevant issues on the European level without violating Swiss law or taking over European law and the domestic implementation of the EU Network Codes. These underlying tensions may compromise Swiss influence on the European level (Interview 10, 15).

With an electricity agreement, a consolidation of the trilateral coordination between SFOE, ElCom, and Swissgrid would help to turn their enhanced access to European institutions into increased influence. Without the agreement, Swiss key actors would need to develop smart lobbying strategies and effective coordination to make the most out of the remaining and increasingly informal channels of influence.

3.2. Other relevant Swiss Stakeholders

In this section, we analyze bottom-up preference projection of other relevant Swiss stakeholders onto the European level (Europeanization mechanism 2).

3.2.1. Cantons and Communities

The electricity negotiations between Switzerland and the EU mainly concern federal laws and policies, but they also affect cantons and municipalities in some respects (Interview 1). These include state aid, market liberalization, and unbundling rules for cantonal and municipal utilities. A priority of the cantons is to maintain Swiss flexibility in creating new long-term, federal-level hydropower support schemes if deemed necessary for achieving the targets of the Energy Strategy 2050 (see 2.1.2 a). By contrast, the cantons do not have any major concerns regarding their own subsidy schemes. In past years, cantons have made very little use of subsidies for electricity generation from renewable sources because of the availability of federal support schemes (Interview 1, 13). Moreover, the large cantonal support schemes in the buildings sector will not fall under state aid rules because the electricity agreement does not cover heating. The inclusion of energy efficiency and consumption issues in the negotiations would “cross a red line” for the cantons as they have important competences in these areas (Interview 13).

The Swiss cities want to ensure the continuation of their energy-related support schemes and a market design that does not hinder the expansion of renewables (SSV 2019: 2). As regards the electricity agreement, it is expected that existing municipal (or cantonal) support schemes for renewable electricity generation would often be exempted from state aid rules because of their small scope (de minimis rule) (Interview 1). Certain state aid limits may, however, apply to cantonal and municipal support for energy research and development involving private actors (Interview 13).

The involvement of cantons and municipalities in Swiss external energy relations is limited. The cantons have taken part in the institutional and electricity negotiations with the EU. The Conference of Cantonal Governments (KdK) coordinates cantonal positions on institutional aspects; the Conference of Cantonal Energy Directors (EnDK) covers electricity matters. Apart from these negotiations, the cantons rely on a single representative in Brussels and have technical contacts to regions of neighboring countries. Formal access to EU institutions or the PLEF is beyond the reach of cantons and municipalities. However, they may come to play a role in garnering public support for the agreement in a possible Swiss referendum (Interview 13).

The conclusion or failure of the electricity agreement is unlikely to markedly alter the institutional arrangements between federal, cantonal, and municipal levels. Its conclusion will only accelerate ongoing developments in the electricity market, including the rise of prosumers, decentral electricity generation, and energy services (Interview 1). Some assume that the agreement is more likely to receive support in a potential referendum if it properly addresses cantonal and municipal concerns (Interview 13).

3.2.2. Swiss DSOs

The Clean Energy Package contains rules regarding the establishment of a European entity of DSOs (EU DSO entity), which shall be set up by all DSOs with at least 100'000 customers. The EU DSO entity aims at raising efficiencies in the electricity distribution networks in the Union and ensuring close cooperation with TSOs and ENTSO-E (recital 60 and Art. 52 ER). Among others, its tasks encompass the coordinated operation and planning of transmission and distribution networks (in cooperation with ENTSO-E), the integration of resources embedded in the distribution network (e.g., renewable energy resources, distributed generation, energy storage), and the development of demand response (Art. 55 and 57 ER). Furthermore, the EU DSO entity may submit proposals for Network Codes to ACER if the

subject-matter of the Network Code is directly related to the operation of the distribution system (Art. 59 para. 3 and 9 ER). Switzerland is indirectly involved in the setup of the EU DSO entity through the membership of VSE in Eurelectric.

3.2.3. Interest Groups

The Swiss electricity sector and its association VSE have only limited influence in Europe. Important channels for interest uploading are through Swissgrid in ENTSO-E, through VSE in Eurelectric, and through VSE and some Swiss generators via the Market Parties Platform in the PLEF. Swissgrid can represent Swiss interests most effectively because many decision-makers in Brussels perceive TSOs to be more neutral than the industry (Interview 22). By contrast, even large Swiss electricity companies find it difficult to attract attention in Brussels individually (Interview 22, 24).

The participation of VSE in Eurelectric, which represents the interests of the electricity industry on the European level, provides access to the EU policy-making process. It ensures that concerns of the Swiss electricity sector about third country treatment enter the interest group statements. This happened, for instance, in the case of the Clean Energy Package (Interview 25). VSE also takes part in the Market Parties Platform of the PLEF, in which many countries are receptive to Swiss concerns. In addition, it holds trilateral forums with Austrian and German sector associations. Its overall leverage on the European level remains limited though (Interview 24). So far, VSE has neither taken an official position on the electricity agreement nor has it requested Eurelectric to endorse the agreement (Interview 24, 25). Accordingly, Eurelectric has not yet expressed its support for the agreement, even though it is generally sympathetic to it (Interview 25).

The European Federation of Energy Traders (EFET) has established a Swiss Working Group that deals with matters of interest for trading companies specific to the Swiss situation. This association has a substantial influence on EU policy making; the Swiss Working Group also

has frequent interactions with Swissgrid to promote the understanding of Swiss specificities. EFET has often voiced concern over the lack of integration of Switzerland in various EU processes (Interview 15).

With an electricity agreement, the present access of the Swiss electricity sector to European policy-making would persist and probably increase in importance. Without an agreement, not all these access points would necessarily be lost. However, the Swiss electricity sector may find it increasingly difficult to raise awareness for its concerns on the European level.

3.2.4. Coordination of other Swiss Actors

In addition to the three key actors (ElCom, SFOE, and Swissgrid), domestic coordination in Switzerland also involves other public and private actors. Among public actors, especially cantons partake in the formation of Swiss positions on European energy policy. Through their inter-cantonal associations, they have participated in the electricity negotiations of the SFOE with the European Commission. Additionally, the cantons hold regular exchanges with ElCom and SFOE, have two representatives in the Board of Directors of Swissgrid, and reach into the industry via ownership of utilities (Interview 13).

Among private actors, influential voices in coordination efforts are the VSE, which represents the Swiss electricity sector, and some larger utilities. Their participation in Eurelectric is a channel for uploading Swiss interests onto the European level (Interview 25). Regarding the electricity agreement, however, the fact that a constructive dialogue between SFOE and the electricity sector has only started quite late may have contributed to resistance among less informed industry actors (Interview 1, 24). Coordination in Switzerland is naturally more difficult than in countries like France with only few large, state-dominated electricity companies (Interview 22). Persisting divisions within VSE on the electricity agreement and the related issue of market liberalization pose a challenge for forming a coherent Swiss position towards the agreement.

Regular and timely federal and industry dialogues can complement the trilateral coordination among key actors. This would increase the coherence of Swiss positions regardless of whether Switzerland and the EU conclude the electricity agreement or not.

3.3. Renewable Energy Investors

In this section, we discuss how the Europeanization of Swiss energy policy can impact renewable energy investment decisions by professional (3.3.1.) and retail investors (3.3.2.), as envisaged by Europeanization mechanism 1. The Swiss Energy Strategy 2050 requires scaling-up investment in renewable generation capacity. Hence, the following policy impact assessment will address the question of what the Europeanization of Swiss energy policy means for the achievement of the renewable energy goals that were formulated in the Energy Strategy 2050 and set forth in the EnG.

3.3.1. Professional Investors

In this section, we discuss professional investors' reactions to the influence of EU energy policy on Switzerland (Europeanization mechanism 1). Previous research has shown that energy investors' reactions to changes in regulation are shaped by their perception of policy risk (Lüthi/Wüstenhagen 2012: 1008) and by their business models (Karneyeva/Wüstenhagen 2017: 454 et seq.).

The application of EU rules for the promotion of renewables to Switzerland may have an impact on the perception of policy risk related to investments in RE in Switzerland, on the risk-adjusted financing cost of new domestic RE capacity, on investment flows, and on the social acceptance of RE projects.

The RE Directive introduces principles for the stability and predictability of financial support for renewables, including the explicit ban on retroactive changes and the transparency requirement for the allocation of support. The aim of these principles is to lower the perceived

“policy risk” and hence the financing costs of RE projects: a higher policy risk could in fact deter investment decisions by professional investors (Lüthi/Wüstenhagen 2012). Making these principles explicit in Swiss legislation could lower the currently perceived high policy risk for investments in renewable energy in Switzerland (Karneyeva/Wüstenhagen 2017) and hence reduce the cost of financing of Swiss utility-scale renewable projects.

The new European rules on renewables call for an acceleration and streamlining of approval procedures. Long and complex planning procedures, caused, among other factors, by the lack of binding deadlines for the official processing of applications, are perceived as a major hurdle for wind energy projects in Switzerland (Thaler et al. 2019: 4; van Baal et al. 2019: 37). Streamlining approval procedures, as required by the RE Directive, would reduce risk for project developers and therefore allow them to invest with lower return expectations, which translates into lower financing cost (Lüthi/Wüstenhagen 2012).

Market-based support schemes compliant with EU rules expose large RE producers to market price signals, meaning that their revenues will depend on future electricity prices. If these instruments are adopted in Switzerland, they can have an impact on the investor landscape. More specifically, different classes of professional RE investors feature a different willingness to accept this type of revenue risk: while the majority of institutional investors is likely to reject investment opportunities where revenues are fully exposed to electricity price risk and hence may need some further form of risk hedging, only a minority of incumbent energy utilities would regard this as unacceptable (Salm 2017: 1372). Introducing market-responsive and competitive support schemes in Switzerland may then lead to more power plant constructions by incumbent utilities. A competitive tendering procedure for support could lead to market concentration, with few aggressive international project developers winning most of the tenders. Experience from other countries shows that close monitoring of auction participation criteria and implementing performance criteria could prevent such market concentration (Interview 27).

The new RE Directive states that, as a rule, support schemes for large-scale RE should be technology neutral. There is some initial evidence that technology neutral auctions might favor solar farms against wind turbines, as the former face fewer permitting challenges compared to the latter, as observed by experts commenting on the results of the first technology neutral auction held in Germany in 2018 (Solarthe-menPlus 2018). In Switzerland, competition for support between different large-scale RE technologies could penalize the more expensive generation capacity (e.g., biogas) and/or those that face opposition by well-organized local and/or national “pressure groups” (wind; Geissmann 2015: 5). This potentially leads to less diversification, especially when combined with broader opportunities for cross-border trade. A less diversified RE mix (e.g., a hydro/solar-only mix) might minimize costs in the short-term but may lead to higher costs later on (e.g., an increased need for seasonal storage).

As long as the support instruments for large-scale RE are market-responsive and competitive, the EU leaves the specific design of instruments to the member states. In this regard, Swiss policy-makers need to be aware that the support schemes for large producers explicitly mentioned in EU law (green certificate schemes, fixed market premia, sliding market premia) imply different degrees of volatility in the expected revenue stream of RE projects. An increase in the volatility of the revenue stream leads to higher financing costs. In particular, under green certificate schemes (“quota systems”) producers are exposed to uncertainty both about the future price of electricity and the future value of the certificates; this results in higher financing costs and a higher risk premium compared to sliding market premia (May et al. 2017: 391 et seq.). Among the most popular market-based support schemes for large producers compliant with the new EU rules (green certificate schemes, fixed market premia, sliding market premia), sliding market premia are those leading to lower financing costs and to financing costs that are not significantly different from those implied by fixed feed-in tariffs (May et al. 2017: 389, 395). It is important to note that, as the costs of renewable energy technologies have fallen

sharply, financing costs of new installations play a central role in determining the cost of achieving energy transition policy objectives (May et al. 2017: 389).

Finally, the introduction of local renewable communities, as envisaged by the new EU rules, could increase social acceptance of renewable energy projects (Tabi/Wüstenhagen 2015: 4). In particular, participatory models for investments in wind farms by citizens living in the proximity of the power plant are seen as a possibility to increase support by the local population (Wüstenhagen et al. 2017; Thaler et al. 2019: 4). Swiss utilities that already have a strong link to a local community could qualify as energy communities. Alternatively, Swiss local energy utilities could become facilitators of local energy markets and energy communities (so called “local DSO” model) by providing support for technology services, balancing services, and infrastructure provisions (Interview 27).

3.3.2. Retail Investors

This section focuses on Swiss retail renewable energy investors and in particular on households who adopt building-scale solar photovoltaic (PV) systems and become prosumers. Solar PV energy is expected to play a key role in the implementation of the Swiss Energy Strategy 2050 (SFOE 2018a: 4).

Investment decisions in decentralized solar energy are influenced by the regulatory framework for renewable energy self-consumption and by support schemes for small RE producers. As discussed in section 2.1.2., potential changes in the Swiss regulatory framework resulting from an adaptation to the new EU rules might include:

- Introduction of explicit rules on stability and predictability of financial support, calling for shorter and predetermined waiting time for support as well as for an explicit ban on retrospective policy changes;

- Introduction of peer-to-peer trading and power purchase agreements for prosumers who sell their excess production of electricity;
- Strengthening of the principle that remuneration for excess electricity sold by prosumers to the grid should reflect the market value of electricity;
- Change in the boundaries of self-consumption that increases the share of self-consumption possible for a household (although this is not a mandatory provision in the new EU laws).

Instead, adaptation to the new EU rules would not impact the choice of the support instrument. In fact, the federal financial support instrument for small-scale renewable generation units (i.e., investment grants) currently in place in Switzerland until 2022 is compliant with the new EU rules on financial support for small renewable producers. Moreover, in the EU legislation there is no legal obligation to implement support schemes for small-scale RE producers in the first place.

We assess the impact of regulatory changes on solar energy investment decisions by Swiss households: (a) through preliminary semi-structured interviews with Swiss households who have already adopted solar panels, with solar PV installers and with experts; (b) through an online survey on the intention to invest in solar panels and on preferences for different regulatory frameworks, answered in December 2018 by 750 Swiss owners of single- and multi-family houses who did not own a solar PV system yet, but had stated their interest in purchasing a solar PV system for their house within the next 5 years. Survey invitations were stratified according to language region, age, gender, party preference, and education to observe potential differences in investment preferences between groups. The survey included a choice task where respondents had to choose between hypothetical solar PV systems for their house, characterized by different investment costs, financial support options, compensation schemes for excess electricity and levels of self-consumption (for further details on the methodology: Petrovich et al. 2019). Observed choices make it possible to assess investors' sensitivity to changes in these factors.

Moreover, respondents were randomly assigned to one of two groups: the first group was told that owners of small solar PV systems receive a one-off investment grant after a given waiting time; people in the second group were additionally told that if rules about solar incentives change while one is still waiting for them, the new rules may apply and reduce the promised amount of financial support (i.e., retrospective policy changes may apply). Comparing investment preferences between these two groups allowed us to test the impact of perceived policy risk on retail investment decisions in solar PV.

Policy risk concerning support: Our results show that a higher perceived “policy risk” could deter investment decisions by Swiss households and reduce their willingness to invest in solar PV systems. Introducing certainty on the waiting time for receiving the investment grant would increase the stated willingness to invest in a solar PV system more than an increase in the investment grant from 30% to 40% (Petrovich et al. 2019). In particular, guaranteeing a waiting time of 1 to 2 years would make the average Swiss household more likely to invest in solar energy compared to a situation where there is full uncertainty on the waiting time for the grant. Further, reducing the waiting time for receiving the grant from 1-2 years to less than 1 year would further increase the likelihood of investment.

The lack of an explicit ban on retrospective policy changes is likely to have a negative impact on households’ stated willingness to invest. When people are aware of the possibility of retrospective policy changes and there is full uncertainty on the timing of the grant, they would invest less per solar PV system, everything else held constant, compared to a situation where the perceived policy risk is lower (Petrovich et al. 2019).

Our interviews also confirmed the negative impact of uncertainty and long waiting times for support on households’ solar investment decisions (Interview 21, 28, 29, 30, 31, 32).

Hence, introducing principles for the stability and predictability of financial support for renewables in Swiss legislation, including the explicit ban on retroactive changes and the transparency requirement

for the allocation of support, as suggested by the RE Directive, could foster investment decisions by retail investors. Shortening the waiting time for receiving investment grants to less than one year and providing certainty on reimbursement deadlines would incentivize Swiss homeowners to invest in solar energy. Shortened waiting times can therefore be considered a more promising measure than increases of investment grants per solar PV system.

Electricity price risk for excess electricity sold to the grid: Our results also show that the decisions of retail investors are not deterred by electricity price market risk to a great extent. Higher uncertainty on the revenues generated by sales of excess electricity to the grid does not lead to a significant decrease in investment compared to a situation where prosumers get a guaranteed and fixed unitary amount for the electricity they feed in (Petrovich et al. 2019). Therefore, energy investment decisions by homeowners seem rather indifferent to the details of the feed-in agreement (and in particular to whether the payment is fixed or indexed to the market price of electricity). This finding also supports the choice of investment grants as an alternative to feed-in tariffs for promoting small-scale solar PV.

That said, our results (Petrovich et al. 2019) also show that a regulatory framework where prosumers have the right to get a positive compensation for excess electricity has a positive impact on their willingness to invest, no matter how low or volatile this compensation is. Explicitly guaranteeing this right for Swiss prosumers might then enhance their investments in small-scale solar.

Self-consumption: Finally, our analysis (Petrovich et al. 2019) and interviews (Interview 2, 23, 28, 29, 33) show that the possibility of consuming self-produced solar energy is very attractive for Swiss homeowners, who report to be willing to invest significantly more in solar PV systems that provide higher self-sufficiency levels. More specifically, the average homeowner is ready to pay twice as much for a system that covers half of his or her own energy consumption, compared to one that covers only 25%.

The attractiveness of self-consumption does not seem to be exclusively related to energy cost savings. More specifically, our interviews revealed that electricity bill savings are often not enough to prompt solar adoption, as the electricity bill is usually not perceived as a substantial part of the family budget (Interview 23, 33).

This suggests that promoting self-consumption would foster investments in small-scale solar generation units by Swiss homeowners. Two measures included in the new RE Directive that can be implemented in this regard are: not discriminating battery storage in network tariffs and loosening the definition of self-consumption (e.g., extending it beyond confined boundaries to include different assets owned by the same consumer at different locations). In order to exploit the full potential of self-consumption, policy-makers should also consider addressing citizens' existing environmental and reliability concerns about battery storage (Interview 30, 33).

Peer-to-peer trading and private power purchase agreements for prosumers: The conditions for Swiss small-scale renewable producers could be further improved (in line with European law) by enabling them to sell their electricity to a wider range of actors through peer-to-peer trading and power purchase agreements (PPAs). Our interviews suggest that complexity, perceived counterparty risk, and data security concerns could be a barrier for the success of peer-to-peer trading and private power purchase agreements among Swiss single- and multi-family house owners (Interview 27, 28, 29, 31). If Swiss policy makers would like to exploit the potential of such measures, they should particularly address people's concerns about different expectations and potentials for disagreement among neighbors (Interview 29, 31). This can be done, for instance, by providing standard contracts or by building up confidence in such measures through their promotion in contexts where trust and relationships among neighbors are already strong (e.g., cooperative housing). Local energy markets could also be pushed "top-down", for instance via pilot projects (as in the above-mentioned case of Walenstadt) or via TSO-driven initiatives aimed at solving and preventing grid bottlenecks (Interview 27).

3.4. Europeanization and Swiss Energy Culture: Elite Views

This section discusses signs of an identity reconstruction among Swiss elites towards an increased feeling of 'Europeanness' (Europeanization mechanism 3). The majority of interviewed Swiss elites, i.e., policy-makers, bureaucrats, public, private and non-governmental stakeholders as well as interest group representatives, was clearly in favor of the electricity agreement. There is a dominant view that Switzerland will (have to) further integrate with the EU energy market and adopt its rules. The reasons cited were mainly technical, such as reducing unscheduled flows and securing grid stability, and economic, notably gaining market access (see also van Baal et al. 2019: 27-28). Differences in views mainly pertained to the pace of integration rather than to the question of whether to integrate or not. Most interviewees were not concerned that EU rules might conflict with present Swiss rules given that Switzerland already follows much of the EU regulation. Moreover, Swiss and EU energy strategies were perceived to aim in the same direction.

The generally positive attitude among Swiss elites towards a deepening of electricity relations with the EU raises two important points. Firstly, interviews with Swiss policy-makers, bureaucrats, and interest group representatives suggest that this group of people is more europeanized than the public. Technical, economic, political, and regulatory considerations as well as personal experiences cause them to view an increasingly close relationship with the EU as the desirable way ahead. Secondly, initial integration could drive further integration. Swiss elites may well develop a reflex that (further) Europeanization in line with mechanism 1, i.e., a top-down process of national adaptation, is the remedy to shortcomings of initial integration. In the long term, electricity market integration with the EU could therefore go well beyond the scope of the electricity agreement. Together, these two points could further europeanize Swiss electricity governance.

Some Swiss interviewees raised moderate skepticism about future relations with the EU in the electricity field. One skeptical argument

contrasted the slim and clean Swiss body of regulation with the somewhat chaotic legal nature of the EU energy acquis. Indeed, some legal experts in Switzerland perceive European law as of poor design quality. An example is the Clean Energy Package that brings new legislation even though some countries have not even properly implemented the Third Energy Package. There are also concerns that an overly strict adherence to EU principles and their legalistic interpretation will render pragmatic solutions in future electricity policy increasingly difficult. The same officials conceded, however, that the current state of physical integration means that closer collaboration with the EU would give Switzerland more control over its own grid. Several interviewees noted the necessity of finding solutions that Swiss voters will eventually approve in a referendum (Interview 1, 3, 13). This links the potential adoption of the electricity agreement to the institutional agreement, which involves much more controversial questions about the future relationship between Switzerland and the EU.

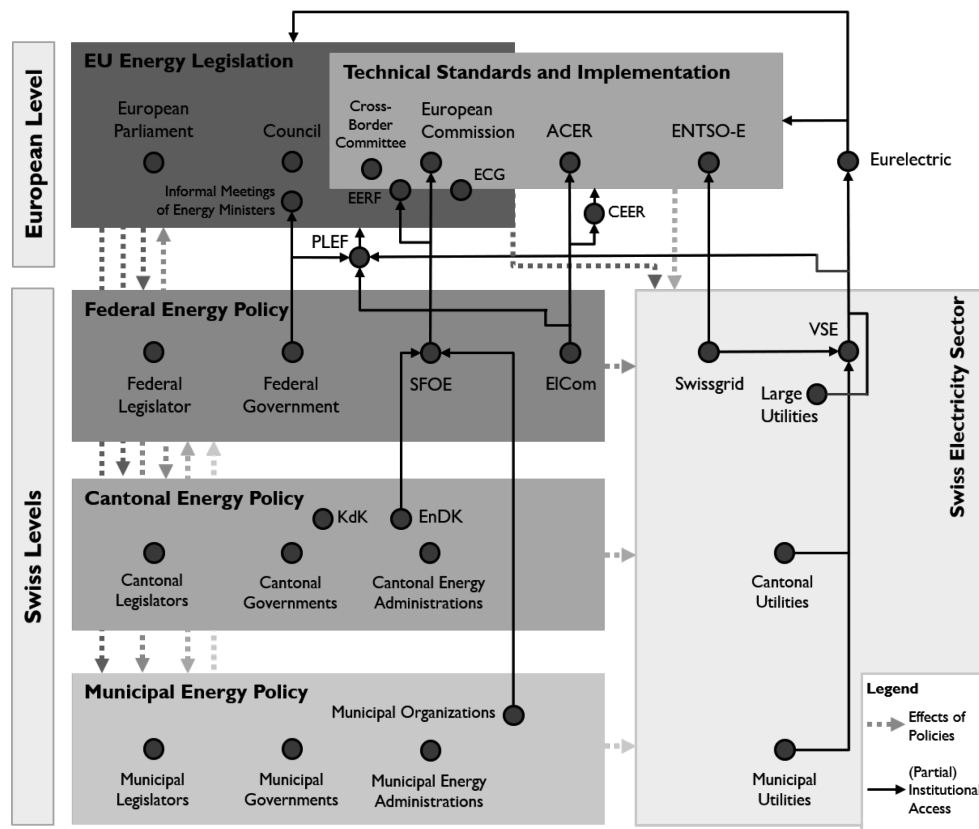
The interview evidence suggests that, besides material interests, also identity may play a role in how Swiss decision-makers perceive closer collaboration with the EU. Some evidence is consistent with the thesis of an increasing 'Europeaness' among Swiss energy elites; other observations point to continued reservations. More research is needed to better understand the tensions between EU and Swiss energy cultures and their significance.

3.5. Interim Conclusions

Complex entanglements characterize the Europeanization of Swiss energy governance. The analysis in this section suggests five findings. First, the European level has already become the new level on top of Swiss multi-level energy governance. Even in the absence of an electricity agreement, EU energy policy has direct implications for Switzerland, as issues around unscheduled flows and access to balancing markets illustrate. Many public and private Swiss decision-makers hold the view that Switzerland will (have to) further integrate with the

EU energy market for both technical and economic reasons. Others are concerned about the bureaucratic and legalist elements of closer collaboration with the EU. Thus, both material interests and identity seem to play a role in the Europeanization of Swiss energy governance and culture.

Figure 2: The Swiss-European system of multi-level energy governance

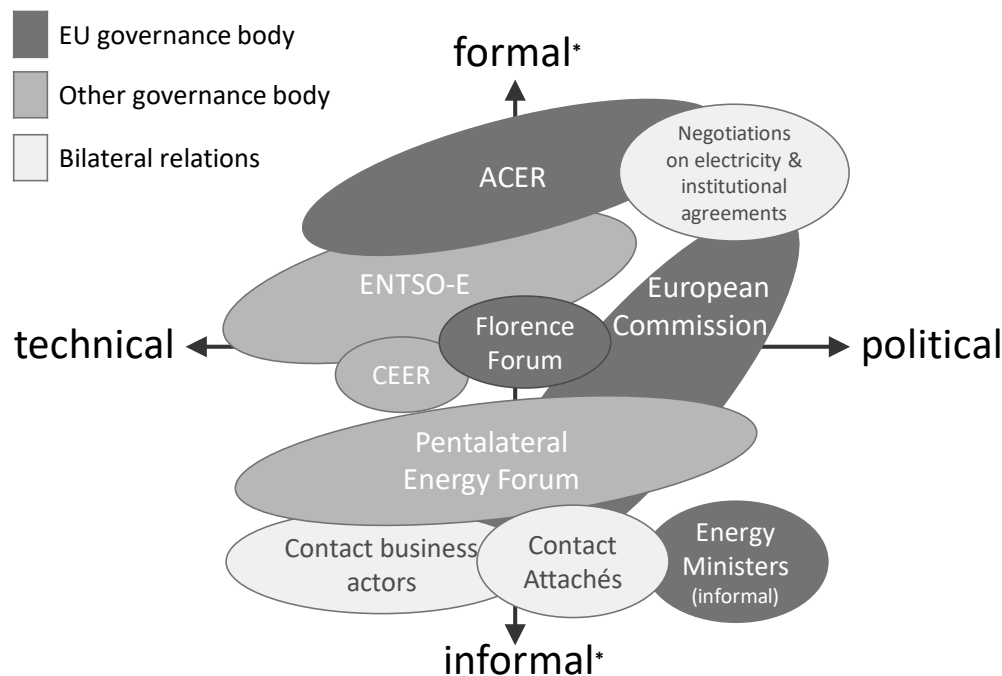


Source: Authors

Second, in conjunction with the emergence of a European governance level, Swiss actors have gained and benefited from various access points to European institutions (Figure 2). These access points differ in terms of their quality, character, and formalization. However, the analysis demonstrates that Swiss actors have found a wide spectrum of formal and informal ways for uploading their preferences to technical and political decision-making on the European level (Figure 3). Strikingly, an EU official involved in high-level EU energy policy-making stated that “the de-facto power and representation of Switzerland

without voting rights is many times higher than the influence enjoyed by a small Eastern European member state with voting rights” (Interview 8). Europeanization is therefore not to be equated with EU imperialism and one-sided Swiss dependency on the EU. It rather highlights a number of *interdependencies* that develop further as integration deepens.

Figure 3: Selected Swiss influences on European energy governance



Source: Authors*

Third, the (non-)conclusion of the electricity agreement will affect the future access and influence of Swiss actors to European institutions. An electricity agreement between Switzerland and the EU would secure the positions of Swiss key actors in Europe (Table 1). While Swissgrid already enjoys a rather strong position, the agreement would noticeably strengthen the roles of ElCom and SFOE. ElCom might be able to play a more active role in ACER; SFOE might gain more access to EU institutions like the Electricity Coordination Group

* The axis ‘formal-informal’ refers to the type of impact the respective channel has in the EU energy regulatory framework (more formal implies a higher degree of direct legal or procedural embeddedness).

(ECG). In addition, Swissgrid's present role and influence would likely be formalized. To turn this additional access into influence, the three key actors should consolidate their trilateral coordination.

A failure of the electricity agreement would put Swiss access to European institutions at risk. The EU would take many of its ensuing decisions against the backdrop of Brexit. Importantly, the EU is increasingly reluctant to grant third countries representation in European institutions without obligations. If the doors to ACER and/or ENTSO-E were closed accordingly, Swiss influence strategies would need to rely more heavily on informal channels. The reliance on informal channels would increase the demand for smart lobbying strategies and effective coordination among ElCom, SFOE, and Swissgrid. It appears unlikely though that this could compensate for the lack of institutional access.

Fourth, the Europeanization of Swiss energy policy will likely improve the general framework conditions for renewable investors. In particular, the adoption of EU rules on streamlined permitting procedures and regulation predictability could lower the perceived policy risk for investments in Swiss renewables, hence it could reduce the cost of financing of Swiss renewable projects and of achieving the goals of the Energy Strategy 2050.

Fifth, the Europeanization of Swiss energy policy could further improve the investment conditions for Swiss small-scale renewables. In particular, Swiss small-scale renewables producers may benefit from selling their electricity to a wider range of actors through peer-to-peer trading and power purchase agreements. Moreover, the adoption of EU rules for the empowerment of renewables self-consumption would significantly foster investment in small-scale solar generation by Swiss homeowners.

Table 1: Swiss channels of influence to European actors, bodies, and institutions (as of May 2019)

Channel	Type	Importance*	Formalization**	Access***	Representative	Status	With Agreement	Without Agreement
ACER	Political > technical	●●●●●	●●●●●	●●	ECom	Partial observer	Full observer	Risk of exclusion
CEER	Technical > political	●	●●	●●●●●	ECom	Observer	No change	No change
Council of Ministers	Political	●●●●●	●●●●●	●	SFOE/EDA	Occasionally invited on informal technical level	Observer at formal technical level?	Risk of less access?
ENTSO-E	Technical > political	●●●●●	●●●●	●●●●	Swissgrid	Member without voting rights	Voting rights	Risk of exclusion
Electricity Coordination Group	Political > technical	●●●●	●●●●●	●	-	-	Participation	No change
Electricity Cross-Border Committee	Political > technical	●●●	●●●●●	●	-	-	Observer status?	No change
European Commission	Political	●●●●●	●●●●●	●●●	SFOE/EDA	Bilateral contacts	More access	Less access
EU member states	Political	●●●●	●	●●●	SFOE/EDA	Bilateral contacts	No change	No change
Eurelectric	Political > technical	●●	●●	●●●●●	VSE, Alpiq, BKW, Groupe E, SIG	Full members or associates	No change	No change
European Parliament	Political	●●●●	●●●●●	●	-	-	No change	No change
Florence Forum (EERF)	Political > technical	●●●	●●●	●●●●	ECom, SFOE	Observer	No change	Risk of exclusion?
Informal Meeting of EU Energy Ministers	Political	●●	●●●	●●	Federal Councilor or SFOE	Observer	No change	Risk of less access

International Balancing Platforms	Technical	•••••	•••	•••••	Swissgrid	Member or observer	No change	Risk of exclusion
National Regulatory Authorities (NRAs)	Political > technical	•••	•	•••	ElCom	Bilateral contacts	No change	No change
Operational TSO agreements	Technical	•••••	•••••	•••••	Swissgrid	Contracting party	No change	Risk of less solidar- ity/tighter legal supervi- sion
Pentalateral Energy Forum (PLEF)	Political > technical	•••••	••	•••••	SFOE/EDA, El- Com, Swissgrid, market actors	Observer	No change	No change
Transmission System Operators (TSOs)	Technical	•••	•	•••••	Swissgrid	Bilateral contacts	No change	Risk of tighter legal su- pervision by EU
Legend								
•		* Importance refers to the role of the respective channel in preparing, defining or deciding European energy regulation and rules						
••		** Formalization refers to the degree of direct legal or procedural embeddedness of the respective channel in the EU energy regulatory framework						
•••		*** Access refers to the degree of access Switzerland or a Swiss actor currently has to the respective channel						
••••								
•••••								
		Low or none						
		Intermediate						
		High						

Source: Authors

4. Conclusions

The study investigated the impacts of the Europeanization of the Swiss energy policy. It focused on necessary adaptations of the Swiss energy governance structure and implications for the achievement of the goals set by the Swiss Energy Strategy 2050, especially as far as investments in renewable energy by decentralized producers are concerned. This chapter reports the main findings and discusses the scenarios of “direct Europeanization” with an institutional agreement and an electricity agreement between Switzerland and the EU, and “indirect Europeanization” without such agreements.

4.1. Conclusions on the Scenarios and Main Insights

Switzerland is deeply enmeshed within the European energy infrastructure, providing important links for cross-border flows of energy, in particular for the import and transit of electricity and gas. Despite the fact that gas might be an important element for energy storage and a possible energy source for electricity generation, it is not an issue in the current negotiations between Switzerland and the EU for an electricity agreement. Even more, cross-border flows of gas are not affected by the current tensions between Switzerland and the EU which is why we kept discussions on gas brief in this study.

Europeanization of energy governance concerns, first of all, the option of Switzerland to join European bodies that coordinate cross-border flows of energy, as well as the option to participate in commercial platforms that facilitate cross-border trading of electricity. When preparing this study, a physical decoupling of the Swiss electricity infrastructure from the European energy system was a farfetched scenario, which was not pursued as a policy goal, neither by the EU nor by Switzerland. The existing physical connections provide for a basic level of security of supply: Even if looking at the electricity sector only, Swiss

energy autarchy might be difficult and expensive to achieve, and, therefore, is not a scenario discussed in this study.

Since 2007, Switzerland and the EU have been negotiating an electricity agreement that would allow Switzerland to participate in the mechanisms of European energy governance and to trade electricity on an equal footing with its European competitors. While some points of the electricity agreement are controversial (environmental concerns about market liberalization, concerns of the cantons regarding limitations on state aid, concerns of large utilities regarding unbundling), the main obstacle to conclude an electricity agreement is the adoption of the institutional agreement. Negotiations on such an agreement have been ongoing since 2012 and the successful conclusion of the institutional agreement is a precondition for any new agreement on market access. When conducting the negotiations with the EU, Switzerland needs to be aware that the EU's internal energy market has evolved considerably over time, having reached a high degree of formalization of its institutions and regulations. This high degree of formalization, as well as ongoing Brexit negotiations, limit the scope for carve-outs and tailor-made bilateral agreements.

At the time of writing this report, it is unclear whether – or at which point in time – Switzerland might adopt the institutional agreement and the electricity agreement. Regarding the impact of Europeanization on the Swiss energy system, the adoption or rejection of these agreements are the predominant scenarios relevant for this study.

An important insight to be gained from this study is the fact that the achievement of the Energy Strategy 2050 goals does not depend on the conclusion of an electricity agreement. To further develop the Swiss energy system, there are ways forward with and without an electricity agreement: In either scenario, it is important that Swiss actors adapt their strategies and policies to changing patterns of access to EU institutions and markets. An important advantage of an electricity agreement is that it provides clear guidance on how to develop Swiss energy governance and legal security with regard to the commercial terms of trade with the EU. Without an electricity agreement, the

terms of trade are not fixed: they are subject to change and some degree of arbitrariness because trade in electricity may become (or is already) a political pawn when shaping the relations between the EU and Switzerland. Because of this effect, reaching the goals of the Energy Strategy will probably become more expensive without full integration into European markets. Regarding domestic policy, each element of European energy governance needs to be assessed on a case-by-case basis to determine its usefulness for Swiss policy goals, i.e., its potential contribution to secure electricity supply and to the goals of the Energy Strategy 2050.

4.2. Conclusions on the Europeanization of Swiss Energy policy

The research conducted in this study sheds light on all three mechanisms of the Europeanization of Swiss energy governance. First, the degree and pace of the adaptation of Swiss energy policy to the EU *energy acquis* will differ in the two scenarios examined. The electricity agreement would grant Switzerland full market access under the condition that it implements most elements of the EU *acquis* for the internal electricity market. Specifically, the electricity agreement enables market coupling, resulting in more efficient cross-border-trade of electricity. Market coupling benefits (and provides legal security to) actors engaging in such trade, e.g., larger utilities and large pump storage plants. Because of its leveling effect on prices, market coupling might redirect investment flows to lower-cost generation sources (hydropower and solar), resulting in less diversification in the Swiss renewable energy mix. Combined with market-responsive support schemes, this would benefit less expensive energy sources and sources which are easier to implement in Switzerland from the point of view of permitting. However, prospective imbalances in renewable energy generation, even with a strong tilt towards hydro and photovoltaics, are less of a concern with efficient cross-border trade. The proper balancing of the energy system will be easier with full market integration, providing relief for Swissgrid.

Looking at the more controversial elements of the electricity agreement, some Swiss actors hope for transitional or flexibility provisions with respect to unbundling and state aid, which would address some specific Swiss concerns. However, it is not yet clear how realistic these hopes are. Pursuing a policy of Europeanization, the Federal Council has proposed a new market design, which is in line with most requirements of European law, in particular with regard to market liberalization. However, there is no provision on the further unbundling of the distribution grid, which is a requirement of European law, but is regarded as burdensome by some larger (mostly cantonal) utilities. Looking at empirical evidence and developments in Europe, retail consumers, in particular households, might not profit much from enhanced unbundling rules or even market liberalization, anyway. In the light of the Energy Strategy 2050 goals, market liberalization allows consumers to purchase electricity that is not necessarily renewable. If additional measures to push renewable energies in overall energy consumption appear necessary, the consistency of such measures (e.g., quota systems) with European law will have to be analyzed.

Without an electricity agreement, Switzerland would retain its formal autonomy in energy governance at the price of an increasing exclusion from the European electricity market. We expect conditions for trade to deteriorate over time without an electricity agreement, most likely leading to declining cross-border trade, to inefficiencies in the European and Swiss electricity system, and to (relatively) higher wholesale prices in Switzerland. To the extent that higher wholesale electricity prices translate into higher retail prices for Swiss consumers, this might create disadvantages for energy-intensive industries and vulnerable consumers. In other countries, increasing electricity prices, whether they are causally related to energy policy or not, have led to controversial political debates. A similar development in Switzerland could create challenges for the social acceptance of the Energy Strategy 2050. However, higher prices might also create incentives to reduce electricity consumption and to deploy higher-cost generation and storage technologies. To secure at least some level of market access, Switzerland would face continued pressures to implement key

parts of the EU *energy acquis* (e.g., technical regulations, market liberalization). Moreover, Switzerland would continue to experience externalities on its grid, such as unscheduled flows, considering that its physical integration into the European grid will remain high in the medium term. At the same time, the Swiss electricity grid will have a crucial transit function for the integration of Italy into the EU internal electricity market. Changes in electricity production and grid infrastructures may alter these mutual interdependencies only in the long term.

The new European rules on the promotion of renewable energy are currently not part of the negotiations on an electricity agreement. However, the institutional agreement contains general provisions on state aid, which would also apply to a future electricity agreement. Should the Swiss legislator decide to introduce new measures for the promotion of renewable energies, they would have to comply with the EU Guidelines on State aid for environmental protection and energy. Even without an institutional agreement, it makes sense to use the new European rules on renewable energies as a source of inspiration.

The new European rules make several principles explicit that also require attention in Swiss constitutional law: they provide for an explicit ban on retroactive legal changes that jeopardize the economic viability of existing energy projects; they call for a reliable long-term framework for support measures; they call for streamlining approval procedures. Complying with these principles lowers the financing costs for investments in renewable energies and contributes to cost reductions in achieving energy policy goals, especially in a situation without an electricity agreement.

The new EU rules differentiate between large centralized (>1 MW) and small decentralized electricity generation plants (<1 MW). Rules for large renewable power plants have implications for Swiss hydropower: existing Swiss measures to promote hydropower may be seen in conflict with EU state aid law; however, these support measures will phase out soon anyway. To be compatible with EU rules, large-scale

plants must be exposed to price signals from the markets and any financial support should be competitively allocated, e.g., through quota models or auctions. As a rule, support should be granted on a technology-neutral basis. An exclusive promotion of Swiss installations is currently also possible under European law; however, by 2023, the European Commission may introduce an obligation to open a small portion of the support scheme to foreign installations. Without an electricity agreement, such an opening step would not be necessary and is not recommended.

With regard to the promotion of decentralized renewable energies (<1 MW), exceptions to competitive procedures which aim to ensure that small producers are on an equal footing with larger generators are still possible under the new European law. Instruments such as investment subsidies and the exemption from grid charges for electricity produced and consumed within the same premises can also be used. Even after the general phase-out of subsidies in Switzerland, the current structure of grid charges provides a financial incentive for prosumers and will remain permissible under European law; here, the needs of the distribution grid and equity considerations must also be taken into account. The new European rules call for possibilities of exchanging renewable electricity without the participation of energy suppliers: these include local energy communities, peer-to-peer trading, and power purchase agreements (PPAs), which are only partially possible under the current Swiss legal framework. Most of the current Swiss support measures for small renewable generators are compatible with European law.

European law provides its member states with some leeway for the design of grid charges. Regarding the buildup of (system-serving) storage capacity, the structure of grid charges may provide decisive incentives to invest; today, however, such incentives for storage are limited to pump storage plants. Particularly without an electricity agreement, legislators will not only need to create incentives for a balanced portfolio of electricity generation technologies, but also sufficient incentives to invest in storage and opportunities to market flexibility. Looking at flexibility, the Federal Council has proposed draft provisions,

which are subject to parliamentary debate and a referendum, and which provide room for enhancement. Sector coupling is not an issue in the pending reforms but might gain importance in a scenario without an electricity agreement.

The European internal energy market still is not fully integrated and does not rest on a harmonized energy policy. Consequently, integration into the European energy system does not relieve policymakers from planning for system and generation adequacy. With energy autarchy being elusive, Switzerland has to undertake strategic considerations regarding domestic production and increasing dependencies on imports. To assess system adequacy, it seems important not only to analyze technical and economic factors, but also the (strategic) behavior of the players and actors involved. Without an electricity agreement, national security concerns gain more weight and additional options might be needed to create a sufficient “storage reserve”, as tentatively envisaged by the Federal Council. A well-designed replacement for the current support schemes might alleviate concerns about declining domestic production and, concurrently, provide incentives to invest in renewable energy.

Even in Europe, there is still a debate on whether energy-only-markets create sufficient incentives to invest in (renewable, sustainable) generation capacity; nevertheless, the Federal Council keeps pursuing the goal of a fully liberalized energy-only-market, although its benefits are unclear in a situation without an electricity agreement. To shield their domestic energy industry from the pressure of fully liberalized markets, many European countries have created capacity mechanisms or other strategic reserves. Switzerland, however, disposes of large potential import capacities, which is why it will be difficult to establish traditional capacity markets in line with European law. To establish the contemplated “storage reserve”, a carve-out in the electricity agreement might be needed (a carve-out is needed for much of the existing state aid).

4.3. Conclusions on the Impact of Europeanization on Swiss Institutional Actors

The degree to which Swiss energy policy preferences can shape EU rules and norms will depend significantly on the conclusion of an electricity agreement. The electricity agreement would strengthen the formal position of Swiss actors in EU institutions, but not put it formally on par with EU member states. The agreement would notably provide ElCom with a more solid formal status in ACER, secure the full membership of Swissgrid in ENTSO-E, and bolster the consultation of the Swiss federal level in EU policy-making. To translate this enhanced formal position into greater influence, a more extensive trilateral coordination among Swiss key actors would be required. The extent to which Switzerland will be able to realize its interests also depends on how successful it is in building coalitions with influential EU member states. For this purpose, informal channels of influence also remain important. In addition, Swiss influence will continue to rely on technological know-how and the structural power arising from its important transit function for European electricity flows.

Without an agreement, Switzerland would increasingly be sidelined in European discussions and it would probably lose formal channels of influence. The process of exclusion has already started, but assessments of how severe it might become differ. EU decisions regarding the future institutional involvement of Switzerland will be closely linked to any decisions taken in the context of Brexit. Especially ElCom's observer role in ACER and Swissgrid's full membership in ENTSO-E and electricity balancing projects would be at risk. In addition, the SFOE may have fewer opportunities for voicing its concerns in Brussels. Several factors could slow down this process of increasing exclusion or attenuate some of its consequences: Swiss actors have a track record in exerting informal influence on the technical level, even when being excluded on the political level. Informal access, such as participation in the PLEF and contacts with EU member states, would further gain in importance. These channels cannot fully compensate for the lack of formal access though. With respect to physical grid

management, Swissgrid explores collaborations with other TSOs on the basis of private law as a fallback option. However, the conformity of these activities with EU law is closely surveilled by the European Commission. Finally, Switzerland has some bargaining power because of its continued role as a major transit country. This structural power is sector-specific and should not be overestimated though. Overall, it is very unlikely that the status quo of Swiss influence in European energy governance can be maintained without an electricity agreement.

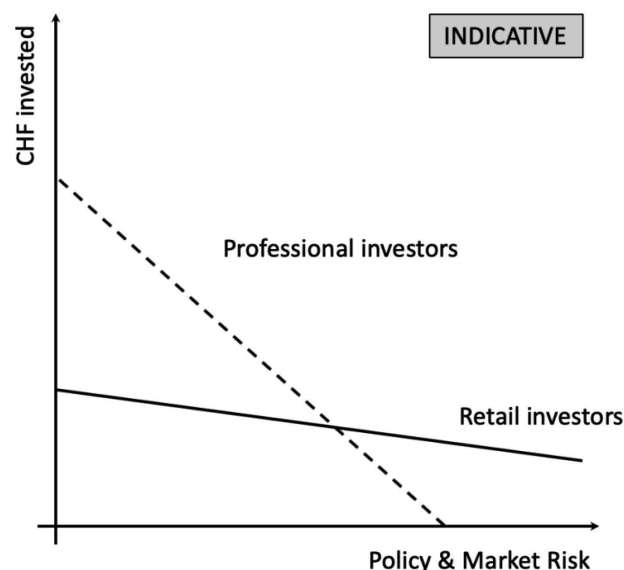
Different trends can be observed with respect to the interaction of European and Swiss energy identities. On the one hand, many Swiss officials and experts seem to hold the view that the physical interdependencies between the Swiss and European electricity grids require closer integration. This is akin to the functionalist EU thinking which drives the accumulation of policy competences by the European Commission. However, technocratic elite preferences can cause public backlash if not democratically legitimated. On the other hand, some Swiss officials are anxious about the bureaucratic and legalist elements of closer collaboration with the EU. They also stress the need of reaching an agreement that Swiss voters would support. Additional research would be needed to better understand these tensions.

Two challenges emerge from these observations: First, to overcome the technocratic nature of the electricity negotiations, Swiss decision-makers need to communicate the advantages of this agreement for citizens in both economic and environmental terms. Current political discussions about a potential institutional agreement revolve more around the general degree of Swiss integration into the EU than around the sectoral agreements linked to an institutional agreement. In the political discourse ahead of a potential referendum, we suggest to openly discuss the implications for the Swiss Energy Strategy 2050 and Swiss security of supply. Second, the electricity agreement and the institutional agreement need to strike a balance between satisfying EU principles and safeguarding control by Swiss governance actors. In this regard, we suggest an understanding of control as formal and informal influence in a multi-level governance system rather than as delusive domestic autonomy.

4.4. Conclusions on the Impact of Europeanization on Swiss Investors

The ratification of an electricity agreement, or its absence, could impact on the behavior of Swiss energy investors. To systematically evaluate the potential impact of an agreement, it is useful to distinguish between two main types of investors, professional investors (e.g. electric utilities and institutional investors, mostly active in large-scale renewable energy projects) and retail investors (e.g. homeowners or small- and medium-sized companies, mostly active in smaller-scale distributed renewable energy projects). Professional investors, who invest large amounts of capital, tend to react more sensitively to policy and market risk, and they tend to be more flexible in terms of where they invest (domestically or in the EU). Retail investors, in contrast, tend to invest smaller amounts, but their mix of financial and non-financial motives makes them less sensitive to changes in policy and market risk (as conceptually shown in Figure 4). To mobilize sufficient investment to achieve renewable energy targets, such as those articulated in the Energy Strategy 2050, policymakers need to be mindful of the preferences and decision processes of both investor groups.

Figure 4: Relative influence of policy and market risk on professional and retail investors



Source: Authors

As far as **professional energy investors** are concerned, the biggest advantage of an electricity agreement lies in lowering policy and market risk, and hence providing a more predictable framework for investments. An electricity agreement provides legal security regarding the commercial terms of trade with the EU and could therefore reduce perceived policy risk related to investment in Swiss RE capacity. Moreover, an agreement, by enabling market coupling, facilitates cross-border trade of electricity and flexibility. Market coupling makes cross-border trading more efficient and brings about new business opportunities for Swiss producers of electricity, in particular Swiss pumped storage plants that could market their flexibility across the border. With an agreement, enhanced cross-border trading opportunities might redirect investment flows to renewable generation sources that are relatively cheaper and easier to implement in Switzerland (hydropower and distributed solar), resulting in less diversification in the Swiss renewable electricity mix. This effect might be reinforced by the introduction of market-based support schemes, in line with EU legislation. Swiss investments in renewable energy projects in the EU would likely benefit from the ratification of an agreement. Without an electricity agreement, we expect the terms of trade to deteriorate, most likely leading to lower cross-border exchanges of electricity, reduced import capacities, and higher wholesale prices for electricity in Switzerland. The no-agreement scenario would make it financially more attractive to invest in domestic generation and storage technologies that are relatively more expensive and/or harder to implement, and may thereby lead to a more diversified Swiss energy mix. However, the higher perceived risk and reduced access to international trading opportunities might somewhat counterbalance these effects of this scenario. Table 2 summarizes the impact of an electricity agreement on professional investors.

Table 2: Impact of an electricity agreement on Swiss professional energy investors

Factor	With electricity agreement	Without electricity agreement
CHF invested in domestic RE	0	+
CHF invested in EU RE	+	0
Ease of exports	+	–
Ease of imports	+	–
Price difference CH/EU	–	+
Overall impact	+	0

Source: Authors

As far as **retail investors** are concerned, positive investment decisions are mostly fostered by self-consumption opportunities, including non-financial motivations to become a prosumer, such as a desire for independence. The ratification of an electricity agreement would leave freedom for Swiss policy makers concerning the choice of support schemes for small-scale renewable producers, allowing for a continuation of current measures such as investment grants, rules for group self-consumption and the current structure of grid charges, which indirectly incentivizes prosumers. Hence, we expect the behavior of retail investors, and households in particular, to be less impacted by whether or not an electricity agreement is reached. However, adopting some of the provisions of the new RE Directive, which is not part of the pending electricity agreement, could foster further investment in small-scale renewables, as will be discussed in the next paragraph.

Although the electricity agreement under negotiation does not mandate the implementation of the EU Clean Energy Package, some its provisions can be a source of inspiration for promoting investments in Swiss domestic renewables, which can support the achievement of the goals of the Energy Strategy 2050. Most importantly, some of the new European rules for renewables could be transferred into Swiss legislation and improve the general framework for investing in renewables.

In particular, the adoption of EU rules on streamlined permitting procedures and regulatory predictability (including an explicit ban of retrospective policy changes) could lower the perceived policy risk for investments in Swiss large- and small-scale renewables and hence reduce the cost of financing Swiss renewable projects. Further, a Swiss energy policy more in line with recently approved EU legislation could further improve the investment conditions for Swiss small-scale renewables. In particular, Swiss small-scale renewables producers may benefit from selling their electricity to a wider range of actors through peer-to-peer trading and power purchase agreements, which are only partially possible under the current Swiss legal framework. Moreover, the adoption of EU rules for the empowerment of renewables self-consumption would significantly foster investment in small-scale solar generation by Swiss homeowners. Two regulatory options included in the EU Clean Energy Package can be particularly helpful in this regard: network tariffs that do not discriminate prosumers' storage and widening the definition of self-consumption (by extending it beyond confined boundaries, to include, for instance, different assets owned by the same prosumer at different locations). Table 3 summarizes the potential impact of the Europeanization of Swiss energy policy on retail energy investors.

Table 3: Impact of Europeanization on Swiss retail energy investors

Factor	With harmonization ES2050 & EU RE Directive	Without harmonization ES2050 & EU RE Directive
No retroactive changes	+	0
P2P trading	+	0
Market liberalisation	+	0
Investment grants	+	+
Retail electricity prices	0	0
Price difference peak/base	0	0
Self-consumption	+	+
Overall impact	+	0

Source: Authors

Annex I: List of Acronyms

ACER	Agency for the Cooperation of Energy Regulators
aFRR	Automatic Frequency Restoration Reserves
CACM	Capacity Allocation and Congestion Management
CCR	Capacity Calculation Region
CEER	Council of European Energy Regulators
CGM	Common Grid Model
COREPER	Committee of (Deputy) Permanent Representatives
DETEC	Federal Department of the Environment, Transport, Energy and Communications
DG ENER	Directorate-General for Energy
DSO	Distribution System Operator
ECG	Electricity Coordination Group
ECJ	European Court of Justice
EDA	Federal Department of Foreign Affairs
EEA	European Economic Area
EERF	European Electricity Regulatory Forum (Florence Forum)
EFET	European Federation of Energy Traders
ElCom	Federal Electricity Commission
EnDK	Conference of Cantonal Energy Directors
ENTSO-E	European Network of Transmission System Operators for Electricity
ENTSO-G	European Network of Transmission System Operators for Gas
ESPEC-N	Environment, Spatial Planning and Energy Committees of the National Council
ESPEC-S	Environment, Spatial Planning and Energy Committees of the Council of States
ETS	Emission Trading System
EU	European Union
EVG	Eigenverbrauchsgemeinschaften
FITS	Flexible Intraday Trading System
GHG	Greenhouse Gas
ISO	Independent System Operator

ITC	Inter-Transmission System Operator Compensation
ITO	Independent Transmission Operator
JAO	Joint Allocation Office
KdK	Conference of Cantonal Governments
KSDL	Transmission Coordination Centre
LTC	Long-Term Contracts
MARI	Manually Activated Reserves Initiative
mFRR	Manual Frequency Restoration Reserves
MLG	Multi-Level Governance
MoU	Memorandum of Understanding
NRA	National Regulatory Authority
PCI	Projects of Common Interest
PICASSO	Platform for the International Coordination of the Automatic frequency restoration process and Stable System Operation
PLEF	Pentalateral Energy Forum
PPA	Power Purchase Agreement
PV	Photovoltaic
RCCs	Regional Coordination Centres
RE	Renewable Energy
ROCs	Regional Operational Centres
RR	Replacement Reserves
RSCs	Regional Security Coordinators
SAFA	Synchronous Area Framework Agreement
SFOE	Swiss Federal Office of Energy
TERRE	Trans European Replacement Reserves Exchange
TSO	Transmission System Operator
TTE	Transport, Telecommunications and Energy Council
VSE	Verband Schweizerischer Verteilnetzbetreiber
WTO	World Trade Organization
XBID	Cross-Border Intraday Market Project
ZEV	Zusammenschluss zum Eigenverbrauch (Consortium for own consumption)

Annex II: List of Interviewees

Interview	Relevant affiliation of interviewee
1	SFOE
2	SFOE
3	SFOE
4	NRA
5	NRA
6	ACER
7	EEAS
8	European Commission
9	Public sector
10	Public sector
11	Public sector
12	Public sector
13	Public sector association
14	TSO
15	TSO
16	TSO
17	TSO
18	ENTSO-E
19	Private sector
20	Private sector
21	Private sector
22	Private sector
23	Private sector association
24	Private sector association (2 interview partners)
25	Private sector association (2 interview partners)
26	Researcher
27	Researcher
28	Swiss PV energy utility and PV installer
29	Swiss PV energy utility and PV installer
30	Swiss PV installer
31	Swiss PV installer
32	Swiss PV owner
33	Swiss PV owner

Annex III: Comparison between EU and Swiss Renewable Energy Policies (incl. Prosumers)

	EU	CH	Influence/ Regulatory Gaps*
Target for renewable energy	Binding 2030 target: 32% final energy consumption (across sectors) at Union level to be supplied by renewable energy (national targets)	RE electricity generation target within CH: 37'400 GWh hydro by 2035 4'400/11'400 GWh non-hydro RE by 2020/2035	Applicability of the EU target to CH electricity, transport and heating & cooling sector subject to negotiation
Financial support for RE	Predictable, stable, no retroactive changes allowed. Large-scale projects: full phase-out of FIT by 2030, any support to be granted in competitive and market-responsive way. Small-scale, pilot & demonstration and local renewable community-owned projects: possible exemption from market-based criteria and possibility to grant FIT, investment grant and exemption from bidding for support; ad hoc support schemes allowed for small producers and energy communities	Phase-out of feed-in tariffs after 2022, full phase-out of all financial support (investment grants and FIT) by 2030 for all sizes. Proposal for storage reserve as a potential indirect support scheme. Proposal for domestic renewable power mix in the default standard product offered to consumers.	Market premia for large hydro are not in line with EU state aid rules. Investment grants for small producers in line with EU rules. Long waiting list for support might not be in the spirit of RE Directive, which calls for predictability and transparency. Swiss storage reserve might qualify as state aid and the currently proposed design seems to comply with EU state aid rules. Standard product offered to consumers is likely to comply with EU rules, especially if modified to allow consumers to switch away from the default power mix more than once a year.

Annex III: Comparison between EU and Swiss Renewable Energy Policies

	EU	CH	Influence/ Regulatory Gaps*
Priority of dispatch for RE	priority of dispatch only for RE < 400 kW, rest dispatched according to market-based transparent criteria.	Priority of dispatch for RE up to 3 MW or a yearly production < 5000 MWh net of any self-consumption.	Adjustment of Swiss rule might be required to comply with the new EU rules
Administrative procedures	Establishment of a single contact point ("one-stop-shop") to coordinate the permitting process (incl. building, re-powering, operating and grid connection permits); predetermined mandatory permitting deadlines max 2 (+1) years if > 150kW; max 1(+1) year if < 150 kW. Renewables self-consumers < 10.8kW: green light for connection to the grid 1 month after notification to DSO, unless explicitly rejected by DSO on justified grounds (safety, technical incompatibility) within a limited period after notification.	Complex administrative procedures, many actors involved. Coordination mechanism introduced for wind energy.	EU law compatibility calls for streamlining and mandatory deadlines for permitting procedures; possible obstacles foreseen due to multilevel governance.
Model for community financing of RE projects	<u>Renewable energy communities</u> (e.g., cooperatives) - projects owned and developed by the community - community can also engage in electricity services - community controlled by shareholders or members (including citizens, local authorities and SMES) located in the proximity of the	<u>Many local energy utilities have a strong community link.</u> Some local utilities have already implemented community financing of local RE projects (e.g., community solar model) developed, managed and owned by the energy utility.	If RE Directive needs to be transposed in CH law, introduction of the concept of RE communities without energy utility intermediation (incl. reform of the legal framework for cooperatives and associations might be necessary).

Annex III: Comparison between EU and Swiss Renewable Energy Policies

	EU	CH	Influence/ Regulatory Gaps*
	RE projects -legal entity clearly distinguished from traditional energy companies (and independent) -eligible for ad hoc, simple and direct payment systems and reduced admin burden		
Network charges or levies for renewable electricity consumed and produced within the same premises	Explicit exemption limited to ≤ 30 kW system. Self-consumption could apply to different assets owned by the same consumer at different locations (no explicit reference to need for generation and consumption of electricity to be behind the same grid connection point), if allowed by the member state.	De facto exemption due to mainly consumption-based tariffs. independent from system size, but tariff structure under revision, possibly increasing the share of the capacity component.	Swiss charging system is in line with the EU new rules on self-consumption. Proposed regulatory changes would not conflict with the new EU rules as long as it does not create an unjustified regulatory barrier to renewables self-consumption (e.g., make self-consumption economically unviable). Push for extending self-consumption definition to different assets owned by the same consumer at different locations.
Network cost charging rule	Varying across member states, in general should not penalize self-consumers and storage. Cost-reflective distribution charges on electricity fed back into the grid by self-consumers are possible.	Mainly consumption-based tariffs, under revision, possibly increasing the share of the capacity component in network charges for households. No distribution charges paid for electricity fed back into the grid by self-consumers.	EU law does not limit freedom of determining a national network cost charging rule. But EU laws require tariff structures that do not undermine the economic viability of self-consumption and do not discriminate storage or between different storage technologies.

Annex III: Comparison between EU and Swiss Renewable Energy Policies

	EU	CH	Influence/ Regulatory Gaps*
Compensation for excess electricity production fed into the grid by prosumers	Market-based: rate should reflect market price of electricity fed-back, possibly including a top-up (premium) for externalities. "Net metering of self-generation" ruled out.	Fixed and set by the municipal utility. "Net metering of self-generation" ruled out (only simultaneous consumption and production).	New EU rules would strengthen the need to introduce an explicit prosumer's right to receive a compensation for excess electricity that reflects the market value of electricity. The RE Directive paves the way for market-based or feed-in premium remuneration, but fixed direct payment might still be compatible.
Aggregation of prosumers (group self-consumption)	Jointly acting renewable self-consumers adjacency rule: same building where the consumers are located, including multi-apartment block. Possibly applying to non-residential buildings.	Zusammenschluss zum Eigenverbrauch (ZEV) adjacency rule: same building and no public roads within the premises.	No major incompatibilities between ZEV and new EU rules on group self-consumption. EU regulation suggests looser definition and need to loosen the infrastructure requirement (although it does not require this).
Peer-to-peer trading of renewable energy	renewable self-consumers' excess production can be sold through automated peer-to-peer trading arrangements (third party intermediated or not)	Pilot project stage.	EU law compatibility might require the introduction of peer-to-peer trading for prosumers; already envisaged in rev. StromVG, but possible need for detailed regulation.
Renewable energy power purchase agreements (PPA)	renewable self-consumers' excess production can be sold directly to another person or entity (without intermediation of an energy supplier).	Not possible (non-liberalized market).	EU law compatibility might require the introduction of a PPA for prosumers; already in rev. StromVG with full market liberalization.

* considering the EU Clean Energy Package (and in particular: RE Directive, Electricity Directive, Electricity Regulation)

Annex IV: Legal Sources

EU Regulations

Gas Supply Regulation: Regulation (EU) 2017/1938 of the European Parliament and of the Council of 25 October 2017 concerning measures to safeguard the security of gas supply and repealing Regulation (EU) No 994/2010

Electricity Regulation: Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity (recast), OJ L 158/55, 14 June 2019

Regulation 713/2009: Regulation (EC) No 713/2009 of the European Parliament and of the Council of 13 July 2009 establishing an Agency for the Co-operation of Energy Regulators

REMIT: Regulation (EU) No 1227/2011 of the European Parliament and of the Council of 25 October 2011 on wholesale energy market integrity and transparency

Risk-preparedness Regulation: Regulation (EU) 2019/941 of the European Parliament and of the Council of 5 June 2019 on risk-preparedness in the electricity sector and repealing Directive 2005/89/EC, OJ L 158/1, 14 June 2019

EU Directives

Gas Directive: Directive 2009/73/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in natural gas and repealing Directive 2003/55/EC

Electricity Directive: Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU (recast), OJ L 158/125, 14 June 2019

RE Directive: Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (recast)

Security of Supply Directive: Directive 2005/89/EC of the European Parliament and of the Council of 18 January 2006 concerning measures to safeguard security of electricity supply and infrastructure investment

EU Communications

State aid Guidelines: Communication from the Commission of 28 June 2014: Guidelines on State aid for environmental protection and energy 2014-2020 (2014/C 200/01)

European Network Codes and Guidelines

GL CACM: Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management

GL EB: Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing

GL FCA: Commission Regulation (EU) 2016/1719 of 26 September 2016 establishing a guideline on forward capacity allocation

GL ITO: Commission Regulation (EU) No 838/2010 of 23 September 2010 on laying down guidelines relating to the inter-transmission system operator compensation mechanism and a common regulatory approach to transmission charging

GL SO: Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation

Others

Articles of Association: Articles of Association of ENTSO-E, Edition 30 September 2014

Swiss Legislation

Cartel Act: Federal Act on Cartels and other Restraints of Competition of 6 October 1995 (CartA, SR 251)

CO₂-Act: Bundesgesetz über die Reduktion der CO₂-Emissionen vom 23. Dezember 2011 (SR 641.71)

CO₂-Ordinance: Verordnung über die Reduktion der CO₂-Emissionen vom 30. November 2012 (SR 641.711)

E-CO₂-Act: Entwurf zu einem Bundesgesetz über die Verminderung von Treibhausgasemissionen (CO₂-Gesetz), BBl 2018 247

EnG: Energiegesetz vom 30. September 2016 (SR 730.0)

EnV: Energieverordnung vom 1. November 2017 (SR 730.01)

rev. EnV: Entwurf zu einer Teilrevision der Energieverordnung, Juli 2018, available at https://www.admin.ch/ch/d/gg/pc/documents/2975/EnV_Entwurf_de.pdf

- rev. StromVG*: Vorentwurf vom 17. Oktober 2018 zu einer Änderung des Stromversorgungsgesetzes, available at <https://www.news.admin.ch/news/message/attachments/54043.pdf>
- rev. StromVV*: Vorgeschlagene Änderungen im Rahmen der Strategie Stromnetze (in Vernehmlassung), available at https://www.admin.ch/ch/d/gg/pc/documents/2962/8_StromVV_Entwurf_de.pdf
- RLG*: Bundesgesetz über Rohrleitungsanlagen zur Beförderung flüssiger oder gasförmiger Brenn- oder Treibstoffe vom 4. Oktober 1963 (Rohrleitungsgesetz, SR 746.1)
- StromVG*: Bundesgesetz über die Stromversorgung vom 23. März 2007 (Stromversorgungsgesetz, 734.7)
- StromVV*: Stromversorgungsverordnung vom 14. März 2008 (SR 734.71)
- Verbändevereinbarung*: Vereinbarung zum Netzzugang beim Erdgas zwischen Genossenschaft VSG ASIG und Interessengemeinschaft Erdgas (IG Erdgas) und Interessengemeinschaft Energieintensiver Branchen (IGEB) vom 1. Oktober 2012

Agreements

- ETS Agreement*: Abkommen zwischen der Schweizerischen Eidgenossenschaft und der Europäischen Union zur Verknüpfung ihrer jeweiligen Systeme für den Handel mit Treibhausgasemissionen, abgeschlossen in Bern am 23. November 2017, Provisorische Anwendung der Artikel 11-13 ab 23. November 2017 (SR 0.814.011.268)
- FTA*: Abkommen zwischen der Schweizerischen Eidgenossenschaft und der Europäischen Wirtschaftsgemeinschaft vom 22. Juli 1972 (SR 0.632.401)

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Annex VII: Advisory Board

The advisory board that was established to accompany this study comprised the following experts:

- Jean-Christophe Füeg, Head of International Affairs, SFOE;
- Prof. Andreas Goldthau, Professor in International Relations at Royal Holloway University of London and Director of the Centre of International Public Policy;
- Dr. Fabian Joas, Senior Associate EU Electricity Market, Economist and Political Scientist with Agora Energiewende;
- Imke Lübbecke, Head of Unit, EU Climate and Energy Policy, WWF European Policy Office in Brussels.

The authors of this study conducted a workshop about key findings of the study with Prof. Andreas Goldthau on February 26, 2019, at the University of St. Gallen. This workshop helped to grasp the linkages between Brexit negotiations and future Swiss-EU relations in a scenario without an electricity agreement. Jean-Christophe Füeg was one of the experts interviewed for the present study. Moreover, the authors of this study discussed specific topics related to the study with Jean-Christophe Füeg and Imke Lübbecke in the context of the workshop “Swiss Energy Strategy 2050 and EU Clean Energy Package: stronger together?” which was held at the University of St. Gallen on May 23, 2019 as a pre-conference workshop at 10th St. Gallen Forum for Management of Renewable Energies (#REMforum 2019). Topics discussed included the state of play of the electricity and institutional negotiations, the impact of the electricity agreement on the goals of Switzerland’s Energy Strategy 2050, the regulatory gaps between EU Clean Energy Package and Swiss energy legislation, security of supply and adequacy assessments, support schemes for solar PV, and the role of prosumers. The authors have sought and received additional formal feedback from the board before the final publication of the study.

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