Urban utilities in Switzerland:
Current situation and opportunities for the private sector

Master’s Thesis

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In partnership with ENGIE
Abstract

Local governments in Switzerland are very relevant actors in the governance scheme of the country. The delivery of local services related to water and energy is one of the local governments’ main tasks and has a long tradition of public provision. In the last few decades, a shift from in-house production to the corporatization of the utilities has emerged, although the public sector is still predominant. This thesis explores the current situation of urban utilities in Switzerland and if there are opportunities for the private sector in the provision of energy services.

Keywords: utilities, Stadtwerke, energy, Switzerland, public-private partnerships, local services
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List of abbreviations

**DBFO**: Design-Build-Finance-Operate

**IDHEAP**: Institute of Advanced Studies in Public Administration (*Institut de hautes études en administration publique*)

**IE**: Investment effort

**IR**: Investment rate

**LGA**: Local Governments Association

**MOE**: Municipally Owned Enterprise

**ND**: Net debt ratio

**NPM**: New Public Management

**OECD**: Organization for Economic Cooperation and Development

**PFI**: Public Finance Initiative

**PPP**: Public-Private Partnership

**PSP**: Private Sector Participation

**SF**: Self-financing of net investments

**UUC**: Urban Utility Company
1 Introduction and problem statement

IGLUS is an action-research interdisciplinary program and platform that contributes to the better governance of increasingly large and complex urban systems. Participants take part in several action-learning modules that bring together students and stakeholders of a wide variety of urban systems in order to learn from past experiences and innovative practice. The focus is in urban infrastructure systems and their dimensions. The systems that are at the core of the studies are transport, energy, water and wastewater, green, and brown (buildings) infrastructure. The three dimensions that are considered key for the performance of these systems are efficiency, sustainability and resilience. Additionally, digitalization and information & communication technologies are present throughout the program as a relevant enabler of urban systems. This thesis will look at local services, particularly energy services in the specific context of Switzerland using what has been learnt through the program as a baseline for the design of the research in terms of governance of urban systems.

Fast-pace urbanization, new technologies and new products are, on one hand, increasing and changing the demand patterns of local services and, on the other hand, asking for governance models for the provision of such services to be revisited. In European countries, traditional governance structures for the provision of urban services related to water and energy have been subject to many changes in recent decades in order to adapt to the new more dynamic situation. The presence of the private sector in the delivery of public services has gained importance but the results of corporatization, privatization and contracting-out (to cite some of the most frequent processes that have been taking place in the production and delivery of public services) are contested and very diverse. Hence, new governance schemes and cooperation models fostered by citizen’s demand of quality services and the need for new skill and expertise in the public administration, are being developed in a scenario where energy and ICT services are at the core of new products, demands and habits.

Switzerland is a unique case in Europe where traditional public stakeholders at the local and regional levels have evolved to adapt to the new trends but with very limited presence of the private sector. The goal of this master’s thesis is to assess the current situation of the local utilities in Switzerland in terms of their relation to the public administration, the models of services provision, their coverage regarding services and territory, and the involvement of the private sector; and to evaluate if there are areas where the private sector and disruptive actors could have opportunities and contribute to the predominant traditionally public provision of energy-related urban services. Therefore, the research
question this master thesis explores is if there are opportunities in the provision of local services associated to energy in Switzerland for companies different from the predominant traditionally publicly owned utilities. And if there are any, where such opportunities might exist.

The study will be a qualitative exploratory case study based on the review of literature dealing with public-private partnerships in relevant topics, and on the study of the particularities of the Swiss context. Thirty-one cities and twenty-seven utilities make up the empirical part of the thesis. Chapter 2 presents a review of the literature with a focus on public-private partnerships. The concept of PPP has been now used for decades, but it still lacks a clear conceptual definition. Several authors focus their research on defining and categorizing the different types of PPPs. The second, third and fourth sections of the literature review look at the three specific aspects that concern this thesis: PPPs in local services, PPPs in the energy sector and PPPs in Switzerland. The literature review aims at understanding the possibilities and schemes of public-private cooperation in the local energy services in Switzerland. The particularities of the governance structures in Switzerland and the framework under which utilities have been developed and operate currently are essential to evaluate the opportunities that the private sector has and the possible collaborations that could contribute to the provision of energy-related local services. Hence, Chapter 3 presents a detailed portrait of the Swiss context. Section 3.1 explains the multi-level governance that characterizes the Swiss administrative and political system. Section 3.2 and Section 3.3 describe the situation of municipalities and utilities in Switzerland.

Basing the selection on the literature and context, thirty-one medium-size cities and their respective urban utilities are studied in Chapter 4 and the data is analyzed in Chapter 5. Most of the data has been obtained from the Federal Statistical Office, annual reports of the cities and the companies and their respective websites. Chapter 6 consists in a summary of this thesis and presents the conclusions of the empirical study.

This master thesis aims to contribute to the research that explores the particularities, strengths and weaknesses of the Swiss governance framework for the provision of local services, and identify the areas where the collaboration with the private sector could bring benefits for the provision of quality energy services.
2 Literature review

Local governments in Switzerland are characterized by having a very relevant role in the governance structure of the country, and count with considerable autonomy when carrying out their tasks. Therefore, the delivery of public local services is highly dependent on local settings, and publicly owned local and regional companies are the main actors in the provision of energy-related services. Hence, opportunities for the private sector might rely heavily in collaborations and agreements with the public institutions and public companies at regional and local levels.

Pertinent literature concerning public-private partnerships will be reviewed in this chapter, focusing on three aspects relevant for the research. First, a brief review of the literature that focus on defining the concept and categorizing PPPs. Second, a look at the literature on PPPs in local services. Third, a review of studies that focus on PPPs in the energy sector. Finally, a section about literature dealing with PPPs in Switzerland will be presented.

2.1 Public-Private Partnerships: the concept

The concept of Public-Private Partnership (PPP) has been recurring in the literature since the late 1970’s (Weihe, 2005), with a significant increase in the last ten years (Roehrich, Lewis, & George, 2014). However, most of the research concentrates on specific forms of PPP and as Weihe points out, an accurate definition of what is meant by PPP is often missing, leading to a “lack of conceptual clarity” that results on generic conclusions and statements that do not apply to all types of PPP (Weihe, 2005).

The origin of PPPs is traced back in the 1970’s with the need of new financial solutions for planning and urban development, especially in the United Kingdom and the United States (Sedjari, 2004). Hinojosa states that the first precedents happened in the United States but previous to the 1950’s in the area of education, then extended to the utilities and took off from the sixties in the urban development and regeneration (Hinojosa, 2007). From then on, the concept of partnership has been gaining relevance in most areas of the world as a means of combining public and private activity and interests (Sedjari, 2004), for the provision of public services with the involvement of the private sector but with a different more direct control than with traditional methods of private delivery of public services (Broadbent & Laughlin, 2003). In fact, the Private Finance Initiative (PFI) in the United Kingdom is often identified as the first form of PPP, as an alternative to the extensive privatizations that have been taking place in the country (Broadbent & Laughlin, 2003). Established in 1992, PFI is a design-build-finance-operate (DBFO) system and is therefore, a
type of PPP mechanism, but not all PPPs that currently exist fall under the PFI scheme widely implemented in the UK. In line with the notion of PPP as a derivation from privatizations, or even rather “a retreat” from privatization, Linder considers partnerships as a development to involve the private sector in policy areas where privatization might be too rigid or where property issues arise (S. H. Linder, 1999).

Acerete Gil (2003) identifies three groups of countries with different degrees of presence of PPPs. The first group, with the greatest development of PPP initiatives is formed by the United Kingdom, Australia and Canada. It is followed by a group of European countries constituted by Ireland, Portugal, Netherlands, Greece and Italy. Germany, France and the Scandinavian countries are part of the third group, as they tend to have more traditional approaches to the involvement of the private sector in public sector activities that do not match the partnership concept (Acerete Gil, 2003).

Numerous authors have focused their research on defining, classifying and typifying the notion of PPP. In Conceptualising public-private partnerships (Mouraviev & Kakabadse, 2012), Mouraviev and Kakabadse review a wide range of meanings attached to the term in Western literature, as well as the theories behind them, and the different forms and models of a PPP.

When analyzing the different definitions of PPP, the authors highlight the tendency of scholars to focus on one or very few features of PPPs. Solidarity and engagement (Sedjari, 2004 in Mouraviev & Kakabadse, 2012), mutuality (Brinkerhoff & Brinkerhoff, 2004 in Mouraviev & Kakabadse, 2012) and expressions as “commitment beyond contracts” (Bovaird, 2004) are often emphasized in its definition, and even if these elements differentiate PPPs from other traditional forms of public-private agreements such as public procurement, sub-contracting and contracting-out, they might not be enough to understand how a PPP can be organized, and carried out. The same applies for those that stress sharing (of responsibilities, costs, benefits) as a key feature. However, according to Mouraviev and Kakabadse, sharing is in fact a distinguishing feature of PPPs, especially when it comes to the sharing of costs: balancing the cost involvement distributes the risks, and also the benefits among partners. If a part’s costs are considerably lower than the other part’s, then the risk is also lower and therefore the need of a more rigid traditional approach to guarantee the first part’s involvement might be necessary. Hence, sharing and mutuality are also closely related features: sharing common objectives supports the development of the cooperation from a joined efforts perspective that takes into account all interests involved. Additional characteristics considered by the authors are the dynamism in the collaboration, that is, the openness of the agreement to continuous negotiations (Andersen,

All considered, Mouraviev and Kakabadse find the following definition (Grimsey & Lewis, 2002) exhaustive and inclusive of most of the key features defining the concept of public-private partnership:

[. . .] agreement where the public sector enters into long-term contractual agreements with private sector entities for the construction or management of public sector infrastructure facilities by the private sector entity, or the provision of services (using infrastructure facilities) by the private sector entity to the community on behalf of a public sector entity. (Grimsey & Lewis 2002, p. 108 in Mouraviev & Kakabadse, 2012).

According to the review carried out by Roehrich, Lewis and George (2014), there are several dimensions that often appear in the definition of the term. Among them, there is the inter-organizational relationship, shared objectives, risk sharing, cooperation, and the contractual governance (Roehrich et al., 2014). References to the duration (usually long term) and to the sharing of other elements (such as benefits from the partnership and investments) are also frequent. Hodge and Greve conclude that there are two main dimensions that define the concept: financial and organizational (Hodge & Greve, 2007).

The objectives that are expected to be achieved with public-private partnerships, are also part of the definition of the PPP. Bovaird (2004) lists seven main purposes that PPPs can potentially satisfy in the public sector. First, they can be used for policy design and planning, especially long term. Another four objectives are also related to policy, particularly policy coordination, monitoring, evaluation and implementation and service delivery. The author notes that service delivery can make use of PPPs in three different forms: partnering with the private sector for in-house delivery, co-producing services with the private sector, and fully externalizing the provision of the service (or policy implementation). The remaining purposes of a PPP are resource mobilization and resource management (Bovaird, 2004).

A very relevant aspect to consider when talking about PPP is the identification of the type of PPP subject of study. Contractual PPPs and institutional, also referred to as organizational, PPPs are substantially different in their meaning and form. In Conceptualising public-private partnerships (Mouraviev & Kakabadse, 2012), the differences between contractual and institutional PPPs are pointed out, as the key features of each type might differ significantly. The first is defined as a public-private collaboration for the implementation of a specific project, and the latter as a jointly owned company for the provision of a public service. The
authors define three types of studies depending on how PPPs are addressed from different perspectives. First, the studies about PPPs as a policy tool, supported by the theory of market efficiency where private markets are accepted to be more efficient in allocating resources than the public sector (more related to the contractual PPP). Second, the PPPs as organizational and financial arrangements that focus on the governance of the collaboration to understand the costs and benefits beyond financial costs. Third, the studies on PPPs performance, risk allocation and success factors, which are considered to partially overlap with the second category.

Bovaird (2004) develops further these two main typologies of public-private partnerships and identifies five categories that are defining of the PPP typologies. First, depending on the sectors that the partnership involves (civil society, private businesses, and non-for-profit organizations). Second, the relationship basis that define the partnership: collaborative, shared power, contractual, loose network. Third, the economic basis that might differ on the supply and demand approaches. Fourth, the policy area the PPP addresses. And fifth, the scope of the partnership, which might be vertical, horizontal or mixed.

The definition of the concept, is often linked to the different public management traditions that have been observed in Europe and other areas of the world in the last decades. PPPs are in some cases identified as a development of New Public Management (NPM) (Broadbent & Laughlin, 2003) or as an alternative between NPM and privatization (Lienhard, 2006). NPM is in fact often associated with privatization, corporatization, contracting-out, externalization, competition, and downsizing; however, decentralization is not always originated in NPM methods but might also come from the countries’ specific constitution principles (Torres & Pina, 2002).

Other authors understand that the term PPP is widely used and can be framed within several public management systems, but implying different features. For instance, Bovaird contrasts the differences of the partnerships if framed in a NPM context or a Public Governance one (Bovaird, 2004) and Weihe identifies five approaches in the literature on PPP that differ from the idea that PPP are a product of NPM practices (Weihe, 2005). According to Weihe, the governance approach to PPPs is a derivation from NPM but other approaches exist that are not necessarily linked to the governance one. Such additional approaches are the policy approach (which identifies PPP with any public-private collaboration in a specific public sector topic), the local regeneration approach, third the infrastructure approach and fourth the development approach (related to partnership initiatives in developing countries) (Weihe, 2005). Linder (S. H. Linder, 1999) scrutinizes the strategic uses of the PPPs in relation to the neoconservative and neoliberal ideologies.
Without relating the concept to a particular public management system, Sedjari considers that PPP projects provide public administration with innovative methods and contribute to the generation of better governance systems (Sedjari, 2004) and Hodge and Greve explain that they are often considered as promising for the management and governance of public service organizations (Hodge & Greve, 2007).

Public-private partnerships are therefore often described as agreements that through burden-sharing bring benefits for the private enterprises and the public sector, even if in many occasions it is still questioned if the sharing is actually burdening the private sector as much as the public one. But in theory, PPPs bring benefits to all stakeholders. They allow the public sector to focus on delivery, keeping responsibility on what is to be delivered and under which conditions, but benefiting from private sector expertise in the operational and managerial part. Financial flexibility, a shift towards result-oriented public management, and taking advantage from economies of scale are also positive for the public sector (Hofmeister & Borchert, 2004). Some advantages for the private sector are the opportunities in new markets, the anticipated outlook on revenues and economic benefits on a longer perspective, and making business with the public sector as a partner (Lienhard, 2006).

Aside from the literature that aims at clarifying and categorizing PPPs, much of the research centers its attention on specific aspects of the governance, planning and risk management (Brinkerhoff & Brinkerhoff, 2011; De Clerck, Demeulemeester, & Herroelen, 2012; Effah Ameyaw & Chan, 2013; Essig & Batran, 2005; Girmscheid & Pohle, 2007; Grimsey & Lewis, 2002; Xiong, Chen, Wang, & Zhu, 2019). Another stream of literature focuses on particular topics object of PPP, such as transport or infrastructure (Cui, Liu, Hope, & Wang, 2018; Hodge & Greve, 2007; Medda, Carbonaro, & Davis, 2013; Tang, Shen, & Cheng, 2010) and also on PPPs cases in specific countries (Effah Ameyaw & Chan, 2013; Essig & Batran, 2005; Johnston & Gudergan, 2007; Klijn & Teisman, 2003; Mouraviev & Kakabadse, 2014; Rossi & Civitillo, 2014; Sadran, 2004; Toro Cepeda, 2009).

In conclusion, the concept of public-private partnerships has gained popularity both in practice and in scholarly research in recent decades. There is not a unique definition of the term, and it is used with diverse meanings, but it is generally seen as an arrangement where public and private organizations (one or more of each) collaborate for the delivery of a public service, with a more flexible approach than other forms of public-private relations such as contracting out and privatization. The organizational and contractual forms vary greatly, as well as the sharing of responsibilities, costs, risks and benefits. It is often linked to the need of financial resources, but also considered as a tool for innovative governance.
and management of projects that brings together private sector capacities and public service perspectives, aligning goals and interests and influencing policy design and implementation. The lack of conceptual clarity goes in hand with the absence of consistent knowledge retention from PPP practice and lack of learning outcome from the successes, benefits and performance assessment of past public-private partnerships.

This review will now look at several streams of literature that focus on topics associated to PPP relevant for this research. First, a review of the literature about PPPs in local services and PPPs in energy. Then, a look into research that deals with PPPs in Switzerland.

### 2.2 Public-Private Partnerships in local services

Public-private partnerships are common in infrastructure projects and in the delivery of public services. Due to their complexity and intensive requirements in terms of technical, financial and managerial skills for their design and development, they might appear to be more adequate for higher levels of government and big public institutions. However, PPPs are also present at the local level even if their local presence might be strongly conditioned by the governance structure of each country and autonomy of local governments. For instance, PPPs are popular in UK, New Zealand and Australia in the form of PFI, as well as in the United States. Also in France, due to the high decentralization, PPPs at the local level are especially relevant (Sadran, 2004). Sadran argues that despite of what is believed due to the cultural opposite positioning of the public and private sectors in France, PPPs have been an essential part of local public sector activity in the country since the 1980's. This is partly a consequence of the increasing complexity in the delivery of public services and in the public administration tasks (taking place not only in France, but in most countries) and the reformulation of relationships between spheres of the public domain (administration, civil society, and the market); and partly due to specific policies that took place in France like decentralization (Sadran, 2004).

Citing Jean-Pierre Gaudin (1999), Sadran explains how decentralization supports externalization for the implementation of public policies. Additionally, the author also concludes from closely examining European Commission literature, that partnerships are an essential mechanism in the design and deployment of European Union policies (Sadran, 2004). Contracting-out is one of the most relevant topics in the current administration of the public sector in the European Union (Torres & Pina, 2001).

In order to understand the degree of use of PPPs at the local level in other European countries different from France, Torres and Pina (2001) study gives a detailed overview on
the topic. They analyzed the degree of externalization in local public service delivery in 22 cities of 12 European countries: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, United Kingdom and Spain. The paper also takes a deep look into Spain Public Finance Initiatives. The surveyed services are very diverse, and grouped in the categories of general services, education, health, public works and town planning, social services, economic activities, cultural activities, and housing; plus economic activities such as central markets, public transport, car parks, tourism and economic development activities. Except for education and public health, which present more heterogeneity, the other services are provided at the local level in all countries and in very few cases the selected services are part of higher levels of government responsibilities.

Torres and Pina (2001) found that 27% of local services in these cities are provided with some kind of PPP scheme. However, they include under the PPP umbrella numerous methods, such as private operation, franchises, public-private ventures and collaborations with non-governmental bodies. The greatest levels of externalization are found in economic activities, social services, and public works and town planning. Yet, PPPs appear to be more common in social services than in the rest of service categories. The cities with the highest results for services delivered by public-private ventures are Toulouse (France), Lisbon (Portugal), Dortmund (Germany) and Manchester (UK). Non-for-profit organizations are also numerous in Manchester and in German cities, but almost inexistent in the other cases. Thus, results show that PPP initiatives are highly present in the delivery of local services, but especially in those that are not at the core of public administration activities (Torres & Pina, 2001).

Bloomfield (2006) states that the majority of public-private partnerships between private companies and local governments can be characterized as business transactions, where the private and the public engage in long-term complex commercial contracts for the provision of a combination of services, construction and financing in exchange of a mix of public funds, public assets and user fees.

As Bloomfield reflects, innovative PPP arrangements are popular among local governments because they are commonly introduced as an alternative to address “policy dilemmas” and projects that do not comply with the conditions identified as essential for more traditional privatization schemes (robust competition, measurable performance, clear requirements and transparency) (Bloomfield, 2006). But the complexity of such particular transactions poses challenges to the attainment of expected public benefits (service quality, costs savings, risk sharing). Thereby, through several explanatory cases (mostly related to water),
she examines the challenges and obstacles that local governments face with PPPs in terms of competition, risk sharing and transparency issues.

The conclusion raises three elements that proved to be essential when dealing with the main challenges of public-private partnerships at the local level. First, the need of local governments to count with specialized expertise from the beginning, for an adequate definition of the partnership. Second, local governments should ensure the availability of resources during the development of the partnership for conducting the right management, monitoring and enforcement. The control that local partners exercise over the partnership is often insufficient (Hertzog, 1995), particularly in the provision of urban services involving private groupings (Sadran, 2004). This is due to the limited resources of individual local governments in the technical and legal domains, especially in decentralized systems, compared to the state but also in contrast with private enterprises. Third, pertinent structures must be in place to ensure accountability and transparency of the long-term business transactions. Furthermore, partnerships will imply the sharing of many elements such as costs, responsibilities and objectives, but the public sector retains the responsibilities in the areas of decision regarding level of services and characteristics of what is to be delivered (Torres & Pina, 2001). Citizens should be aware of the public authorities preserving such responsibilities and the control they maintain over the activities involved in the agreement, as it is a differentiating feature of partnerships in contrast to privatization (Acerete Gil, 2003).

Research dealing specifically with PPPs in urban utilities is scarce, and it addresses mostly the water sector (Chong, Huet, Saussier, & Steiner, 2006; Effah Ameyaw & Chan, 2013; Marin, 2009; Seppälä, Hukka, & Katko, 2001; Zhong, Mol, & Fu, 2008).

### 2.3 Public-Private Partnerships in the energy sector

As in other sectors where the state used to be dominant in the provision of public services, energy and electricity have also witnessed a rise of PPP initiatives in countries all over the world irrespective of their level of economic development. The economic recessions that took place towards the end of the 1970’s fostered the use of PPP in the energy sector as an alternative to traditional building processes and ownership models, in particular, in energy infrastructure projects (Sovacool, 2013). Until then, utilities were predominantly owned and managed by the public sector, operating in what was believed to be a natural monopoly due to features like being capital intensive, with significant sunk costs and for benefitting from economies of density, scale and scope (Sovacool, 2013). The only exception to this was the US (Sovacool, 2013), where already in the beginning of the twentieth century, a
different system that involved the private sector was established. Such system can be
considered as the first precedent of modern PPPs because it entailed concessionaire
agreements between the private sector and the government, where the private utilities
would operate under privileged conditions but with additional regulation, price control and
special oversight from the public sector (Southard, 2010).

With regard to the other countries, as it has already been mentioned, the United Kingdom
experience is often considered as the precursor of the privatization and PPP reforms to
come. But in the energy sector, Chile was the first country to start an integral reform of the
electricity sector in 1978 that opened the public monopoly towards the private sector
(Sovacool, 2013). These reforms were based on assumed potential benefits such as
efficiency gains and lower rates if the electricity market was driven by customer’s demand
and competition under the right regulatory framework but without direct public provision
(Sovacool, 2013). In view of their positive results, electricity reform projects with private
sector participation (PSP) were then transferred to multiple countries, with great intensity
also in developing countries, Asian countries in particular: PSP was brought in the electricity
sector of sixty-two developing countries between 1990 and 1997, with private participation
focusing on power generation (Pongsiri, 2003; Sovacool, 2013).

The case of Thailand is studied by Pongsiri (2003) in Public-Private Partnerships in Thailand:
A Case Study of the Electric Utility Industry. Since the 1990, the private sector has been
increasingly present in a scenario that used to be completely controlled by the Government
in all areas of electricity generation, transmission and distribution. Power generation was
open to the private sector in order to introduce private financing for the increase of
generation capacity via two programs: Independent Power Producers and Small Power
Producers, with arrangements with the Electricity Generating Authority of Thailand as
purchaser (Pongsiri, 2003). The results of the study show that appropriate risk allocation,
conflict resolution, a control over asymmetries in the partnership and contractual
safeguards for sovereign risks are relevant for the implementation of the public-private
partnership. Moreover, the author emphasizes that the expectations were significantly
different between the public and the private actors, and these differences should be taken
into account when implementing and developing the partnership (Pongsiri, 2003).

Despite of the efforts to implement PPP in the energy sector of many developing countries,
Pongsiri (2003) considers that the private sector is insufficiently present in most of those
countries, especially when the institutional environment and macro-economic framework
are not stable enough to attract private sector in a more solid way so as to generate growth.
The same issue takes place in African countries, where “healthy public firms are necessary
to attract investors” to establish in cooperation with the public sector, which has been leaving the provision of water and electricity services to entrepreneur’s initiative on a smaller scale, the operation of utilities in a more efficient scale (Auriol & Blanc, 2007). For instance, in Uganda, the government has been for years trying to attract private investors and realize public-private partnerships to overcome the electricity deficit without much success (Akampurira, 2009). Stakeholders identified the inability of municipalities to provide equity financing, the numerous requirements and long processes for project approval, delays in public bureaucracy, environmental groups resistance and poor coordination among Government departments, as main constraints for the development of PPPs in the electricity sector in Uganda (Akampurira, 2009).

In the study Public-private partnerships in renewable energies in Latin America and the Caribbean (Coviello, Gollán, & Pérez, 2012), there is also references to the role of a stable public sector for the support in the development of PPP in energy. Among the most effective ways the public sector can help consolidating PPPs are: the creation of a regulatory and political environments that present low risks and stability, special incentives for new technologies, special tariffs for energy generation, the establishment of long-term goals, improve local financing possibilities and define clear processes for all the stakeholders.

In parallel to the stream of literature that looks at PPPs in the energy sector in developing countries, there is substantial research with a focus on the link between renewable energies and public-private partnerships. In some cases, both topics are studied together as essential elements of the issue of study, as in Covielo et al. (2012) and Sovacool (2013). Renewable energy technologies demand high investments up-front and go hand in hand with innovation and therefore, public-private partnerships appear as a complement to limited public funding for their development (Cedrick & Long, 2017). Additionally, renewable energies and decentralized energy production are often considered as solutions to overcome the lack of access to electricity in many developing countries. Thus, the three concepts are closely related to each other.

Sovacool (2013) study provides eight examples where the 5P model of PPP, a new pro-poor model of partnership that has been widely implemented in order to expand access to energy services in poor communities by developing renewable energy projects, has been successful. The 5P model involves the citizens as consumers and also as partners in the ventures, which also usually include other local, national and international actors. The countries part of the study are Bangladesh, Indonesia, Nepal, Zambia, Laos, India, Sri Lanka and China. China was subject to the electricity reforms in developing countries in the 1990’s mentioned above, and in the twenty-first century has continued to develop different PPP
models in the energy sector targeting diverse goals and end-users. The case presented by Sovacool (2013) consists in a PPP for the distribution of over 400,000 solar home systems between 2002 and 2007 at reduced costs thanks to the partnership, addressing concerns related to electricity access in rural areas and sustainable energy policies. The main partners were the World Bank, the Global Environment Facility, the National Development and Reform Commission, and local solar manufacturers (Sovacool, 2013). The PPP project for development of a wide electric vehicle charging infrastructure network is another example of how China is using PPP to develop their energy policy (Yang, Long, Li, & Rehman, 2016).

In the context of Latin American and Caribbean countries, PPPs are considered effective for the deployment of sustainable energy projects because they bring financing, pilot projects, new technologies, help establishing policies, and promote inter-sectorial innovation, among others (Coviello et al., 2012).

In the OECD countries, PPP mechanisms are also being used for the deployment of renewable energy projects at larger scales. Dinica (2008) argues that the strong expansion of wind power generation in Spain was due to the possibility of development via PPP in the first stages, which alleviated the risk perceived by early investors in the 1990’s and boosted the confidence and interest of private investors in the following years. Nowadays, it is fully private partnerships that dominate the scenario but the public-private ones were determinant in the strong initial development (Dinica, 2008). As of year 2000, 95.7% of the installed wind energy production capacity was owned by partnerships in Spain (Dinica, 2008). Portugal started implementing PPPs by the end of the twentieth century, mostly for highways, railways and health care infrastructure; and renewable energies infrastructure has in the latter years (Martins, Marques, & Cruz, 2011). A contractual PPP for a wind power generation plant was the first PPP in the renewable energies sector in Portugal (Martins et al., 2011). Additional topics related to sustainable energies and use of PPPs in Europe are public lighting, cooling and heating networks, and energy performance in buildings (Bougrain, 2012).

2.4 Public-Private Partnerships in Switzerland

The literature dealing with the topic of public-private partnerships in Switzerland is limited. Experiences of synergies between public institutions and the private sector in the country are numerous, but not that often identified as PPPs.

Hofmeister and Borchert’s contribution (2004) helps understanding the framework under which PPPs fall in the Swiss public sector. A modernization of the sector via New Public
Management (NPM) strategies was a first step towards the upgrading of processes and tools, but it did not change the system. An “inward-looking orientation of the public sector” together with a lack of stakeholder orientation remained present in the Swiss public sector (Hofmeister & Borchert, 2004). Moreover, NPM projects were not accompanied in Switzerland by a focus on competition and privatization, as it happened in many other European countries. Decentralization was part of the Swiss administrative system already before NPM were partially brought into play, so they did not have any effect either on the delegation of public tasks towards lower levels of government nor external parties. Consequently, “Swiss PPP projects focus on the technical level and do not enter the field of ‘high politics’” (Hofmeister & Borchert, 2004). The authors argue that PPPs, if designed taking into account the specificities of the Swiss national context, are relevant for the Swiss public sector to address the challenges of the network society, understanding the interconnections and relationships between national and international actors, and social, political, economic and ecologic aspects.

Based on the Basic Study of PPP in Switzerland (Bolz, 2005), Lienhard (2006) introduces the particularities of public-private partnerships in Switzerland from the economic, financial and legal perspectives and analyses some of the existing experiences. According to Lienhard, the role of governments is shifting from a service state to a warranty one, and that is the reason why the public sector is incorporating private sector’s models. This is highly influenced by the challenges that appear from increased complexity in the fulfilment of public tasks plus financial limitations (budget deficits and public debt), which ask for a more efficient and innovative approach (Lienhard, 2006). But, according to the author, the Swiss political system, the legal context and the delayed implementation of liberalization compared to other European countries are essential conditionals when analyzing the experiences, risks and potentials of PPPs in Switzerland.

Swiss governments are generally better able to secure capital than private enterprises, therefore, PPPs can lead to higher financing costs but this should be assessed together with other benefits associated to the agreement, such as efficiency, speed, and risk distribution (Lienhard, 2006). Additionally, legal constraints must be considered for the potential development of a PPP in Switzerland. These are for instance the safeguard of democratic rights of participation, principles of constitutional transactions and procurement laws. Finally, Lienhard observes that the potential for PPPs in Switzerland is particularly high in the areas of structural engineering, public facilities management, transportation, site promotion and e-government.
Lienhard (2006) identifies PPPs with organizational forms where at least a public and a private actor cooperate in an institutionalized way for the fulfilment of public tasks. Depending on the intensity with which cooperation is designed, three PPP models are pointed out by the author: operator model, franchising model and society model. Cooperative task fulfilment and procurement are popular in the country, but not under the label of PPP, which is often associated with private financial initiatives for infrastructure projects, neglecting the fact that PPPs apply to many other projects and that its main feature is not private financing but rather a life cycle perspective (long-term) with risk sharing to achieve “mutually compatible” goals (Lienhard, 2006). Hofmeister and Borchert (2004) confirm that most Swiss partnerships are in the area of transportation, especially construction of transportation infrastructure such as roads, tunnels, airports, and railways, and also other infrastructure for water and energy services. Some cases can be observed also in relation with education, health care, tourism and cultural facilities.

Both papers dealing with PPPs in Switzerland, Lienhard (2006) and Hofmeister and Borchert (2004), showcase a few practical experiences of partnerships between public and private actors in Switzerland. The Greater Zurich Area project is included in the two studies. It consists in a cooperation for the economic development of the area around Zurich, the goal was to attract foreign companies to the region though marketing and tailored support on the process of setting in the area. The partners were numerous in this case: six cantons, two cities, and eleven private companies; and the main benefits expected by each side were increased tax inflows for the public governments, and increase demand of services and clients for the private companies participating in the PPP. A total of 66 companies decided to be located in Greater Zurich Area between 2001 and 2002, directly generating almost 900 new jobs. The organizational PPP found the most trouble in the assignment of tasks each partner would have to carry out, and in involving new public sector partners to increase availability of resources (Hofmeister & Borchert, 2004; Lienhard, 2006).

Uster Center project and INTRAC express are other two successful examples of public-private partnerships in Switzerland. Ulster Center objective was to align the municipality, and two investors (Credit Suisse and Ryffel AG) for the planning and urban development of the city center in a time- and resource-savvy way. INTRAC express is also a public-private partnership, but in this case, the public sector party was Bern’s public transportation company owned by the City, BERNMOBIL; plus the building private company Weiss+Appetito AG. In this case, the two companies joint expertise for the design and development of tramlines not only in Bern, but also in other municipalities (Hofmeister & Borchert, 2004).
3 Context

The way utilities work in Switzerland is a product of the country’s federal organization and distinctive multi-level governance. That is the reason why this section will present in the first place key aspects of the Swiss government structure.

Switzerland is a multicultural Federal Republic. The Confederation, Cantons and municipalities are the main territorial units of the country, but other units have been identified independently from administrative boundaries; mainly for statistical purposes. Bern is the capital city of the Confederation. The country is characterized by a multi-level governance where the allocation of power is balanced among the relevant actors. Federal bodies steer political processes, but the people and the cantons retain significant power and influence in many areas. The Confederation holds programming and subsidizing functions mainly, while the Cantons have most of the executive powers. However, many tasks are shared between the Confederation and the Cantons. As a result, there are several institutions for inter-governmental cooperation. Moreover, the three levels of government can levy taxes.

The provision of services such as water and energy is part of the municipalities’ tasks. Hence, the second part of this contextualization will look more carefully at the municipal level in Switzerland, its main characteristics and specificities. This will be followed by an overview of the utilities: the different schemes under which they are operating, features and current situation.

This context will be used as a basis to select the factors and cases that will be examined in the empirical study.

3.1 The Swiss multi-level governance

Switzerland is a federal republic constituted by twenty-six cantons or states. It is a non-centralized rather than decentralized federation on the grounds of how the Confederation was created. It was a process in which previously distinct units, the Cantons, gave up some of their sovereignty towards an upper level of government, the Confederation, in order to provide shared rule for certain specific purposes. In that way, federal powers are usually specified and limited in the constitution with the remaining unspecified powers remaining for the constituent units. Therefore, cantons retain their sovereignty, and high levels of autonomy and powers.
Territorial heterogeneity and cultural diversity are part of the country’s character. For instance, there are four official languages in the Confederation: German, French, Italian and Romansh. German is used by close to 65% of the population, followed by French (22.7%) and Italian (8.4%) (Federal Statistical Office, 2017c).

There are three levels of government: federal, cantonal and municipal. According to the principle of subsidiarity, tasks will be allocated at the lowest possible level of government. The Confederation assumes only tasks that exceed the possibilities of the cantons or that ask for uniformity in the Confederation. This mainly translates in programming and subsidizing functions, as well as legislative power in nation-wide policy areas. The Cantons retain most of the executive powers and are in charge of the organization and competencies of the local administration. In general, municipalities have significant autonomy when carrying out their tasks, which consist mostly in residual powers allocated by the cantons. Local service delivery is exclusively under municipal responsibility, some of these are local roads, gas, electricity and water supply and schools. (Horber-Papazian & Soguel, 1996; Ladner, Soguel, Emery, Weerts, & Nahrath, 2019; W. Linder & Iff, 2011). The main functions and competences of each level of government are summarized in Table 1.

Additionally to the principle of subsidiarity, the principle of fiscal equivalence is also present in the allocation of tasks between the three levels of government. It means that the institution responsible for a service, should bear its cost and therefore can also determine its characteristics. Regulation, provision, use and financing are interlinked by the principle of fiscal equivalence (Ladner, 2019c). Despite the efforts to set a clear division of powers, a political interlacing is observed (Ladner, 2019c) and there is an intense vertical and horizontal cooperation among institutions.

The country is also characterized by a strong multi-level governance system. When it comes to decision-making, federal bodies steer political processes, but the people and the cantons have significant power and influence (W. Linder & Iff, 2011). Federalism, concordance and direct democracy are the three cornerstones of the political system that help understand how the power is balanced among the different parties. The first attempts to concentrate regulation, funding and execution of specific tasks at only one level of government; consequently, it does divide the powers between the Confederation and the Cantons, and also between the Cantons. Concordance balances the power among political actors and direct democracy allows the people to participate regularly in political decisions at all three levels of government (Ladner, 2019a).
Table 1: Main functions and competences of each level of government. (Federal Constitution of the Swiss Confederation, 1999; Horber-Papazian & Soguel, 1996; W. Linder & Iff, 2011)

<table>
<thead>
<tr>
<th>Confederation</th>
<th>Cantons</th>
<th>Municipalities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main functions</strong></td>
<td><strong>Executive powers and organization of local administration</strong></td>
<td><strong>Local service delivery</strong></td>
</tr>
<tr>
<td>Programming, subsidizing and legislating in nation-wide policy areas</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Competences</strong></td>
<td><strong>Competences</strong></td>
<td><strong>Competences</strong></td>
</tr>
<tr>
<td>· Organization of federal authorities</td>
<td>· Organization of cantonal authorities</td>
<td>· Education: kindergarten and primary schools</td>
</tr>
<tr>
<td>· Foreign affairs</td>
<td>· Organization of local authorities</td>
<td>· Waste management</td>
</tr>
<tr>
<td>· Army and civil protection</td>
<td>· Education: secondary schools and universities</td>
<td>· Municipal streets</td>
</tr>
<tr>
<td>· Monetary policy</td>
<td>· Culture</td>
<td>· Local infrastructure</td>
</tr>
<tr>
<td>· Nuclear energy</td>
<td>· Protection of the natural and cultural heritage</td>
<td>· Local police</td>
</tr>
<tr>
<td>· Postal and telecommunication services</td>
<td>· Management of own water resources</td>
<td>· Zoning</td>
</tr>
<tr>
<td>· Technical universities, research, statistics</td>
<td>· Energy: measures of use of energy in buildings</td>
<td>· Citizenship</td>
</tr>
<tr>
<td>· National highways, and railway financing</td>
<td>· Organization of courts and administration of justice in civil and criminal matters</td>
<td>· Municipal taxes</td>
</tr>
<tr>
<td>· Policy and principles for spatial planning</td>
<td>· Public health</td>
<td></td>
</tr>
<tr>
<td>· Agriculture</td>
<td>· Cantonal streets</td>
<td></td>
</tr>
<tr>
<td>· Energy policy and legislation on use of energy, transport and supply of electricity, systems for transport of liquid or gaseous fuels</td>
<td>· Citizenship</td>
<td></td>
</tr>
<tr>
<td>· Legislating on: protection of the environment, railway, cableways, shipping, aviation and space travel, employment, banking and stock exchange, financial services, insurances and social security</td>
<td>· Cantonal taxes</td>
<td></td>
</tr>
</tbody>
</table>
Despite of all the efforts to allocate tasks, responsibilities and financial burdens at specific levels of government, the government organization creates very pronounced financial interdependence, as well as institutional and administrative entanglement (Horber-Papazian & Soguel, 1996). The circles of decision-makers, recipients of public services and payers do not always coincide.

The book *Swiss Public Administration. Making the State Work Successfully* (Ladner et al., 2019) develops further the topics that have just been introduced. It contains as well a detailed picture of how other areas related to the country’s organization and administration work in Switzerland (i.e. law, finances, and public policies).

### 3.2 The situation of Swiss municipalities

#### 3.2.1 Population and size of municipalities

The 8.5 million population of the country (Federal Statistical Office, 2017a) is unevenly distributed throughout the cantons, which differ much in size. For instance, the biggest canton, Graubünden, has an area of 7105 km$^2$ while the smallest one, Basel-Stadt, is only 37 km$^2$. Still, both host the same percentage of total population, around 2.3% each. The most densely populated areas are Geneva and the north of the country. In fact, Basel-Stadt and Geneva, being city-states, are the cantons with the greatest density of population (over 5000 inhabitants/km$^2$ and 2000 inhabitants/km$^2$ respectively), and followed by Zürich, Zug, Basel-Landschaft, Aargau and Thurgau (with densities below 1000 inhabitants/km$^2$).

As of December 2017, there were 2240 municipalities (also referred to as communes or communities in the literature) in Switzerland. Population has an urban character: about 63% live in urban core areas and another 22% in areas under influence of urban centers. Only 15% of the residents live in non-urban areas (Federal Statistical Office, 2017b).

The size of Swiss cities is relatively small: as of December 2017, none of the municipalities had a population over 500,000. There are six cities that have a population above 100,000 inhabitants: Zürich, Geneva, Basel, Lausanne, Bern and Winterthur. The cities of Luzern, St. Gallen, Lugano and Biel have a population between 50,000 and 100,000. Almost 60% of the municipalities have less than 2000 inhabitants, and over half of the population lives in towns (in Switzerland, municipalities are only considered cities if their population is above 10,000 inhabitants) (Federal Statistical Office, 2017a). Together, the 10 biggest cities represent 16.9% of the total population. Table 2 summarizes the number of municipalities per size, and the total population they represent in total and in relative terms.
3.2.2 Other territorial subdivisions

As explained above, there are three levels of government in the Confederation, and federal, cantonal and municipal are also the three administrative levels. Some cantons also have districts (often called with different terminology depending on the canton) as territorial subdivisions and even as administrative units in some cases. But, aside from this, further subdivisions of the territory are considered, mainly for statistical purposes.

On top of the cantons, a regional level has been defined where seven NUTS-2 regions were delimited for statistical purposes: Eastern Switzerland, Zurich, Central Switzerland, Northwestern Switzerland, Espace Mittelland, Lemanique Region and Ticino.

Furthermore, the Federal Statistical Office has developed a statistical definition of urban space to better render statistically Swiss urbanization. It establishes four categories of urban spaces. First, agglomerations, which are constituted by the main core municipalities, secondary core municipalities and peripheral ones. Second, the multi-oriented municipalities that are communes which activities are oriented towards several centers of agglomeration. Third, the out-of-agglomeration centers, for communes that don’t belong to any agglomeration. An additionally, the concept of statistic city, which definition is based on density and number of inhabitants, jobs and hotel nights converted (Goebel & Kohler, 2014).

Zürich is the biggest of all the urban agglomerations and the only one with a population over one million. It encompasses 150 municipalities, with a total of 1,369,000 inhabitants. Geneva and Basel are the second and third biggest agglomerations, with over 500,000 inhabitants. These three gather one third of the country’s population. Table 3 shows the characteristics of the six biggest urban agglomerations of Switzerland in terms of population.
In 2001, in view of the problems derived from peri-urbanization that many areas were facing, the Swiss Confederation launched a national agglomeration policy with the objective of helping maintain the agglomerations’ competitiveness, quality of life and supporting its sustainable development. By increasing the focus of the federal government on the agglomerations problems, the Confederation wanted to improve the vertical collaboration between the different territorial administrations and also encourage the horizontal cooperation among them. Through financing for transport infrastructure projects mainly, the goal was to bring actors together to overcome institutional fragmentation and pursue the integration of urban spaces. Doing so, it did not only support the cantons and cities that were already working towards a better metropolitan governance, but it also stimulated others to do the same and share experiences.

In the same year, the Tripartite Conference of Agglomerations was created in order to provide the federal government, cantons and cities with a platform that would ease the development of the agglomeration policy at all levels. A peculiarity of the policy is that if a project of transport infrastructure is of relevance for the urban area of the agglomeration as a whole, then the Confederation may finance it even if it is located on the other side of the border (Walther & Reitel, 2012).

In light of the challenges still existing in most Swiss urban areas and the success of the program, the Confederation launched in 2016 the Agglomerations Policy 2016+ to reinforce and unfold further the current scheme (Federal Office for Spatial Development, 2015).

### 3.2.3 Local autonomy

Urban self-governance is characteristic of Swiss municipalities, as they enjoy great autonomy in their political processes and in carrying out their tasks.

The book *The place and role of local government in federal systems* (Steytler, 2005) is a collection of papers presented in the 2004 annual conference of the International Association of Centers for Federal Studies (IACFS). Bulliard’s paper *Local government in*
Switzerland (2005) draws a complete picture of the constitutional and institutional framework that establishes the autonomy, organization, supervision, tasks and finances of Swiss municipalities. The author highlights the fact that Swiss communes existed before the Confederation was created, and that they hold a relevant role in the country's politics. Their autonomy is guaranteed by the federal constitution, within the limits of cantonal laws. The supervision and control cantons exert over municipalities is greater than that of the Confederation over the cantons, however “it has to respect the municipal power of self-organization and municipal autonomy” (Bulliard, 2005). However, French-speaking cantons are usually more centralized than the German-speaking ones, which generally give more autonomy to the municipalities (Bulliard, 2005).

According to Wicht (2016), culture (associated to the language) is also determinant for the organizational schemes chosen for delivery of local public services. For instance, his research shows that French-speaking Swiss municipalities are 60% less likely to contract out a service to a private enterprise than a commune located on the German area (Wicht, 2016).

Ladner’s chapters The Organization and Provision of Public Services and The Characteristics of Public Administration in Switzerland (Ladner, 2019b, 2019c) in Swiss Public Administration. Making the State Work Successfully describe how the administration and provision of public services is organized in Switzerland, and therefore serve also to understand the role of local governments, and their situation and responsibilities in relation to the cantonal and federal levels.

Regarding the division of tasks, Ladner explains that the allocation of responsibilities was never one hundred per cent clear and highlights that over time, the interdependence between levels and the complexity of the processes from decision-making to execution and financing increased, resulting in local governments being more often responsible for implementing decisions that were taken at higher levels. Financial flows did also become more intricate in this process (Ladner, 2019c).

Nevertheless, the autonomy of the communes is still outstanding. Steiner (2003) considers proof of such autonomy “the fact that the municipalities obtain 70 percent of their gross income by means of their own financial resources”. Transparency at the local level is also characteristic from Swiss municipalities. As Ladner explains, residents “see exactly” what their taxes are used for but also “they have quite direct ways to influence not only policy but also – and in particular – the expenditures of local authorities. They do so with full knowledge that it is through their taxes that these expenditures will be financed. Correspondingly, they do not just let themselves be ‘managed’ or ‘administered’ but expect
good quality, efficiently delivered services from ‘their’ community and ‘their’ community employees.” (Ladner, 2019b).

3.2.4 Financial situation, inter-municipal cooperation and mergers

From 1999, the Institute of Advanced Studies in Public Administration (Institut de hautes études en administration publique, IDHEAP) of the University of Lausanne, publishes an analysis of the financial situation of the cantons, approximately half of the cities over 20,000 inhabitants, and the Confederation. From 2017, three areas are assessed: the financial health of each institution, the quality of the management of public finances and the indebtedness. A total of 21 out of the 46 Swiss cities with a population over 20,000 are included in the last report (N. C. Soguel & Munier, 2018). The average of the indicators for those cities for the years 2008-2017 shows that the financial health and the management of public finances has been in average good or very good. Conversely, the indebtedness indicators’ average for that period shows weak values; especially the gross debt in relation to the revenues of the cities.

The economic recession in the 1990’s, when a fiscal crisis took place together with an increase of public debt, triggered the deployment of initiatives for addressing challenges that had long been in the political agendas related to the efficiency, quality and accountability in the provision of public services.

Fiscal pressure for municipalities was intensified as more tasks and costs were delegated from upper levels (but not decision-making power) with no increase in financial resources. Tax competition was also influencing the constraints that communes were facing. First, inter-municipal cooperation and later also municipal mergers, were promoted by cantons and were popular among all types of municipalities as a way of overcoming economic difficulties and improving fulfillment of local tasks.

Several authors (Bel & Warner, 2015; N. Soguel, 2006; Steiner, 2003) write about inter-municipal cooperation, their characteristics and results. Steiner and Soguel look also at the municipal mergers, or amalgamation of municipalities, in Switzerland.

Inter-municipal cooperation projects tend to involve small and large municipalities, more than medium size ones. Benefitting from economies of scale for the first, and balancing the effects of functional and population spreading over jurisdictional limits for the larger, might be a reason for this. Inter-municipal cooperation has gained significance over time (N. Soguel, 2006). It has impacted positively the effectiveness and efficiency in the provision of local services, however, it is not associated with lower municipal expenditures (Steiner,
In contrast, mergers have been more often encouraged by financial incentives from interested cantons (N. Soguel, 2006) as the municipality suffering financial difficulties is among the top reasons for mergers (Steiner, 2003).

### 3.3 Swiss utilities

#### 3.3.1 Main characteristics of the utilities in Switzerland

In line with Swiss federalism and a strong tradition of urban self-governance (Mühlemeier, 2018a), tasks are allocated at the lowest level of government possible. Therefore, delivery of local services (including utilities) are in most cases part of the cities’ responsibilities.

In contrast with other European countries, where predominant energy providers operate at a national level, utilities in Switzerland are located and regulated at the local level and, together with big energy providers, are among the most powerful actor groups when it comes to energy related topics (Mühlemeier, 2017). Something similar happens in Germany also, and scholarly research tends to ignore their importance when it comes to energy transition strategies and policies, and tends to centre only in big energy providers and small innovative businesses (Mühlemeier, 2017). Due to their link to the municipal level, utilities in German-speaking areas are called Stadtwerke or Gemeindewerke (Stadt meaning city, and Gemeinde, municipality or local community in German), also named in the literature as Urban Utility Companies (UUC), and belong to a subsidiary and bottom-up governance scheme (Mühlemeier, 2018a). On the French area of Switzerland, public entities in charge of the utilities are often named Services Industriels (Industrial Services in English) (Wicht, 2016).

According to Mühlemeier (2018), “their key responsibility is to supply ‘their city’ with all critical infrastructure services (i.e. electricity grid, gas network, district heating, and water) and the management of the necessary local infrastructures”. Hence, two characteristics can be inferred from this. First, that the same entity usually provides services in multiple areas such as electricity, water, and heating; and even telecommunications and public transport in some cases. That is the reason why they are also referred to as “multi-utilities” in the literature (Farsi & Filippini, 2009). Multiservice integration allows the utilities to benefit from financial and technical synergies (Paquier & Pflieger, 2008). Second, that they have multiple roles: from suppliers, to producers and network operators. This is particularly accurate for large municipal utilities, that especially when it comes to energy related services, act as fully integrated companies that manage in-house all the stages of the value chain (Mühlemeier, 2018b).
Still, the characteristics of each UUC may differ a lot, and a great heterogeneity is found among Swiss UUC. For instance, around 800 utilities can be found that are part of the electricity market but only some own significant generation capacity while most are merely resellers (Blumer, Mühlebach, & Moser, 2014).

According to the Survey of Industrial Services of French-speaking Switzerland (Genoud, Garcia, & Finger, 2003), 96.6% of the utilities in the French-speaking part of the country distribute electricity but only 58.6% are producers. With reference to other services, 55.2% supply water, 37.9% cable services, 34.5% gas and 24.1% other services. Over 50% provide only two or three services, and about 30% provide 4 to 5 services. Only 13% offer six or more services (Genoud, Garcia, & Finger, 2003).

This heterogeneity applies also to the institutional model chosen for service delivery, and to the ownership structure. While in some cities, the UUC is still part of the city administration (as in Kreuzlingen), others have transformed the company into a private corporation (like Elektrizitätswerk Jona-Rapperswil AG, ewjr), with usually at least one public institution as shareholder. However, the most common scheme to date is the one of an independent public company, owned by the city itself (as in Chur, where the city owns IBC Energie Wasser Chur), or owned by a group of neighbouring cities (like Gruyère Énergie SA, GESA). The association of local governments for the provision of certain local services in partnership, without a corporatized structure is also common (it is the case of SIGE, the association of Montreux and other nine communes of the area). In fact, Steiner (2001) identified 1359 local government associations (LGAs) in Switzerland, as stated in Wicht (2016). The following sub-section presents a more detailed description of the models of service delivery.

Ownership and operation of the network infrastructure belongs to the same entity in the majority of the cases, in contrast to German energy sector for example, where a concession system exists. Yet, a strong regulatory system is in place in both models (Mühlemeyer, 2018a).

Regarding financing, urban utilities in Switzerland usually have profitability objectives and are seen as a source of public finance rather than as a public expenditure (Paquier & Pflieger, 2008). For instance, according to a survey of electricity distributors (which, according to the report, are in majority multiservice utilities) in the French-speaking part of the country, service tariffs and connection fees are the main way of financing; only about 10% consider municipal budget as a financing resource (Genoud, Garcia, & Finger, 2003).
The control that municipalities have over the utilities, often creates certain interlinked financial flows associated to parafiscality from which the commune benefits (Revaz, 2008). Additionally, such control has also allowed to align the utilities’ strategy and investments with public policies in areas such as urban development and environment (Revaz, 2008).

3.3.2 Institutional models of service delivery

Grossi and Reichard (in Grossi & Reichard, 2016) list as follows the institutional models of service delivery:

- In-house delivery: the municipality delivers the service directly, usually through a municipal department, and retains great influence over the service.
- Autonomous public entity: the service is delivered by an autonomous entity, that can also be a corporation, of public ownership (fully or in majority) but with managerial autonomy.
- Group of municipalities that cooperate for the delivery of a service.
- Contract-based PPP: agreement between public and private bodies for the service delivery. The agreement often involves financing by private actors, and other stages like building and operation.
- Organizational PPP: mix ownership of the corporation through which the service is provided, with public and private bodies as shareholders.
- Contracting-out: the municipality has a contract with a private organization for the execution or operation of the service; but the municipality is responsible for supervising and controlling the adequate delivery of the service.
- By “the market”: the municipality leaves to private enterprises the responsibility for the quality and availability of the service.

According to the authors, municipally owned enterprises (MOEs), contractual PPPs and contracting-out are the most common models in the utility sector (Grossi & Reichard, 2016).

The study conducted by Grossi and Reichard (2016) compares how utilities are delivered in several European countries, including Switzerland. Out of the seven countries included in the study, Switzerland is among those with the strongest local government, together with Finland and Sweden and it stands out for the noteworthy inter-municipal cooperation. The study shows the relevance of municipally owned enterprises, with between 20% and 80% of total local government workforce employed by them depending on the city. Germany is the only other country of the study with a percentage over 40%. With regard to the legal form of the MOEs, public law entities and joint-stock companies are dominant in Switzerland; and they are most present in the water, sewage and energy sectors.
Organizational and contractual PPS are seldom present. Nevertheless, contracting-out of some services is very present in Switzerland, with 40% of the municipalities contracting out some services in contrast with 18% in Austria.

Pascal Wicht, in his thesis *Organizational Choices in the Delivery of Local Public Services in Switzerland: A Cultural Perspective* (2016), analyses the importance of cultural factors in the make-or-buy choice for delivery of public services. For the analysis, Athias and Wicht created an original dataset with information about the mode of provision of 22 public services in Swiss municipalities (that include a wide range of services, associated to utilities but also services such as those related to schools and roads).

Three main categories for the model of service delivery were considered for the Athias-Wicht survey: in-house, public contracting and private contracting (Wicht, 2016). These three categories group the most common models observed for provision of public services in Swiss communes as follows:

**In-house:**

- Internal: the municipality provides the service with public employees and takes all the decisions.
- Public company: the service is provided by a public agency or a publicly owned firm, being an autonomous entity in terms of budget and management, but with the public authority holding control over the characteristics of the service.

**Public contracting:**

- Local Government Association: the service is provided by an entity under public law created to provide one or several services, with the municipalities involved represented in the leading organs of the entity.
- Public contract: the service is bought to another municipality or another public authority.

**Private contracting:**

- Private contract: the service is bought to a private firm and paid by the municipality.
- PPP: the municipality and a private firm jointly develop, finance and operate the provision of the service. The private actor receives payment from the municipality.
- Concession: same as PPP except that the private operator is paid directly by the consumers.
The cases where the service was provided by a non-for-profit organization, an upper level of government without the involvement of the municipality, or not provided by the city, were not included in the survey.

The results of the survey show that private provision is only 23.5%, compared to 76.5% of public provision (53.6% in-house and 22.9% through public contract). Still, some services have a share of private contracting over 40%. It is the case of refuse collection, maintenance of water facilities, street lights and road maintenance.

Six factors are identified as significant in the make-or-buy decision. On one hand, the author finds that contracting difficulty of a service leads more often to public provision. On the other hand, three aspects influence positively private contracting: the presence of a competitive private sector environment, uncertainty in the future demands and characteristics of the service, and a high sensitivity of the residents (meaning that the quality of the service is important). However, the effect of the latter two decreases as the size of the municipality increases. Size proved to be also relevant: bigger municipalities do produce services in-house more often, and smaller municipalities are more prone to contract with other public entities than with the private sector. Finally, culture showed that has also an influence and that private contracting happens more often in German-speaking municipalities (Wicht, 2016).

### 3.3.3 Big Swiss utilities

In the energy companies’ scenario in Switzerland, there are several big players but not all of them are utilities companies. For instance, BKW AG, Romande Energie and EWZ are big energy companies but are not UUC in the traditional sense. BKW AG is a Bern-based company and its activity covers about 400 communes in Switzerland and over 1 million customers. It is an international company that offers solutions for produce and supply of energy, but the BKW Group offers also additional services as consulting, water, transport and telecommunications. Romande Energie is the leading supplier of electricity in French-speaking Switzerland: it provides electricity to over 300,000 customers in close to 300 municipalities of the cantons of Vaud, Valais, Fribourg and Geneva mainly (Groupe Romande Energie, 2018). EWZ is an energy company active in Zürich and some areas of the canton of Graubünden, with about 223,000 customers (EWZ, n.d.).

The two biggest utilities companies of Switzerland are Services Industriels de Genève (SIG) and Industrielle Werke Basel (IWB).
Services Industriels de Genève (SIG) is an autonomous public law institution to which the Canton of Geneva granted concession rights to provide water, gas, electricity and thermal energy in its territory, as well as to carry out the activities of waste recovery and wastewater evacuation and treatment. It is fully owned by public institutions: the Canton of Geneva is the main shareholder, followed by the City of Geneva and other the other municipalities of Geneva (“SIG,” n.d.). It is governed by the Geneva Constitution, the Act on the Organization of Public Law Institutions (LOIDP) and the Act on the Organization of the Industrial Services of Geneva (LSIG). According to the latter, SIG can also provide telecommunications services and related infrastructure (it exploits an optic fiber network that serves 80% of the residents in the canton), and it is entitled to develop activities linked to its areas of responsibility in accordance with the constitutional principles of energy conservation, environment protection and priority development of renewable energies (Grand Conseil de la République et Canton de Genève, 1974).

Therefore, SIG activities go beyond the provision of water and energy services; it also develops infrastructure projects, invests in solutions related to renewable energies and smart cities, and participates in other enterprises that work in those sectors at local and federal levels. It also partners with institutions, businesses platforms and companies for the development of innovative projects. For instance, the TOSA bus, the first high-capacity electric wide-range vehicle with quick recharging at stops, is the result of a public-private partnership between the Canton of Geneva, Transports Publics Genevois, OPi, SIG and ABB Séccheron. With regard to the optic-fiber network, the SIG and Swisscom work together for the network to be dual so that it will have the required capacity in the future (SIG, 2018).

Moreover, SIG services are aimed not only to households but also businesses. It offers energy audits and tailored solutions for energy efficiency and offers to participate in renewable energy projects; as a means to involve private actors in the energy transition.

In 2017, SIG served over 228,000 customers in 46 different communes. The optic-fiber network reaches 80% of the population in Geneva and 100% of the electricity produced came from renewable sources. Additionally, it has participations in 17 Swiss companies and 16 projects for the development of wind farms (SIG, 2018).

Industrielle Werke Basel (IWB) is a public company owned by the canton of Basel-Stadt. It is an infrastructure company and supplier of energy (electricity and heat) and water in the canton. It builds and operates optic fiber network in the city, and it also supplies natural gas and biogas in 29 communes in the area around Basel in the northwestern part of Switzerland (IWB, 2018). It does as well, provide services to households and companies. The company strategy “Smart IWB 2020” is to increase the number of innovative services
alternative to traditional energy services, in order to grow their sales of electricity and provide integrated energy services to a wider public (IWB, n.d.).

3.4 Conclusion

This contextualization has introduced how the Swiss federalist structure is determinant in the current settings of utilities in the country. The country administrative and governance multi-level structure, provides municipalities with considerable autonomy when it comes to carrying out their tasks. Yet, the administrative scenario is fragmented in numerous municipalities, which have a very small size in their majority. Only six cities have a population of over one hundred thousand, and more than half of the population lives in towns of less than ten thousand inhabitants. This creates a situation where not all municipalities have the capacity and resources for delivering all local public services they are responsible for, and formulas like mergers and local government associations have gained importance in the last decades.

Utilities in Switzerland are dominated by the public sector. Energy and water related services were traditionally produced in-house and delivered directly by the municipality or a department of the city. However, with the new public management trends, opening of markets and influence of private-sector managerial features, many of these utilities have been corporatized and other forms of public provision have gained presence during the last decades: MOEs, public contracting, and local government associations. The strong sensitivity of residents to the quality of the services, especially in medium to small cities, where the control and influence over policies and administration is significantly high; added to a strong demand for responsiveness and accountability at the local government level, has preserved the dominance of the public sector. Still, private contracting is also present for the provision of local services. Influential factors on the decision to contract-out are the contracting difficulty and uncertainty of the service, and characteristics of the municipality such as: the size, financial situation, and cultural environment. The existence of a competitive private market is also relevant.

Hence, several factors are drawn from this context as influential in the opportunities for the private sector in the provision of services associated with energy in Switzerland. On one hand, information related to the city subject of study will be analyzed. Location and language of the city are considered as cultural factors. The size of the city and the population evolution from the 1990’s will help understand how the city has grown over the years and see if any mergers have taken place. Additionally, the literature shows that financial flows between the municipalities and the urban utilities can be quite interlinked,
therefore, the financial situation of the city will be assessed as it could be related to the financial situation of the utility itself.

On the other hand, the study will take a look at several features of the utilities operating in the case-cities. First, the institutional model under which the utilities services are provided, plus the ownership structure of the utility. These are considered relevant to understand the relation between the local government and the utility, as well as the presence of the private sector. Second, the territorial coverage and the services provided by the utility are essential to understand the extent of its operations. All these elements, summarized in Table 4, will be analyzed for each selected city, and then put into perspective together.

Table 4: Elements of the empirical study

<table>
<thead>
<tr>
<th>Associated to the city</th>
<th>Associated to the utility</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Location and language</td>
<td>• Model and ownership structure</td>
</tr>
<tr>
<td>• Population growth</td>
<td>• Territorial coverage</td>
</tr>
<tr>
<td>• Financial situation</td>
<td>• Services provided</td>
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</table>
4 Empirical study

4.1 Selection of cases and data

Evidence from Swiss utilities research shows that big cities are more likely to produce local services in-house or through publicly owned companies; as they can benefit directly from economies of scale and they have enough resources to take full responsibility and ownership in the processes related to production and provision of the services. Moreover, some of the biggest cities count with big enterprises as local utilities that cover a very wide range of services and are significantly self-sufficient, technically and financially. Besides, public contracting is more frequent than private contracting in small cities and towns; and private business might be limited in small municipalities due to their scarce population. All this considered, the private sector might have more opportunities to provide services or collaborate with the local utilities in medium-size cities where population is enough to have a relevant target market, and which also might have a greater area of influence over smaller municipalities that might rely on them for the delivery of energy-related services.

Considering that the bigger cities are the six that have a population of over 100,000, this study will focus on medium-size cities with a population between 20,000 and 100,000 inhabitants. All the references to current population are as of 31st of December 2017 from the Federal Statistical Office official statistics (Federal Statistical Office, 2018a) and the historical data about population in the period 1991-2017 is sourced from the Permanent Resident Population Balance 1991-2017 of the Federal Statistical Office (Federal Statistical Office, 2018a).

Cities located in the cantons of Geneva, Basel-Stadt, Basel-Landschaft, Ticino and Graubünden will be excluded from the study. These are Vernier, Lancy, Meyrin, Carouge, Riehen, Allschwil, Lugano, Bellinzona and Chur.

Hence, thirty-one cities will be subject to study and analysis in this thesis (by canton in alphabetical order): Aarau, Wettingen, Biel/Bienne, Köniz, Thun, Bulle, Fribourg, Emmen, Kriens, Luzern, La Chaux-de-Fonds, Neuchâtel, Schaffhausen, Rapperswil-Jona, St. Gallen, Wil, Frauenfeld, Kreuzlingen, Sion, Montreux, Nyon, Renens, Yverdon-les-Bains, Baar, Zug, Dietikon, Dübendorf, Horgen, Uster, Wädenswil and Wetzikon.

The financial situation of the municipality will be also part of the study, however, there is not a single source of information about the financial situation of the cities for all the cases. For the cities included in the public finances report published by the IDHEAP (N. C. Soguel & Munier, 2018), a graph summarizing the financial situation of each city between the years
2001 and 2017 is produced from the data available in the report. The report contains for each city, ten indicators that can be grouped in three categories: financial health, quality of management of public finances and the extent of indebtedness. The value for each indicator can be translated into a score of maximum 6 points, so that all indicators are comparable. The higher the score, the better. When grouped to create a score for each of the three categories, each indicator is weighed differently depending on its importance. The graph presented in this study, uses the report’s data and scoring guidelines to create a synthetic overview of the financial situation of each municipality between 2001 and 2017. It shows for each year, the score for financial health (maximum score 42), quality of management of public finances (maximum score 36) and indebtedness (maximum score 18). The highest the score, the better financial situation of the municipality. The average score for the period 2001-2017 is the score of the average yearly value for each indicator, not the average of the yearly scores.

For the rest of the cities not included in IDHEAP’s cantonal and municipal finances report, the financial assessment will be based on individual annual financial reports and only for the year 2017 (or other year if 2017, and therefore pointed out accordingly in the study). Three relevant indicators, out of the ten considered by IDHEAP, are picked or estimated from the municipal annual financial reports for the year 2017. Soguel and Munier, indicate the coverage of expenses, current expenditure per inhabitant and net debt ratio as synthetic indicators for each of the three categories of financial health, quality of management of public finances and indebtedness. Instead, self-financing of net investments and investment effort are looked at in this study for the first and second categories, as they are considered to be more related to the expenses on infrastructure and public works. First, the self-financing of net investment (SF): this indicator, part of the financial health category, gives information on the share of net investments that the city can finance on its own, without the support of loans. A value below 100% shows that the municipality needs borrowing for the investments. A result over 100% shows that the commune can fund more than its investments with its own resources, and thus, reduce its debt. Values of 70-80% are generally considered as acceptable. Second, the investment effort (IE): the investment effort of the municipality is measured in relation to the current expenditures, and is part of the quality of management of public finances category. It is considered that the ideal effort of investment is 7-10% of the expenses. Below that, the city risks outdated infrastructure while beyond that, it risks to have too much infrastructure with its associated costs. Limits for reasonable values are 3% and 14%. For some cities, instead of the investment effort, the investment rate (IR) is indicated: it shows the gross investments in relation to the consolidated expenditure. A value of 20%, indicates a good
investment activity in the commune, below 10% it is considered poor and above 30% it is considered excessive. Third, the net debt ratio (ND), representing the indebtedness of the municipality: this indicator provides information on the liabilities of the commune, not just its debt. It relates the volume of net liabilities of financial assets to the fiscal revenues of the municipality. A result of 100% shows that a full year of tax revenues should be committed to payment of liabilities. A negative result shows that the city has active net assets. An optimal value is under 50%, while over 125% is considered excessive.

The ideal, acceptable and critical values for each indicators above presented are according to IDHEAP’s report (N. C. Soguel & Munier, 2018). Each indicator’s value or estimation, will be given a score following also the report’s guidelines. For the score, maximum value is 6, limit value is 4, and under 4 the indicator is bad or critical.

After each city’s information, an overview of the utility operating in the city will be presented: the model of service delivery, ownership structure, territorial coverage, and main services provided. The focus will be in the local utilities belonging to the case cities.

All the data gathered in this empirical study, will be analyzed and compared in the next section in order to be able to draw conclusions about the relevance of each factor in the current utilities scenario in mid-size cities in Switzerland and analyze the opportunities that private actors might have in the provision of energy-related services.

4.2 Aarau (Aargau)

4.2.1 The city: location, language, population growth and financial situation

Aarau is the capital of the Canton of Aargau, in the north of the country. It is located in the German-speaking part of Switzerland. With a population of 21,268, it is the biggest city of the canton (just slightly bigger than Wettingen), and it is the core of a medium-size urban agglomeration formed by 12 neighboring communes with a total of 78,800 inhabitants.

The city had a continuous loss of population in the 1990’s. In 2010, the municipality of Rohr, with 3249 inhabitants, was merged with Aarau, which explains the jump of population between 2009 and 2010 and the year-over-year average growth of 1.18% between 1991 and 2018, which is above average (1.02% for the selected cities). From 2010, the city of Aarau has been growing at a steady rate of 1.3% in average. In 2017, the city appears to be in a good financial situation: self-financing of net investments and net debt indicators are
within ideal limits and the investment effort was good (Stadt Aarau, 2018). After Luzern, it has the best synthetic score for the three indicators together with Wädenswil.

4.2.2 Utility: model, ownership structure and coverage

Eniwa AG is the utility company of the City of Aarau. It was formerly called IBAarau. The City of Aarau is the major shareholder, it used to own over 95% but since 2018 it retains 80% of the shares. The multi-utility core activities are energy production, electricity supply and water supply. It also distributes natural gas and biogas, is developing a district heating network, and offers mobility and telecom services. Its territorial coverage varies depending on the services, from 1 to a maximum of 30 municipalities (Eniwa, n.d.).

In relation to smart city initiatives, Eniwa is in charge of the implementation of smart city measures in cooperation with Novatlantis, which is the project manager and leads other activities of the project like workshops. The project first stage was planned to last until the end of 2018, and is funded by the federal program for smart cities (“Smart City Aarau,” n.d.).

<table>
<thead>
<tr>
<th>Table 5: Main features of Eniwa AG</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Eniwa AG</strong></td>
</tr>
<tr>
<td><strong>Type/Owner</strong></td>
</tr>
<tr>
<td>Company</td>
</tr>
<tr>
<td>City of Aarau major shareholder (80%)</td>
</tr>
<tr>
<td><strong>Territorial coverage</strong></td>
</tr>
<tr>
<td>Electricity: Aarau, plus other 21 municipalities</td>
</tr>
<tr>
<td>Water: Aarau plus other four communes</td>
</tr>
<tr>
<td>Natural gas/biogas: 25 communes</td>
</tr>
<tr>
<td>District heating: Aarau</td>
</tr>
<tr>
<td>Fiber: 29 communes</td>
</tr>
</tbody>
</table>
4.3 Wettingen (Aargau)

4.3.1 The city: location, language, population growth and financial situation

Wettingen is the second largest city of the canton of Aargau. It is located east of Aargau, less than 30km away from the capital city. German is the official language as well. It is part of the Baden-Brugg urban agglomeration, similar in population to that of Fribourg and Biel/Bienne: it is formed by 15 municipalities with a population of over 110,700. Until 2010, when Rohr and Aarau merged, Wettingen was the biggest city of the canton. In 2017, it had a population of 20,721. It has grown moderately since 1991, with an increase of the population of 17.6% and a year-over-year average growth of 0.63%.

The financial situation of the city in 2017 with respect to the three selected indicators is bad, the worst of all the selected cities. Investments in that year have been very strong, with an investment effort of approximately twice as much as what is considered ideal and self-financing of such strong investments has been low, contributing to an overall low score. Net-debt ratio is slightly above acceptable limits (Wettingen Stadt, 2018).

![Population growth in Wettingen in the period 1991-2017](image)

4.3.2 Utility: model, ownership structure and coverage

Wettingen’s utility is Elektrizitäts- und Wasserwerk Wettingen AG (ewwag). Since 2017, it is a limited public company fully owned by the City of Wettingen. It supplies water and electricity to over 20,000 customers in the city (ewwag, n.d.).
Table 6: Main features of Elektrizitäts- und Wasserwerk Wettingen AG (ewwag)

<table>
<thead>
<tr>
<th>Type/Owner</th>
<th>Territorial coverage</th>
<th>Power</th>
<th>Water</th>
<th>Natural Gas</th>
<th>Heating</th>
<th>Mobility</th>
<th>Tourism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public company</td>
<td>Wettingen (and other communes, not specified)</td>
<td>☑</td>
<td>☑</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Owned by City of Wettingen</td>
<td></td>
<td></td>
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</tbody>
</table>

4.4 Biel/Bienne (Bern)

4.4.1 The city: location, language, population growth and financial situation

Biel/Bienne is a bilingual city located in the border between the French- and German-speaking parts of Switzerland, in the canton of Bern. Biel is the German name of the city, and Biel the French one. In 2005 the official name of the city was changed from Biel to Biel/Bienne.

With a population of 56,640, Biel/Bienne is the 10th biggest city of Switzerland, and it is also the core of an urban agglomeration of 26 communes and over 105,700 inhabitants.

After a period of negative growth between 1993 and 2001, the city started to gain population again, with an annual average growth rate of 1.0% since 2011. Overall, the growth balance between 1991 and 2017 (7.16%) is among the lowest of the sample.

The yearly score of the financial situation of Biel shows a lot of variability in the period 2001-2017. Overall, the average for the period shows an acceptable financial situation, however...
for about half of the years of the sample the situation was bad or very bad. In contrast, 2017 has a good score (86.2 out of 96). In that year, self-financing of net investments and the investment effort have been acceptable and the net debt ratio very good (N. C. Soguel & Munier, 2018).

Figure 4: Financial situation scores for the City of Biel/Bienne in the period 2001-2017

4.4.2 Utility: model, ownership structure and coverage

Energie Service Biel/Bienne (ESB) is Biel’s local utility, it is a public company owned by the City of Biel/Bienne. It provides a wide range of services in Biel and its surrounding area: produces and distributes electricity, as well as water, natural gas, heating, electric vehicle charging points and an optic fiber network (Energie Service Biel/Bienne, n.d.).

Table 7: Main features of Energie Service Biel/Bienne (ESB)

<table>
<thead>
<tr>
<th>Energie Service Biel/Bienne (ESB)</th>
<th>Type/Owner</th>
<th>Territorial coverage</th>
<th>Electricity</th>
<th>Water</th>
<th>Natural gas</th>
<th>Heating</th>
<th>Mobility</th>
<th>Telecom</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Public company</td>
<td>Biel, Evilar/Macolin, Brügg, Ipsach, Nidau, Port, Orpond, Safnern</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>
4.5 Köniz (Bern)

4.5.1 The city: location, language, population growth and financial situation

Köniz is located in the canton of Bern, and it is part of Bern agglomeration, which gathers 73 communes and 418,200 inhabitants. It is the fourth biggest agglomeration of the country in terms of population. German is the official language.

The city of Köniz has a population of 41,507. In the year 1999 there was a strong growth of 3.0%, followed by a period of alternating gains and losses of population. From 2006, the population of the city has been growing steadily, and especially steeply in 2016 and 2017 (1.8% and 1.4% respectively).

![Population growth in Köniz in the period 1991-2017](image)

The financial situation of the city of Köniz has been variable throughout the years, but the average of the indicators between 2001 and 2017 is good. The financial health is the item that shows the most variability, with very good values in 2006-2008 and 2011-2013 but especially low in 2001 and 2002, as well as in the last years four years. Debt of the city has been increasing since 2013, as net investments were also doing so. However, net debt ratio is still good and self-financing has been good in general despite the low value in 2017. The year 2017 shows one of the worst results of the period, especially for the financial health indicators: self-financing of net investments is below acceptable limits with a value of 31.5% only, which translates into a score of only 1.4 points. Investment effort is low, but acceptable and net debt ratio is acceptable, not far from ideal limits, with a score of 5.4. In conclusion, despite of the low score for 2017, the city of Köniz is not under financial difficulties even if two of these three financial indicators have gotten worse in the last years (N. C. Soguel & Munier, 2018).
4.5.2 Utility: model, ownership structure and coverage

Köniz does not have its own local utility. Being in the metropolitan area of Bern, it is one of the about 30 municipalities where Energie Wasser Bern is the main provider of local utilities. Energie Wasser Bern is a public-law independent company owned by the City of Bern (Energie Wasser Bern, n.d.).

Energie Wasser Bern supplies water and electricity, natural gas and biogas, district heating and provides consultancy and installation services related to energy. It is building the optic fiber network in cooperation with Swisscom and operates several charging stations for vehicles, both electric and with natural gas. Energie Wasser Bern is active in approximately 30 municipalities around the city of Bern.

<table>
<thead>
<tr>
<th>Table 8: Main features of Energie Wasser Bern (EWB)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Energie Wasser Bern (EWB)</strong></td>
</tr>
<tr>
<td><strong>Type/Owner</strong></td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Public company Owned by the City of Bern</td>
</tr>
</tbody>
</table>
4.6 Thun (Bern)

4.6.1 The city: location, language, population growth and financial situation

Thun is located in the canton of Bern. German is the official language of the city. It is the core of an agglomeration area of 15 communes with a total population of 80,800. The city has a population of 43,743 as of December 2017, it is the 11th biggest municipality in the country. The population growth between 1991 and 2017 was of 13.5%, so less than half of the average of the selected cities, 31.2%. The period between 2006 and 2010 represents the one with the steepest growth, with an average annual rate of 0.9%.

![Figure 7: Population growth in Thun in the period 1991-2017](image)

![Figure 8: Financial situation scores for the City of Thun in the period 2001-2017](image)
In average, the financial situation of the city of Thun has been very good in the period 2001-2017, the indebtedness status shows especially good scores. The financial health shows very good values in general and the quality of management public finances too, but in 2016 both categories worsened and the trend followed in 2017, lowering the overall score to 57.7 out of 96. So, despite of the good historical trend, the city of Thun shows a present bad financial situation in 2017. Regarding the three selected indicators: investment effort has been moderate in general, but always above the limit value of 3% in the last decade, and self-financing average value of 88.9% in the last decade is good. Net debt ratio has been negative since 2001. For 2017, is the SF indicator that is critical, with a score of 0.5, but investment effort and net debt ratio remain acceptable and excellent respectively (N. C. Soguel & Munier, 2018).

4.6.2 Utility: model, ownership structure and coverage

In 2001, the former utility of the city of Thun, EWB, was transformed into the stock company Energie Thun AG. This is a stock company of which the City of Thun holds the majority of the shares (at least 51%) (“Company profile - History [Unternehmensporträt - Geschichte],” n.d.).

Energie Thun AG is involved in the production and distribution of electricity and biogas. It also delivers district heating and water. Additionally, it offers energy-related services such as energy labelling and certification, consulting for commercial and industrial customers, power connections, safety checks, two natural gas charging stations for vehicles and eight electric charging stations. It is in charge of the local streetlights and it operates optic fiber connections for businesses.

Energie Thun provides electricity to the city of Thun, and natural gas and biogas to Thun and other seven municipalities: Steffisburg, Heimberg, Hilterfingen, Oberhofen, Rubigen, Münsingen and Konolfingen. Water services cover Thun and other two municipalities of the same district: Schwendibach and Homberg.

Table 9: Main features of Energie Thun AG

<table>
<thead>
<tr>
<th>Energie Thun AG</th>
<th>Type/Owner</th>
<th>Territorial coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public company</td>
<td>City of Thun major shareholder (at least 51%)</td>
<td>Electricity: Thun (without Bundesareal and Goldwil) Water: Thun, Schwendibach, Homberg Natural gas / biogas: Thun, Steffisburg, Heimberg, Hilterfingen, Oberhofen, Rubigen, Münsingen, Konolfingen</td>
</tr>
</tbody>
</table>
4.7 Bulle (Fribourg)

4.7.1 The city: location, language, population growth and financial situation

Bulle is the second largest city of the canton of Fribourg. It is a French-speaking city. It is well known for its quality of life and its location is close to other important cities: about 30km and 60km to Fribourg and Bern to the north, and 50km to Lausanne to the south. It is the core of a small agglomeration of 7 municipalities and 33,000 inhabitants.

The current population of Bulle is 22,709. The increase of population in the year 2000 is due to the incorporation of the town La Tour-de-Treme, of 3309 inhabitants. Bulle presents the greatest growth of all the cities in this study: the city increased by 148% its population between 1991 and 2017, and leaving out the increase due to La Tour-de-Treme, the average yearly growth rate is of 2.6%. The agglomeration of Bulle also has the greatest average of the year-over-year growth rate among the Swiss agglomerations defined by the Federal Statistical Office, with a value of 2.3%.

![Population growth in Bulle](image)

Figure 9: Population growth in Bulle in the period 1991-2017

In the year 2017, investment rate and self-financing of investments has been low but acceptable and net debt ratio shows a very good indebtedness situation (Ville de Bulle, 2018).

4.7.2 Utility: model, ownership structure and coverage

Gruyère Énergie SA (GESA) is a utilities company in public hands: it is owned in its majority (85.7%) by the City of Bulle, and the rest of the shareholders are other cities of the area that are also served by the company. GESA produces and distributes electricity and heating,
supplies thirty-one municipalities with water and offers also some telecommunication services (GESA, 2018, n.d.).

Table 10: Main features of Guryère Énergie SA (GESA)

<table>
<thead>
<tr>
<th>Type/Owner</th>
<th>Territorial coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public company</td>
<td>Electricity: Botterens, Bulle, Val-de-Charmey, Châtel-sur-Montsalvens, Corbières, Crèzou, Echerens, Morlon, Flaz</td>
</tr>
<tr>
<td>Public ownership: the City of Bulle is the main shareholder (85,7%) and the rest are all cities of the area</td>
<td>Heating: Bulle, Ritz</td>
</tr>
<tr>
<td>Water: same as electricity plus other 22 communes</td>
<td></td>
</tr>
</tbody>
</table>

4.8 Fribourg (Fribourg)

4.8.1 The city: location, language, population growth and financial situation

The city of Fribourg is the capital and also biggest city of the canton of Fribourg. Located in the Swiss language border, French is the main language of the city even if German is spoken by part of the population.

Fribourg is the core of an urban agglomeration that gathers 31 communes with a population of about 108,800. The agglomeration has been growing at an average yearly rate of 1.4% since 1991. Currently, the city has 38,521 inhabitants. After a period of negative population growth between 1992 and 2000, the city started gaining population again with an average yearly rate of 1.3% until 2016. With a very steep growth between 2010 and 2014, Fribourg lost population in 2017 for the first time since the year 2000. There are plans to merge the
city with other eight neighboring communes. If the project is approved, the new *Greater Fribourg* would have a population of just over 75,000 inhabitants (Ville de Fribourg, n.d.).

The city of Fribourg has been in a good financial situation in the period 2001-2017 in average, however, since 2012 all the three categories of indicators have been falling, especially the financial health. However, the year 2017 shows an improvement. SF, IE and ND are acceptable for the year 2017 (N. C. Soguel & Munier, 2018).

![Financial situation scores for the City of Fribourg in the period 2001-2017](image)

**Figure 11: Financial situation scores for the City of Fribourg in the period 2001-2017**

### 4.8.2 Utility: model, ownership structure and coverage

Sinef SA is a public limited company fully owned by the City of Fribourg (SINEF SA, n.d.). It was created in 2016, together with Freiburg Water - Freiburger Wasser SA, which is in charge of the infrastructure for drinking water in the city. Groupe E SA is a stock company, of which the Canton of Fribourg holds 80% of the shares (Groupe E, n.d.). Sinef SA operates and supplies mainly water and natural gas, while Groupe E provides mainly electricity and energy related services.

Sinef SA activity focuses mainly on drinking water in the city of Fribourg. In the area of energy, it offers services related to natural gas, district heating and solar thermal energy, with a strong focus on construction services. Groupe E SA is an energy provider present in several municipalities of the cantons of Fribourg, Neuchâtel, Vaud and Bern. It provides electricity and biogas, energy-related consultancy services, electric installations, heating...
and maintenance services, compressed natural gas refueling stations and charging stations for electric vehicles.

Table 11: Main features of SINEF SA

<table>
<thead>
<tr>
<th>SINEF SA</th>
<th>Type/Owner</th>
<th>Territorial coverage</th>
<th>ELECTRICITY</th>
<th>WATER</th>
<th>NATURAL GAS/D仇NG</th>
<th>RESE流/UE</th>
<th>FIBRE</th>
<th>HIGHWAY</th>
<th>TRAFFIC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Public company</td>
<td>Fribourg – not clear if more communes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.9 Emmen (Luzern)

4.9.1 The city: location, language, population growth and financial situation

Emmen is a municipality located in the metropolitan area of Lucerne, only 5km from the main city, in the canton of Luzern. German is the official language. Emmen has a population of 30,682, and has significantly grown since 1991. Except for a negative period in the 1995-1998, the city has been constantly growing, especially since 2010. The average yearly growth rate between 2010 and 2017 is of 1.3%.

![Population growth in Emmen in the period 1991-2017](image)

The financial situation of the city of Emmen has been acceptable in average in the period between 2001 and 2017. However, the indebtedness situation has been mostly critical except for the period 2007-2010 and the financial health shows very low scores for several years. The overall financial situation in 2016 and 2017 is very bad. With respect to self-
financing of net investments and net debt ratio, it is the worst case of the study. Investment effort in the year 2017 was within ideal limits though (N. C. Soguel & Munier, 2018).

![Financial situation scores for the City of Emmen in the period 2001-2017](image)

**Figure 13:** Financial situation scores for the City of Emmen in the period 2001-2017

4.9.2 **Utility: model, ownership structure and coverage**

Emmen does not have its own local utility company. Energy and water services are provided in Emmen by the utility of the main city of the metropolitan area: Energie Wasser Luzern AG.

4.10 **Kriens (Luzern)**

4.10.1 **The city: location, language, population growth and financial situation**

Kriens, as Emmen, is a city part of Luzern’s agglomeration, less than 4km away from Luzern.

The city currently has a population of just under 27,000. It experienced periods of growth 1991-1996, 1998-2002, 2006-2009 and 2010-2014, followed by years with slight loss of population. Since 2014, the city has lost almost 1% of its inhabitants.
The financial situation of Kriens with respect to the year 2017 and the three selected indicators is bad: investment effort is high, but within acceptable limits; however, the self-financing of net investments and the net debt ratio are too low and too high respectively, and therefore have very low scores: 1.4 and 2.5 (Gemeinde Kriens, 2018).

4.10.2 Utility: model, ownership structure and coverage

As in Emmen, Energie Wasser Luzern AG is the main energy and water services provider in Kriens.

4.11 Luzern (Luzern)

4.11.1 The city: location, language, population growth and financial situation

Luzern is the most populous city among the ones in these study. It is located in Central Switzerland region, it is the capital of the canton of the same name, and it is German-speaking. The population of the city as of December 2017 is 81,401, and its urban agglomeration counts with 229,400 residents and 19 communes. The yearly growth of the agglomeration between 1991 and 2017 was of 0.7%, slightly below average.

In 2010, the merger of Littau and Luzern was effective, which explains the strong increase of population in that year. If both municipalities are considered together, the increase of population between 2009 and 2010 was of 1%. If 2010 is not taken into account, the average
The year-over-year growth of Luzern since 1991 is only 0.3%; the city growth has been moderate and it is stagnant since 2014.

The financial situation of Luzern in the period 2001-2017 has been excellent in average. The indebtedness situation of the city was always good. Between 2008 and 2012 there was a period of weak financial situation, due to the bad performance of some indicators related to the financial health and the quality of management of the public finances. However, since 2013, the score is again reaching very high values. For the three selected indicators, Luzern is the best performing city with 6 points for SF and ND, and 5.9 in IE (N. C. Soguel & Munier, 2018).

Figure 15: Population growth in Luzern in the period 1991-2017

Figure 16: Financial situation scores for the City of Luzern in the period 2001-2017
4.11.2 Utility: model, ownership structure and coverage

Energie Wasser Luzern AG is a private limited company, fully owned by the City of Luzern (Energie Wasser Luzern, n.d.).

Energie Wasser Luzern AG provides electricity in Luzern, Kriens and Schwarzenberg, and natural gas in Luzern, Kriens, Emmen and other 21 municipalities. It is building and operates three district heating networks in Emmen, Luzern and the Rontal valley. It supplies water and optic fiber services in the municipality of Luzern only. In the area of mobility, it operates charging and refueling stations for electric and natural gas fueled vehicles. Additionally, it offers several energy consulting services both for individual and business customers.

Table 12: Main features of Energie Wasser Luzern AG (ewl)

<table>
<thead>
<tr>
<th>Type/Owner</th>
<th>Territorial coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owned by the City of Luzern</td>
<td></td>
</tr>
</tbody>
</table>

4.12 La Chaux-de-Fonds (Neuchâtel)

4.12.1 The city: location, language, population growth and financial situation

La Chaux-de-Fonds is the fourth largest city in the French speaking part of Switzerland (Romandie). It is located in the canton of Neuchâtel, close to the French border, in a

Figure 17: Population growth in La Chaux-de-Fonds in the period 1991-2017
mountainous area with low population density. The districts of La Chaux-de-Fonds and Le Locle conform the small agglomeration La Chaux-de-Fonds – Le Locle, with 8 communes of those two districts and 52,600 inhabitants.

La Chaux-de-Fonds has a population of 38,625 (December 2017). If compared to the other cities of the sample, it presents together with St. Gallen the lowest year-over-year growth rates (0.2%), an also the minimum increase in population of only 5.2% between 1991 and 2017. The population in the city is decreasing or remaining constant since 2014 after a period of relatively strong growth between 2010 and 2014.

In average, the financial situation of La Chaux-de-Fonds has been good in terms of financial health and quality of the management, but bad indebtedness situation. The debt indicators show critical values for the whole period, and financial health has been critical in the city in half of the years of the sample. Self-financing of net investments and investment effort in the year 2017 are excellent, however, the net debt ratio is excessive and scores only 0.8 (N. C. Soguel & Munier, 2018).

4.12.2 Utility: model, ownership structure and coverage

As in Neuchâtel, Viteos SA is the main utility company in La Chaux-de-Fonds. It is publicly owned, the City of Neuchâtel is the biggest shareholder and the City of La Chaux-de-Fonds the second, as it holds 36.5% of the shares.
4.13 Neuchâtel (Neuchâtel)

4.13.1 The city: location, language, population growth and financial situation

Neuchâtel is the capital city of the canton of the same name, and core of the 15th biggest agglomeration area of Switzerland, and the biggest one of the agglomerations with less than 100,000 inhabitants. It is the functional core of the area comprising 17 communes and 89,800 residents. It is a French-speaking city.

As of December 2017, Neuchâtel has a population of 33,578. Its population increased only by 5.6% since 1991, and it presents several years in that period with loss of population. It shows very moderate growth, and even loss of population since the year 2013.

![Figure 19: Population growth in Neuchâtel in the period 1991-2017](image-url)
The average between 2001 and 2017 of all indicators for financial health and quality of management of public finances is very good, and the overall score for the average shows a good financial situation of the city of Neuchâtel. However, the data shows that city has been through financial difficulties between 2001 and 2006, due mainly to very bad scores for the financial health and the indebtedness of the city. From 2007 onwards, both categories of indicators have started to ramp-up. The debt indicators are now stable and good, but the financial health shows unsteady scores. The three selected indicators for the year 2017 are excellent or very good: self-financing of net investments has been of 121.4% and therefore scores 6 points. The investment effort has been good, with a score of 5.5 and also the net debt ratio, with 5.4 (N. C. Soguel & Munier, 2018).

![Financial situation scores for the City of Neuchâtel in the period 2001-2017](image)

**Figure 20:** Financial situation scores for the City of Neuchâtel in the period 2001-2017

### 4.13.2 Utility: model, ownership structure and coverage

La Chaux-de-Fonds and Neuchâtel are both served by the same utility company, Viteos SA. Viteos SA is a public limited company fully publicly owned. Its main shareholders are the City of Neuchâtel and the City of La Chaux-de-Fonds with 47.3% and 36.5% of the shares respectively, together with other 25 municipalities of the canton of Neuchâtel (Viteos SA, 2018).

Viteos SA supplies electricity in five cities: Hauterive, La Chaux-de-Fonds, Le Locle, Les Planchettes and Neuchâtel. It also manages public lighting in the cities of Le Locle, La Chaux-de-Fonds and Neuchâtel and offers energy-related services such as: design, maintenance and installation of electric installations, energy consultancy and energetic certifications.
Moreover, it distributes natural gas in numerous municipalities of the canton of Neuchâtel: Bevaix, Boudry, Corcelles-Cormondrèche, Cornaux, Cortaillod, Cressier, La Chaux-de-Fonds, Haurteuve, La Tène, Le Locle, Les Brenets, Milvignes, Neuchâtel, Peseux, Saint-Blaise, Val-de-Ruz, and Val-de-Travers. It operates remote cooling and heating networks in Cernier Fontainemelon, La Chaux-de-Fonds, Le Locle, Neuchâtel, and Saint-Aubin. And finally, it also supplies and operates water related services in La Chaux-de-Fonds, Le Locle, Les Planchettes, Neuchâtel, Val-de-Ruz, and Vallée de La Brévine.

Table 14: Main features of Viteos SA

<table>
<thead>
<tr>
<th>Type/Owner</th>
<th>Territorial coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shareholders: City of Neuchâtel (47%), City of La Chaux-de-Fonds (36%) and City of Le Locle (15%) plus other 23 municipalities of the area</td>
<td></td>
</tr>
</tbody>
</table>

4.14 Schaffhausen (Schaffhausen)

4.14.1 The city: location, language, population growth and financial situation

Schaffhausen is the capital city of the canton of Schaffhausen, and it is located in the north of the country bordering with Germany. The official language is German.

Figure 21: Population growth in Schaffhausen in the period 1991-2017
Schaffhausen has a population of 3633, but it is the core of an agglomeration of 15 communes and 70,700 inhabitants. Its growth since 1991 is relatively low (7.4%), but consistent since 2006 with an average annual growth rate of 0.8%.

Except for few particular years, the financial health of Schaffhausen between 2001 and 2017 is very good, as well as its indebtedness situation. The quality of management of public finances shows certain variability. Overall, the financial situation of the city can be considered as very good. The self-financing of net investments and the net debt ratio for 2017 have been excellent, and the investment effort good, with a score of 4.8 (N. C. Soguel & Munier, 2018).

![Financial situation scores for the City of Schaffhausen in the period 2001-2017](image)

**Figure 22: Financial situation scores for the City of Schaffhausen in the period 2001-2017**

### 4.14.2 Utility: model, ownership structure and coverage

SH Power is a utility company owned by the City of Schaffhausen and the City of Neuhasen am Rheinfall (SH Power, 2019a). It provides the area of Schaffhausen with electricity, natural gas and biogas, and drinking water, plus energy efficiency consultancy services and internet services in collaboration with Sasag Kabelkommunikation SA.

**Table 15: Main features of SH Power**

<table>
<thead>
<tr>
<th>SH Power</th>
<th>Type/Owner</th>
<th>Territorial coverage</th>
<th>ELECTRICITY</th>
<th>WATER</th>
<th>NATURAL GAS/BIOGAS</th>
<th>HEATING OIL</th>
<th>NETWORK</th>
<th>TELECOMM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Public company</td>
<td>Electricity: Schaffhausen</td>
<td><img src="image" alt="Electricity" /></td>
<td><img src="image" alt="Water" /></td>
<td><img src="image" alt="Natural Gas/Bioenergy" /></td>
<td><img src="image" alt="Heating Oil" /></td>
<td><img src="image" alt="Network" /></td>
<td><img src="image" alt="Telecommunications" /></td>
</tr>
<tr>
<td></td>
<td>Owned by the City of Schaffhausen and the City of Neuhasen am Rheinfall</td>
<td>Water: Schaffhausen, Neuhasen am Rheinfall</td>
<td><img src="image" alt="Electricity" /></td>
<td><img src="image" alt="Water" /></td>
<td><img src="image" alt="Natural Gas/Bioenergy" /></td>
<td><img src="image" alt="Heating Oil" /></td>
<td><img src="image" alt="Network" /></td>
<td><img src="image" alt="Telecommunications" /></td>
</tr>
</tbody>
</table>
4.15 Rapperswil-Jona (St. Gallen)

4.15.1 The city: location, language, population growth and financial situation

Rapperswil-Jona is a municipality of the German-speaking canton of St. Gallen. The two communes of Rapperswil and Jona were merged into a single municipality from 2007. The graph represents the population of Jona alone until 2006, as it was the bigger of the two municipalities (Rapperswil was approximately half its size). Together with Rüti, in the canton of Zürich, forms a small urban agglomeration of 46,700 communes. The population of the municipality is of almost 27,000 residents. Since the merger with Jona, the average annual growth is of 0.5%.

![Population growth in Jona and Rapperswil-Jona in the period 1991-2017](image)

With respect to the three indicators of the study for the year 2016 (2017 not available), Rapperswil-Jona is in a very good financial situation: self-financing of net investments and net debt ratio have been excellent, and the investment rate of the city has been very good (Rapperswil-Jona Stadtrat, 2018).

4.15.2 Utility: model, ownership structure and coverage

The utility company in Rapperswil-Jona is Elektrizitätswerk Jona-Rapperswil AG (ewjr), which is a private limited company with over 1300 shareholders. The City of Rapperswil-Jona is the largest single shareholder with 20% of the shares (EWJR, n.d.). EWJR produces and distributes electricity, and also provides other energy-related services such as electrical installations, energy consulting, charging stations for electric vehicles and telecom services.
4.16 St. Gallen (St. Gallen)

4.16.1 The city: location, language, population growth and financial situation

St. Gallen is the capital city of the canton of the same name. German is the official language. It is the core of the 7th largest urban agglomeration with 23 communes and a population of over 166,800. It is considered the core of the Eastern Switzerland region.

The municipality has 75,522 residents, and its relative population growth between 1991 and 2017 is the second lowest of the sample, 5.4%. It suffered continuous losses of population in the 1990’s but has been growing at a constant rate between 2006 and 2014.

The financial situation of St. Gallen was good between 2001 and 2008, but from that year, the financial health of the municipality and the quality of management of public finances started to gradually deteriorate, reaching a critical situation in 2012-2014. The trend reversed from 2014, but the indebtedness situation is worse than before. In 2017 the synthetic score is acceptable and the three indicators SF, IE and ND are within acceptable
limits. The average situation for the complete period 2001-2017 is good (N. C. Soguel & Munier, 2018).

Figure 25: Financial situation scores for the City of St. Gallen in the period 2001-2017

4.16.2 Utility: model, ownership structure and coverage

St. Galler Stadtwerke (sgsw) is a public-law company managed as a department of the Technical Operations Directorate of the City of St. Gallen. It supplies St. Gallen with a wide range of services: electricity, water, natural gas, district heating, charging stations for electric vehicles, optic fiber network, and other services as consulting. Moreover, its gas networks extends from St. Gallen to Lake Constance (sgsw, n.d.-a).

St. Gallen has a well-developed smart city strategy, led by the Stadtwerke of the city. Some smart solutions already rolled out are: dynamic street lighting, measure of level of waste collectors, smart charging stations, smart metering for water and electricity, the optic fiber network. Among the goals for 2017-2020 are the open data platform and stakeholders’ participation platform (sgsw, n.d.-b; Stadt St. Gallen, n.d.).

Table 17: Main features of St. Galler Stadtwerke (sgsw)

<table>
<thead>
<tr>
<th>St. Galler Stadtwerke (sgsw)</th>
<th>Type/Owner</th>
<th>Territorial coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Public-law company managed as a department of the Technical Operations</td>
<td>St. Gallen (for gas, more municipalities, from St. Gallen to Lake Constance)</td>
</tr>
<tr>
<td></td>
<td>Directorate of the City of St. Gallen</td>
<td></td>
</tr>
</tbody>
</table>
4.17 Wil (St. Gallen)

4.17.1 The city: location, language, population growth and financial situation

Also located in the German-speaking canton of St. Gallen, Wil is smaller than Rapperswil-Jona but its agglomeration with an area of influence of 10 municipalities is significantly larger, as it has a population of over 74,100 inhabitants and that has been growing on average 0.9% since 1991.

Between 1991 and 2013, the city grew at an average yearly rate of 0.6%. In 2013, the municipalities of Wil and Bronschhofen merged, increasing the population of the city by 27.3%. Since 2014 the growth of the city is stagnated.

Figure 26: Population growth in Wil in the period 1991-2017

For the year 2017, the city of Wil has had an extremely high self-finance of net investments and a very good net debt ratio. In contrast, the investment rate has been below ideal and scores only 3.2 (Stadt Wil, 2018).

4.17.2 Utility: model, ownership structure and coverage

Technische Betriebe Wil is the public utilities company owned by the City of Wil. It provides electricity and water in the municipality of Wil, and natural gas/biogas in Wil and other thirteen surrounding municipalities: Aadorf, Wängi, Bichelsee-Balterswil, Eschlikon, Münchwilen, Bettwiesen, Tobel-Tägerschen, Wilen, Sirmach, Kirchberg, Rickenbach, Zuzwil, and Niederhelfenschwil. In addition, it offers telecommunication services (TV, internet and telephone) in about thirty municipalities and also sustainable mobility services related to electric vehicles and natural gas vehicles (tb-wil, n.d.).
The City of Wil is currently developing a smart city strategy but not specific measures have been defined or put in place yet. Under the motto “The highest possible quality of life with the least possible use of resources” the city started a consultation phase in 2018 in order to ensure that the strategy targets the residents’ needs.

Table 18: Main features of Technische Betriebe Wil

<table>
<thead>
<tr>
<th>Type/Owner</th>
<th>Territorial coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public company Owned by the City of Wil</td>
<td>Electricity: Wil Water: Wil Natural Gas: Wil, Aadorf, Wängi, Bichelsee-Balterswil, Eschlikon, Münchwilen, Bettwiesen, Tobel-Tägerschen, Wilen, Sirmach, Kirchberg, Rickenbach, Zuzwil, Niederhelfenschwil</td>
</tr>
</tbody>
</table>

4.18 Frauenfeld (Thurgau)

4.18.1 The city: location, language, population growth and financial situation

Frauenfeld is the capital and biggest city of the canton of Thurgau, in northeast Switzerland. The official language is German. It has a population of 36,332 (December 2017). Between 1991 and 2017 Frauenfeld has experienced a strong increase in its population, of 47.0%, especially since 1997. Since 2006, the city has been growing steadily with an average yearly rate of 1.2%.

Figure 27: Population growth in Frauenfeld in the period 1991-2017
The financial situation of Frauenfeld has been good or very good between 2006 and 2012, but between 2013 and 2016 the situation has been bad due mainly to a decrease of the financial health of the municipality. In 2017 the situation is good again, and the overall average of the period 2001-2017 is very good. However, self-finance of net investments in 2017 has been of only 52.9% which translates in a score of 2.9 and the investment effort was high, 13.9%, scoring 4.1. The net debt ratio was negative (N. C. Soguel & Munier, 2018).

![Financial situation scores for the City of Frauenfeld in the period 2001-2017](image)

**Figure 28: Financial situation scores for the City of Frauenfeld in the period 2001-2017**

### 4.18.2 Utility: model, ownership structure and coverage

Werkbetriebe Frauenfeld is a public law company owned and managed by the City of Frauenfeld (Werkbetriebe Frauenfeld, n.d.). Werkbetriebe Frauenfeld supplies with electricity and water the city of Frauenfeld, and with natural gas Frauenfeld, Felben, Gachnang and Warth-Weiningen. It also operates a district heating network.

<table>
<thead>
<tr>
<th>Table 19: Main features of Werkbetriebe Frauenfeld</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Werkbetriebe Frauenfeld</strong></td>
</tr>
<tr>
<td><strong>Type/Owner</strong></td>
</tr>
<tr>
<td>Public-law company Owned by the City of Frauenfeld, managed by a department of the City</td>
</tr>
<tr>
<td><strong>Territorial coverage</strong></td>
</tr>
<tr>
<td>Electricity: Frauenfeld</td>
</tr>
<tr>
<td><img src="image" alt="Electricity" /></td>
</tr>
<tr>
<td><strong>Table 19: Main features of Werkbetriebe Frauenfeld</strong></td>
</tr>
<tr>
<td><strong>Werkbetriebe Frauenfeld</strong></td>
</tr>
<tr>
<td><strong>Type/Owner</strong></td>
</tr>
<tr>
<td>Public-law company Owned by the City of Frauenfeld, managed by a department of the City</td>
</tr>
<tr>
<td><strong>Territorial coverage</strong></td>
</tr>
<tr>
<td>Electricity: Frauenfeld</td>
</tr>
<tr>
<td><img src="image" alt="Electricity" /></td>
</tr>
</tbody>
</table>
4.19 Kreuzlingen (Thurgau)

4.19.1 The city: location, language, population growth and financial situation

Kreuzlingen is the second biggest city of the canton of Thurgau. It has a population of 21,801, but its urban agglomeration with another commune is similar in size to that of Frauenfeld, with about 24,000 inhabitants. After a period of losses of population, the city of Kreuzlingen shows constant growth since 2000 at an average rate of 1.6%.

![Population growth in Kreuzlingen in the period 1991-2017](image)

In 2017, the city had a net debt ratio and very good self-financing of net investments. The only weak indicator of the three is the investment effort, that appears to have been very high and thus have a score of 3.5 (Stadt Kreuzlingen, 2018).

4.19.2 Utility: model, ownership structure and coverage

Kreuzlingen provides energy and water services in-house via the Technische Betriebe Kreuzlingen, which works as a department of the city’s administration (Technische Betriebe Kreuzlingen, n.d.). It distributes electricity, gas and water in Kreuzlingen. It does as well support sustainable mobility with charging stations for electric vehicles and natural gas vehicles, and rents electric vehicles. Additionally, it offers energy consulting services.

<table>
<thead>
<tr>
<th>Type/Owner</th>
<th>Territory coverage</th>
<th>Electricity</th>
<th>Water</th>
<th>Gas</th>
<th>Natural Gas</th>
<th>Heating</th>
<th>Mobility</th>
<th>Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of the City of Kreuzlingen</td>
<td>Kreuzlingen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 20: Main features of Technische Betriebe Kreuzlingen
4.20 Sion (Valais)

4.20.1 The city: location, language, population growth and financial situation

Sion is a French-speaking city, capital of the canton of Valais in the southwest part of Switzerland. The size of Sion’s agglomeration is similar to that of Neuchâtel and Montreux, with 17 municipalities and 86,500 inhabitants.

Sion has a population of 34,599 as of December 2017, and it shows an important growth of 39.2% between 1991 and 2017. This is due to the significant organic growth of the city but also to the mergers that took place in 2013 with the commune of Salins and in 2017 with Les Agettes.

The debt situation of the city of Sion has been good since 2001, even if it has slightly worsened since 2015. The financial health of the city was very good between 2001 and 2005, but from 2005 on, it shows lower scores reaching its lowest point in 2015, but never critical. The quality of management of public finances shows acceptable results in general, but with critically bad scores in 2003, 2006 and 2017. Overall, the average for the period 2001-2017 is good. All three indicators, SF, IE, and ND, are within acceptable limits in 2017 (N. C. Soguel & Munier, 2018).

Figure 30: Population growth in Sion in the period 1991-2017
Figure 31: Financial situation scores for the City of Sion in the period 2001-2017

4.20.2 Utility: model, ownership structure and coverage

Énergie de Sion-Région SA (esr) is a public company owned by seventeen municipalities in the districts of Sion: Arbaz, Grimisuat, Savièse, Sion and Veysonnaz; district of Hérens: Ayent, Hérémemence, Evolène, Mont-Noble, St-Martin, and Vex; district of Conthey: Conthey and Vétroz; and district of Sierre: Crans-Montana, Icogne, Lens and St-Léonard (Énergies Sion Region SA, 2018).

Table 21: Main features of Énergie de Sion-Région SA (esr)

<table>
<thead>
<tr>
<th>Type/Owner</th>
<th>Territorial coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public company</td>
<td>Arbaz, Ayent, Conthey, Evolène, Grimisuat, Hérémemence, Icogne, Lens, Crans-Montana, Mont-Noble, Savièse, Sion, St-Léonard, St-Martin, Vétroz, Vex et Veysonnaz</td>
</tr>
</tbody>
</table>

Énergie de Sion-Région SA offers services in multiple areas. It is an electricity supplier and offers also electric installations and alarm systems. It provides drinking water in Sion and natural gas in about 20 municipalities in collaboration with the city of Sierre. It operates charging stations for electric vehicles as well as natural gas refueling. Moreover, it is developing two district heating networks in Sion and in Crans-Montana. Additionally, it offers numerous services in the telecommunications sectors: TV, mobile phone, cable
internet and optic fiber in all the shareholder municipalities, through the subsidiary company esr multimedia SA.

4.21 Montreux (Vaud)

4.21.1 The city: location, language, population growth and financial situation

Montreux is located in the canton of Vaud, by the Lake Geneva. French is the official language in the city. It is the heart of another large agglomeration in the Romandie, that of Vevey-Montreux, with 11 municipalities gathering up to 86,200 residents.

The city has a population of 26,574, and it has been growing significantly between 1996 and 2016, at an average year-over-year rate of 1.2%.

Figure 32: Population growth in Montreux in the period 1991-2017

In 2016 (report of the year 2017 not available), net debt ratio was negative and therefore excellent, but the self-financing of net investments was too low, scoring 1.9, and the investment effort was acceptable, with a 4.5. The financial situation of Montreux is weak, but not as bad as in other municipalities in the canton (especially smaller ones). Changes in taxes are expected to improve the commune’s financial situation from next year (Département des institutions et de la sécurité - Canton de Vaud, 2018).

4.21.2 Utility: model, ownership structure and coverage

Water in Montreux is provided via a local governments association: SIGE, which stands for Intercommunal Management Service (in French, Service Intercommunal de gestion). SIGE
tasks are the supply and distribution of drinking water, and wastewater treatment. The association is formed by ten municipalities of the Riviera-Pays-d’Enhaut district: Blonay, Chardonne, Corseaux, Corsier-sur-Vevey, Jongny, La Tour-de-Peliz, Montreux, St-Légier-la-Chiésaz, Vevey and Veytaux (SIGE, n.d.).

There is not a local utility in Montreux delivering services related to energy. In this case, Romande Énergie is the main provider.

Table 22: Main features of SIGE

<table>
<thead>
<tr>
<th>Type/Owner</th>
<th>Territorial coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Municipalities association (Blonay, Chardonne, Corseaux, Corsier-sur-Vevey, Jongny, La Tour-de-Peliz, Montreux, St-Légier-la-Chiésaz, Vevey and Veytaux)</td>
<td>Blonay, Chardonne, Corseaux, Corsier-sur-Vevey, Jongny, La Tour-de-Peliz, Montreux, St-Légier-la-Chiésaz, Vevey and Veytaux</td>
</tr>
</tbody>
</table>

4.22 Nyon (Vaud)

4.22.1 The city: location, language, population growth and financial situation

Nyon is also located in French-speaking Switzerland, in the canton of Vaud. However, it belongs to the Geneva metropolitan area, an agglomeration of 88 municipalities with close to 600,000 residents. The city, with a population of 20,533 in 2017, grew 42.7% since 1991 with the high average yearly rate of 1.4%.

Figure 33: Population growth in Nyon in the period 1991-2017
Nyon’s net debt ratio in 2016 was high and the net debt per capita very high (6450 francs compared to 3500 on average for all the canton’s communes, and 3000 francs maximum acceptable value). Moreover, self-financing has also been low but investment rate was kept within ideal levels (Département des institutions et de la sécurité - Canton de Vaud, 2018).

4.22.2 Utility: model, ownership structure and coverage

Nyon provides electricity, water and natural gas services in-house, via Services Industriels de Nyon (SINyon), which is a service provider dependent of the City of Nyon. Its territorial coverage is the city for the supply of electricity; six municipalities for the gas network: Duillier, Eysins, Nyons, Prangins, Signy and Grens; and seven for water: Arnex, Borex, Crans, Céligny, Nyon, Prangins and Signy. It has also deployed a network of charging stations for electric vehicles in Nyon, and a refueling station for natural gas-fuelled vehicles (SINyon, n.d.).

<table>
<thead>
<tr>
<th>Type/Owner</th>
<th>Territorial coverage</th>
<th>Electricity</th>
<th>Water</th>
<th>Natural Gas</th>
<th>Accessibility</th>
<th>Mobility</th>
<th>Finance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service dependent of the City of Nyon</td>
<td>Electricity: Nyon Water: Arnex, Borex, Crans, Céligny, Nyon, Prangins, and Signy Gas: Duillier, Eysins, Nyons, Prangins, Signy and Grens</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 23: Main features of Services Industriels de Nyon (SINyon)

4.23 Renens (Vaud)

4.23.1 The city: location, language, population growth and financial situation

Renens, also located in the canton of Vaud, is part of Lausanne’s urban agglomeration: this is the fifth largest metropolitan area of the country in terms of population and the second by number of municipalities: it has 127 communes with a total population of over 420,800.

Renens municipality has a population of 21,036, it grew 19.9% between 1991 and 2017.

In the year 2016, the indebtedness situation of Renens was good, with a net debt ratio of 77.0% (5.3 points) and also its investment rate, which was of 11.7%, that is 4.3 points. Only self-financing of net investments appears to have been below acceptable limits, with a score of 3.7 (Département des institutions et de la sécurité - Canton de Vaud, 2018).
4.23.2 Utility: model, ownership structure and coverage

Service intercommunal de l’électricité SA (SIE SA) is a public company that supplies electricity, Four municipalities are its shareholders: Renens (36.8%), Ecublens (36.8%), Crissier (23.7%) and Chavannes-près-Renens (2.7%) (SIE SA, n.d.). The main mission of SIE is to supply energy in these four municipalities.

Table 24: Main features of Service intercommunal de l’électricité

<table>
<thead>
<tr>
<th>SIE SA – Service intercommunal de l’électricité</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type/Owner</strong></td>
</tr>
<tr>
<td>Company with four municipalities as shareholders: Renens (36.8%), Ecublens (36.8%), Crissier (23.7%) and Chavannes-près-Renens (2.7%)</td>
</tr>
</tbody>
</table>

4.24 Yverdon-les-Bains (Vaud)

4.24.1 The city: location, language, population growth and financial situation

Yverdon-les-Bains, located by Lake Neuchâtel, is located in the canton of Vaud. It is a French-speaking city as well. And is the core of a small agglomeration of 13 communes and 41,900 inhabitants. The municipality’s population is just over 30,000, and its growth has been relatively great since 1991 (with an average yearly growth rate of 1.2%).

The self-financing of net investments and the investment rate of Yverdon-les-Bains in 2016 were good, with a score of 5.7 for both indicators. The net debt ratio however was too high, and therefore the score for that year is only 3.1 (Département des institutions et de la sécurité - Canton de Vaud, 2018).

4.24.2 Utility: model, ownership structure and coverage

The City of Yverdon-les-Bains manages directly the public law institution Yverdon-les-Bains Énergies, a multi-service utility supplying electricity, water, natural gas in the city and neighboring municipalities. It also operates since 2015 the district heating network of Yverdon-les-Bains, and a network for charging electric vehicles. Additionally, it is developing the optic-fiber network and offers some multimedia services in partnership with specialized companies. Yverdon-les-Bains Énergies is also in charge of public lighting in the city (Yverdon-les-Bains Énergie, n.d.).

Table 25: Main features of Yverdon-les-Bains Énergies

<table>
<thead>
<tr>
<th>Yverdon-les-Bains Énergies</th>
<th>Type/Owner</th>
<th>Territorial coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Public-law institution of the City of Yverdon-les-Bains</td>
<td>Yverdon-les-Bains and neighboring municipalities</td>
</tr>
</tbody>
</table>
4.25 Baar (Zug)

4.25.1 The city: location, language, population growth and financial situation

Baar is a 24,322 inhabitants city in the German-speaking canton of Zug, and it is located at about 5km of the capital city. Since 1991, it has been growing strongly at a rate of 1.6% (among the highest of the sample).

![Population growth in Baar](image)

Baar financial situation for 2017 appears to be good from its annual financial report. Self-finance of net investments in the city were very high, thus obtaining the maximum score of 6, and same score for the net debt ratio indicator. The investment effort was good, with a score of 5.0 (Stadt Baar, 2018).

4.25.2 Utility: model, ownership structure and coverage

The private stock company WWZ is the main energy, water and telecom services provider in the canton of Zug. A more detailed description of the company is presented in the following subsection about Zug.

4.26 Zug (Zug)

4.26.1 The city: location, language, population growth and financial situation

Zug is the capital of the canton, German is the official language. It is the core of the tenth biggest agglomeration of the country in terms of population, with 130,700 residents.
distributed in 14 communes. The city has grown a lot, particularly since 2010, with an increase in its population of 12.3% in only seven years.

As in Baar, SF and ND indicators were excellent in Zug in the year 2017. Investment effort in this case was too high, obtaining a score below acceptable of 3.8 (Stadt Zug, 2018).

4.26.2 Utility: model, ownership structure and coverage

WWZ AG is a private stock company that produces, distributes and supplies energy, water, natural gas and other services in the canton of Zug. It has over 4500 shareholders and the public sector owns approximately 30% of the shares (WWZ, 2018). Its activity spans over the canton of Zug and beyond for some services. It offers a wide range of products related to electricity, for residential and business customers, and also supplies gas and drinking water. It operates two district heating networks, Circulago and Menzingen. It installs electric vehicles charging stations and is part of a charging network. It is also active in the telecommunications sector, offering internet, TV and telephone services with optic fiber. It is one of the leading cable network companies in Switzerland and partner in the Quickline network (WWZ, n.d.).

Table 26: Main features of WWZ AG

<table>
<thead>
<tr>
<th>WWZ AG</th>
<th>Type/Owner</th>
<th>Territorial coverage</th>
<th>Electricity</th>
<th>Water</th>
<th>Natural gas</th>
<th>Telecom</th>
</tr>
</thead>
<tbody>
<tr>
<td>WWZ AG</td>
<td>Private stock company with about 4500 shareholders (30% of shares owned by public sector)</td>
<td>Most of the Canton of Zug and some municipalities in neighbouring cantons of Aargau, Luzern and Zürich for electricity, natural gas, water and telecom. <strong>Electricity</strong>: municipalities of the canton of Zug and Hochdorf (Luzern) <strong>Heating</strong>: Cham, Menzingen, Steinhausen and Zug</td>
<td>✨</td>
<td>🛀</td>
<td>🍬</td>
<td>📛</td>
</tr>
</tbody>
</table>
4.27 Dietikon (Zürich)

4.27.1 The city: location, language, population growth and financial situation

Located in the German-speaking canton of Zürich, Dietikon is part of Zürich’s metropolitan area. The urban agglomeration of Zürich defined by the Federal Statistical Office is the biggest of Switzerland. It encompasses 150 municipalities and it is the only one with a population over a million. Dietikon’s population is 27,079. Between 2007 and 2016 the average yearly growth of the city is remarkably high, 2.1%, but it has stagnated in the last year.

![Population growth in Dietikon in the period 1991-2017](image)

In the year 2017, Dietikon’s self-financing of net investment rate and net debt ratio were excellent. Investment effort was slightly weak, but still within reasonable values, scoring 4.9 (Stadt Dietikon, 2018).

4.27.2 Utility: model, ownership structure and coverage

Limeco is Dietikon’s based regional Stadtwerke. It is a public institution owned by the municipalities of Dietikon, Geroldswil, Oberengstringen, Oetwil adL, Schlieren, Unterengstringen, Urdorf and Weiningen. It supplies electricity and is developing an extensive district heating network to areas in up to nine municipalities. It is also in charge for the cities’ wastewater treatment and waste recycling (Limeco, n.d.).
4.28 Dübendorf (Zürich)

4.28.1 The city: location, language, population growth and financial situation

Dübendorf is the fourth largest city of the canton of Zürich, after Zürich, Winterthur and Uster. It is located in the metropolitan area of Zürich and belongs to Uster district. It has a population of 28,141. It has grown 34.7% since 1991.

With a negative net debt ratio, and a self-financing of net investments of over 100%, Dübendorf scores 6 points for these two indicators in the year 2017. Investment effort however has been too strong, with the lowest score of all the cities of the study, 2.9 (Stadt Dübendorf, 2018).

4.28.2 Utility: model, ownership structure and coverage

Dübendorf’s local utility is Glattwerk AG, a public company that has the City of Dübendorf as only shareholder. It offers a wide range of services related to energy in Dübendorf and its surrounding area, specifically in the municipalities of Gockhausen, Wallisellen, Dietlikon and Weiningen.
and Wangen-Brüttisellen. It supplies electricity and gas, and operates also district heating. It provides services such as electrical installations, energy consulting and charging points for electric vehicles. Telecommunications is also at the core of its business, and its optic-fiber network covers Dübendorf, Gockhausen, Wallisellen, Dietlikon and Wangen-Brüttisellen. Additionally, it plans, builds, operates and maintain also public lighting in Dübendorf, Gockhausen and Hermikon (Glattwerk AG, n.d.).

Table 28: Main features of Glattwerk AG

<table>
<thead>
<tr>
<th>Glattwerk AG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type/Owner: Public company Owned by the City of Dübendorf</td>
</tr>
<tr>
<td>Territorial coverage: Dübendorf, Gockhausen, Wallisellen, Dietlikon and Wangen-Brüttisellen</td>
</tr>
<tr>
<td>ELECTRICITY</td>
</tr>
</tbody>
</table>

4.29 Horgen (Zürich)

4.29.1 The city: location, language, population growth and financial situation

Horgen is also located in the canton of Zürich and under the influence of its urban area. It has a population of 20,335. The average yearly growth rate of the city since 1991 is of 0.9%.

Figure 40: Population growth in Horgen in the period 1991-2017

Self-financing of net investments in Horgen between 2013 and 2017 has been excellent in average. In 2017, the investment effort was of 10.3%, which is good (score 5.8) and the net debt ratio also acceptable, with 5.4 points (Stadt Horgen, 2018).
4.29.2 Utility: model, ownership structure and coverage

The municipality of Horgen provides and manages in-house the supply of electricity, water, gas and district heating in the city, via the utilities department of the city, Gemeindewerke Horgen (Stadt Horgen, n.d.).

Table 29: Main features of Gemeindewerke Horgen

<table>
<thead>
<tr>
<th>Type/Owner</th>
<th>Territorial coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of the city administration of Horgen</td>
<td>Horgen</td>
</tr>
</tbody>
</table>

4.30 Uster (Zürich)

4.30.1 The city: location, language, population growth and financial situation

Uster is the third largest city of the canton of Zürich, and it also belongs to the greatest urban agglomeration of the country. It has a population of 34,516 and has grown 1.3% in average per year since 1991.

![Population growth in Uster in the period 1991-2017](image)

Results for the City’s balance in 2017 are positive, with an income surplus of 4,5Mio francs (4.5 times that of 2016) and the net debt ratio is negative, which is excellent. The investment effort score is low in 2017 because the indicator above the ideal limit, which means that the city is investing heavily in new infrastructure. Self-finance of net investments...
remains low (50%) due to this high investment rate, but it improved compared to 2016 (28%) (Stadt Uster, 2018).

4.30.2 Utility: model, ownership structure and coverage

Uster also has its own local utility company, Energie Uster AG is a public company fully owned by the City of Uster. It supplies electricity in four municipalities: Nänikon, Uster, Wermatswil and Werikon; and gas in those four municipalities plus Pfäffikon and Riedikon. It is also the water supplier in Freudwil, Nänikon, Riedikon, Sulzbach, Uster, Wermatswil and Werikon. Moreover, Energie Uster is currently building to regional heating networks and also has installed six charging points for electric vehicles (Energie Uster, n.d.).

Table 30: Main features of Energie Uster AG

<table>
<thead>
<tr>
<th>Energie Uster AG</th>
<th>Territorial coverage</th>
<th>Electricity</th>
<th>Water</th>
<th>Gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type/Owner</td>
<td>Public company</td>
<td>Nänikon, Uster, Wermatswil, Werikon</td>
<td>Freudwil, Nänikon, Riedikon, Sulzbach, Uster, Wermatswil, Werikon</td>
<td>Pfäffikon, Nänikon, Riedikon, Uster, Wermatswil, Werikon</td>
</tr>
<tr>
<td>Owned by the City of Uster</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.31 Wädenswil (Zürich)

4.31.1 The city: location, language, population growth and financial situation

Wädenswil is located in the district of Horgen, in the canton of Zürich. Its population of 21,792 residents has fluctuated a lot over the years, but it presents a relative low growth of 13.1% since 1991, and a yearly average rate of 0.5%.
After Luzern, Wädenswil shows together with Aarau the best global score for the three indicators, with excellent values in 2017 for the self-financing of net investments and the net debt ratio plus a score of 5.6 for the investment effort (Stadt Wädenswil, 2018).

### 4.31.2 Utility: model, ownership structure and coverage

The city of Wädenswil manages in-house the local utility department, Stadt Wädenswil Werke, in charge of supply of drinking water, natural gas and biogas, sewage and waste management in the city. As for electricity in the city, EKZ is the main electricity supplier (Stadt Wädenswil, n.d.). EKZ is a public company owned by the Canton of Zürich and active in several municipalities in the cantons of Zürich and Schwyz as well as in other territories, with branches in Dietikon, Sargans and Bulle.

#### Table 31: Main features of Stadt Wädenswil Werke

<table>
<thead>
<tr>
<th>Type/Owner</th>
<th>Territorial coverage</th>
<th>Electricity</th>
<th>Water</th>
<th>Natural gas &amp; biogas</th>
<th>Sewage &amp; waste management</th>
<th>Telecom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managed by the municipality</td>
<td>Wädenswil</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 4.32 Wetzikon (Zürich)

#### 4.32.1 The city: location, language, population growth and financial situation

Wetzikon is another municipality in the canton of Zürich, which is the one with the highest number of cities with a population over 20,000. Wetzikon has 24,513 residents, and it shows a relatively strong growth since 1991 of 43.9%, especially steep between 1999 and 2016, at an average 2.0% yearly growth rate in that period. However, it has lost population in 2017.

Wetzikon financial situation score is also excellent: in the year 2017, SF and ND obtained a score of 6 and the IE 5.5 (as it was slightly below ideal rates) (Stadt Wetzikon, 2018).
4.32.2 Utility: model, ownership structure and coverage

Stadtwerke Wetzikon is a public company owned by the City of Wetzikon, which core activity is the supply of electricity to Wetzikon’s population, and water and natural gas in Wetzikon and the municipality of Seegräben (Stadt Wetzikon, n.d.).

Table 32: Main features of Stadtwerke Wetzikon

<table>
<thead>
<tr>
<th>Type/Owner</th>
<th>Territorial coverage</th>
<th>Electricity</th>
<th>Water</th>
<th>Natural gas</th>
<th>Internet</th>
<th>Telescom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public company Owned by City of Wetzikon</td>
<td>Electricity: Wetzikon Water: Wetzikon and Seegräben Natural gas: Wetzikon and Seegräben</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5 Data analysis

In order to understand the opportunities for the private sector and foreign actors in the provision of local services related to energy in Switzerland, the current situation of medium-size cities and of the local utilities associated with them was studied. Thirty-one medium-size cities with a population between 20,000 and 100,000 were selected for the study of several factors that were considered as relevant according to the literature and research presented in the second and third chapters of these master thesis. Such factors were, on one hand, related to the city: location, language, population and evolution of the population, and financial situation. On the other hand, there were the elements concerning the utility company providing energy related services in those cities: model of service provision, ownership structure, and coverage in terms of services and territory.

The data gathered in the empirical study about all these factors will now be analyzed and discussed individually, as well as in connection between the city-related ones and the ones related to the utilities.

The cases show that the public sector and publicly owned companies are dominant. Besides, utilities provide a wide range of services, which allows them to offer integral solutions (sometimes in cooperation with other public partners), and their operations are not limited to municipal boundaries (as they often spread to neighboring communes).

First, an overview of the characteristics of the cities part of the study is presented. Second, the financial situation of the cities is assessed. Third, the dominance of the public sector is analyzed, followed by an analysis of the services and territorial coverage of the utilities. The last two subsections look at the links between the language, location, population, financial situation and utilities features.

5.1 Medium-to-small and German-speaking cities are predominant in the study

There are forty cities in Switzerland with a population between 20,000 and 100,000. Thirty-one of these cities are part of this study and only three of them have, as of December 2017, a population over 50,000: Luzern, St. Gallen and Biel/Bienne. There are other eleven with between 30,000 and 50,000 inhabitants, and the rest, 55% of the sample, have only between 20,000 and 30,000 inhabitants. Hence, the size of the municipalities studied tends to be small within the considered population range. With respect to the population growth history of these cities, all of them have a positive year-over-year growth rate between 1991
and 2017 with values between 0.2% and 3.7% with an average of 1%, note however that most of the higher values are due to mergers of municipalities, and cities without mergers have grown at a maximum yearly rate of 1.6%. Despite of the more or less uniform positive yearly growth, two different periods with contrasting trends can be distinguished. On one hand, between 1991 and 2001, the growth of each city was very variable, in fact, one third of the cities lost population in that decade while others grew at very high rates: for example, Baar grew by 21.5%, Uster 14.6% and Jona by 12.9%, between 1991 and 2001. Out of the six cities that lost over 1% of its population in that period, five are German-speaking cities core of urban agglomerations with over 70,000 inhabitants, and two of them had a municipality merged in the following years. On the other hand, all the cities grew significantly in the period between 2001 and 2017: the highest growth rates have been in core cities due to mergers (i.e. Rapperswil-Jona, Bulle, Wil, Luzern and Aarau). The contrast in the average growth for each period is very strong: 5.8% in 1991-2001 versus 23.3% in 2001-2017. The percentages for each city and period are represented in Figure 44. According to the information found, there were mergers of municipalities in six cases.

![Figure 44: Population growth per city in the periods 1991-2001, 2001-2017 and 1991-2017.](image)

According to the agglomerations definition of the Federal Statistical Office, eighteen of the cases are cities core of urban agglomerations. The other thirteen cases correspond with six cities of Zürich’s urban metropolitan area, two in Luzern’s and one in Baden-Brugg, Bern, Geneva, Lausanne and Zug each. The average number of municipalities per agglomeration from the ones studied is 30, however the range is very wide: Zurich’s involves 150 communes and Frauenfeld and Kreuzlingen, both in Thurgau, are the smallest with just one
and two. In terms of language, 70% of the cities of the study have German as the main language, and only 30% are French-speaking. An overview of the cities, language, current population, mergers and agglomeration information is represented in Table 33.

Table 33: Summary table with the cities’ information: language, population in 2017, mergers and agglomerations

<table>
<thead>
<tr>
<th>Canton</th>
<th>Municipality</th>
<th>Main language</th>
<th>Popul. 2017</th>
<th>Merg</th>
<th>Agglomeration</th>
<th>If not core, part of</th>
<th>No. communes</th>
<th>Popul. x1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aargau</td>
<td>Aarau</td>
<td>GE</td>
<td>21,268</td>
<td>yes</td>
<td></td>
<td></td>
<td>12</td>
<td>78.8</td>
</tr>
<tr>
<td>Aargau</td>
<td>Wettingen</td>
<td>GE</td>
<td>20,721</td>
<td>no</td>
<td>Baden - Brugg</td>
<td></td>
<td>15</td>
<td>110.7</td>
</tr>
<tr>
<td>Bern / Berne</td>
<td>Biel/Bienne</td>
<td>GE</td>
<td>54,640</td>
<td>yes</td>
<td></td>
<td></td>
<td>26</td>
<td>105.7</td>
</tr>
<tr>
<td>Bern / Berne</td>
<td>Köniz</td>
<td>GE</td>
<td>41,507</td>
<td>no</td>
<td>Bern</td>
<td></td>
<td>73</td>
<td>418.2</td>
</tr>
<tr>
<td>Bern / Berne</td>
<td>Thun</td>
<td>GE</td>
<td>43,743</td>
<td>yes</td>
<td></td>
<td></td>
<td>15</td>
<td>80.8</td>
</tr>
<tr>
<td>Fribourg/Freib</td>
<td>Bulle</td>
<td>FR</td>
<td>22,709</td>
<td>yes</td>
<td></td>
<td></td>
<td>7</td>
<td>33.0</td>
</tr>
<tr>
<td>Fribourg/Freib</td>
<td>Fribourg</td>
<td>FR</td>
<td>38,521</td>
<td>yes</td>
<td></td>
<td></td>
<td>31</td>
<td>108.8</td>
</tr>
<tr>
<td>Luzern</td>
<td>Emmen</td>
<td>GE</td>
<td>30,682</td>
<td>no</td>
<td>Luzern</td>
<td></td>
<td>19</td>
<td>229.4</td>
</tr>
<tr>
<td>Luzern</td>
<td>Kriens</td>
<td>GE</td>
<td>26,997</td>
<td>no</td>
<td>Luzern</td>
<td></td>
<td>19</td>
<td>229.4</td>
</tr>
<tr>
<td>Luzern</td>
<td>Luzern</td>
<td>GE</td>
<td>81,401</td>
<td>yes</td>
<td></td>
<td></td>
<td>19</td>
<td>229.4</td>
</tr>
<tr>
<td>Neuchâtel</td>
<td>La Chaux-de-Fonds</td>
<td>FR</td>
<td>38,625</td>
<td>yes</td>
<td></td>
<td></td>
<td>8</td>
<td>52.6</td>
</tr>
<tr>
<td>Neuchâtel</td>
<td>Neuchâtel</td>
<td>FR</td>
<td>33,578</td>
<td>yes</td>
<td></td>
<td></td>
<td>17</td>
<td>89.8</td>
</tr>
<tr>
<td>Schaffhausen</td>
<td>Schaffhausen</td>
<td>GE</td>
<td>36,332</td>
<td>yes</td>
<td></td>
<td></td>
<td>15</td>
<td>70.7</td>
</tr>
<tr>
<td>St. Gallen</td>
<td>Rapperswil-Jona</td>
<td>GE</td>
<td>26,989</td>
<td>yes</td>
<td></td>
<td></td>
<td>3</td>
<td>46.7</td>
</tr>
<tr>
<td>St. Gallen</td>
<td>St. Gallen</td>
<td>GE</td>
<td>75,522</td>
<td>yes</td>
<td></td>
<td></td>
<td>23</td>
<td>166.8</td>
</tr>
<tr>
<td>St. Gallen</td>
<td>Wil</td>
<td>GE</td>
<td>23,768</td>
<td>yes</td>
<td></td>
<td></td>
<td>10</td>
<td>74.1</td>
</tr>
<tr>
<td>Thurgau</td>
<td>Frauenfeld</td>
<td>GE</td>
<td>25,442</td>
<td>yes</td>
<td></td>
<td></td>
<td>1</td>
<td>25.4</td>
</tr>
<tr>
<td>Thurgau</td>
<td>Kreuzlingen</td>
<td>GE</td>
<td>21,801</td>
<td>yes</td>
<td></td>
<td></td>
<td>2</td>
<td>24.0</td>
</tr>
<tr>
<td>Valais / Wallis</td>
<td>Sion</td>
<td>FR</td>
<td>34,599</td>
<td>yes</td>
<td></td>
<td></td>
<td>17</td>
<td>86.5</td>
</tr>
<tr>
<td>Vaud</td>
<td>Montreux</td>
<td>FR</td>
<td>26,574</td>
<td>yes</td>
<td>Vevey-Montreux</td>
<td></td>
<td>11</td>
<td>86.2</td>
</tr>
<tr>
<td>Vaud</td>
<td>Nyon</td>
<td>FR</td>
<td>20,533</td>
<td>no</td>
<td>Geneva</td>
<td></td>
<td>88</td>
<td>592.1</td>
</tr>
<tr>
<td>Vaud</td>
<td>Renens</td>
<td>FR</td>
<td>21,036</td>
<td>no</td>
<td>Lausanne</td>
<td></td>
<td>127</td>
<td>420.8</td>
</tr>
<tr>
<td>Vaud</td>
<td>Yverdon-les-Bains</td>
<td>FR</td>
<td>30,143</td>
<td>yes</td>
<td></td>
<td></td>
<td>13</td>
<td>41.9</td>
</tr>
<tr>
<td>Zug</td>
<td>Baar</td>
<td>GE</td>
<td>24,322</td>
<td>no</td>
<td>Zug</td>
<td></td>
<td>14</td>
<td>130.7</td>
</tr>
<tr>
<td>Zug</td>
<td>Zug</td>
<td>GE</td>
<td>30,205</td>
<td>yes</td>
<td></td>
<td></td>
<td>14</td>
<td>130.7</td>
</tr>
<tr>
<td>Zürich</td>
<td>Dietikon</td>
<td>GE</td>
<td>27,079</td>
<td>no</td>
<td>Zürich</td>
<td></td>
<td>150</td>
<td>1369.0</td>
</tr>
<tr>
<td>Zürich</td>
<td>Dübendorf</td>
<td>GE</td>
<td>28,141</td>
<td>no</td>
<td>Zürich</td>
<td></td>
<td>150</td>
<td>1369.0</td>
</tr>
<tr>
<td>Zürich</td>
<td>Horgen</td>
<td>GE</td>
<td>20,335</td>
<td>no</td>
<td>Zürich</td>
<td></td>
<td>150</td>
<td>1369.0</td>
</tr>
<tr>
<td>Zürich</td>
<td>Uster</td>
<td>GE</td>
<td>34,516</td>
<td>no</td>
<td>Zürich</td>
<td></td>
<td>150</td>
<td>1369.0</td>
</tr>
<tr>
<td>Zürich</td>
<td>Wädenswil</td>
<td>GE</td>
<td>21,792</td>
<td>no</td>
<td>Zürich</td>
<td></td>
<td>150</td>
<td>1369.0</td>
</tr>
<tr>
<td>Zürich</td>
<td>Wetzikon</td>
<td>GE</td>
<td>24,513</td>
<td>no</td>
<td>Zürich</td>
<td></td>
<td>150</td>
<td>1369.0</td>
</tr>
</tbody>
</table>
5.2 Financial situation of the cities

Twelve cities of the study have historical financial situation data available for the period 2001-2017 from IDHEAP’s report on cantonal and municipal finances. Despite of specific years where financial situation was bad in some of the cities, the broader picture shows a positive financial situation for most of these cities. Figure 45 shows the average scores for financial health, quality of management of public finances and indebtedness situation of each city in the period 2001-2017. The average of the three categories’ indicators is acceptable in Emmen, La Chaux-de-Fonds and Biel/Bienne, and good or very good for the rest. Luzern, Schaffhausen, Frauenfeld, Thun and Köniz are the ones with the best averages for that period, with an overall score of 89 or higher out of 96 points.

![Graph showing average financial situation scores for 2001-2017 by city.]

Figure 45: Average financial situation scores for the period 2001-2017 by city

For these twelve cities, the data about the three individual indicators for the period 2001-2017 is also available. A graph will be presented with the average value of each indicator in the period 2001-2017 for each city, in relation to the ideal limits for the indicator’s value, the acceptable limits and the country’s average (country’s average for the cities included in the IDHEAP’s study only).

Figure 46 shows the self-financing of net investments average values. All the cities have values above acceptable, so none of these twelve cities have been on average in a critical situation for self-financing their net investments. Five of them have very high values, of over 100%, which shows a very positive self-financing situation; these are Thun, Fribourg, Luzern,
Schaffhausen and St. Gallen. The average for all the cities included in the report is 112.3%, which shows a very good situation in general for the whole period.

Looking at individual cases, Thun is the highest ranking city in average. It had very high index in 2001 and 2002, but extremely low in 2017 (17.3%). Biel SF index is good in average, but some years was very low (minimum in 2010, 32.4%). Köniz values are acceptable in average, but decreasing from 2013, down to 31.5% in 2017. Fribourg had low results in 2012-2016, but ramping-up (79.6% in 2017). Emmen had very low values in the last 7 years. Frauenfeld presents low values in the last six years, 34.8-52.9%. St. Gallen is well positioned but it has been below 100% since 2010.

Figure 46: Self-financing of net investments average values for the period 2001-2017 by city

In the case of the investment effort, there are upper and lower limits that set the ideal and acceptable values. Again, all the twelve cities’ averages for the investments efforts between 2001 and 2017 are within the acceptable range, and most of them are within, or very close to, ideal values. For instance, five of them do present ideal average values: Köniz, Fribourg, Luzern, La Chaux-de-Fonds, and Neuchâtel; and Biel, Emmen, Schaffhausen and Frauenfeld are close to the upper and lower ideal range of 7-10%. Sion’s values are very high in general, with over 12% for every year of the sample. Thun is the lowest ranking municipality. Fribourg investment effort index average is good, but in general very high from 2014, with 20.9% in 2016 and 13.4% in 2017. La Chaux-de-Fonds is in the ideal range almost every year.
of the sample. Schaffhausen shows values lower than the average, especially in the last years (3.6% in 2016 and 4.5% in 2017). As in SF, the country’s average for IE in 2001-2017 is excellent. Results are presented in Figure 47.

![Figure 47: Investment effort ratio average values for the period 2001-2017 by city](image)

Net debt ratio ideal maximum value is 50%, but it is considered acceptable up to 125%. In this case, the sample’s country’s average is acceptable with a net debt ratio of 102.5% for the period 2001-2017. Out of the twelve cities that belong to this study and to the report, only four of them managed to maintain an excellent average: Thun and Frauenfeld, for which ND is negative for all or most of the years of the period, Sion and Luzern. Biel, Köniz, Fribourg, Schaffhausen and St. Gallen have reasonable averages below 125%; however St. Gallen’s ND has been higher in the last years, with an average of 112.7% between 2013 and 201. Emmen, Neuchâtel and La Chaux-de-Fonds are the worst positioned. Results are presented in Figure 48. Emmen’s ND ratio has followed an increasing trend since 2008. In contrast, Neuchâtel presents a high average, but it is not representative of the trend for the last five years, average 2013-2017 is 45.0% only.
As for 2017, Table 34 presents a ranking of the total score estimated for each city according to the three indicators in 2017. Each indicator’s maximum score is 6, and the total score simply adds the three individual scores to a maximum of 18 points.

The financial situation, with regard to the three selected indicators, of more than half of the selected municipalities is very good. Self-financing of net investments is usually very high and the net debt ratio is low or even negative in many cases. Out of the top 17 municipalities (score over 14.5), only 4 have critical values and it is always with respect investment effort (or investment rate). This means that investment activity in Wil is weak and too strong in Zug, Kreuzlingen and Dübendorf. In the rest of them, all three indicators have ideal values.

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1 The scores have been calculated following the scoring guidelines of IDHEAP’s municipal and cantonal finances report for the year 2017 (N. C. Soguel & Munier, 2018). However, for the cities not included in the report, the values for each indicators have been taken from or calculated from each municipality’s annual financial reports as indicated in the empirical part, and are subject to inaccuracies in the calculations. Moreover, for the cities of Rapperswil-Jona, Yverdon-les-Bains, Renens, Nyon and Montreux, the scores correspond to the year 2016. In the case of Horgen, the SF index is for the average of the period 2013-2017. For Rapperswil-Jona, Wil, Bulle, Yverdon-les-Bains, Renens, Nyon and Montreux the investment rate was calculated instead of the investment effort, for all the others, the score corresponds with the investment effort.
or within the acceptable range. Except for Bulle, Biel, Neuchâtel and Sion; all the others are located in what is considered as Greater Zürich area.

There are 14 municipalities that score 14.5 or lower. The net debt ratio is remarkably high in La Chaux-de-Fonds, Emmen, Kriens, Yverdon-les-Bains and Wettingen. In contrast, La Chaux-de-Fonds SF and IE are very good. Montreux and Frauenfeld both have very low SF index but ideal ND ratio. SF is also very low in Köniz, Kriens, Emmen and Wettingen. Kriens and Emmen, two of the lowest ranking ones, are cities in the periphery of Luzern. Most of the others are located to the West of the country.

Table 34: Financial situation ranking based on the three indicators (self-financing of net investments, investment effort and net debt ratio) for the year 2017

<table>
<thead>
<tr>
<th>Canton</th>
<th>Municipality</th>
<th>SF score</th>
<th>IE/IR score</th>
<th>ND score</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luzern</td>
<td>Luzern</td>
<td>6.0</td>
<td>5.9</td>
<td>6.0</td>
<td>17.9</td>
</tr>
<tr>
<td>Zürich</td>
<td>Wädenswil</td>
<td>6.0</td>
<td>5.6</td>
<td>6.0</td>
<td>17.6</td>
</tr>
<tr>
<td>Aargau</td>
<td>Aarau</td>
<td>6.0</td>
<td>5.6</td>
<td>6.0</td>
<td>17.6</td>
</tr>
<tr>
<td>Zürich</td>
<td>Wetzikon</td>
<td>6.0</td>
<td>5.5</td>
<td>6.0</td>
<td>17.5</td>
</tr>
<tr>
<td>St. Gallen</td>
<td>Rapperswil-Jona</td>
<td>6.0</td>
<td>5.2</td>
<td>6.0</td>
<td>17.2</td>
</tr>
<tr>
<td>Zürich</td>
<td>Horgen</td>
<td>6.0</td>
<td>5.8</td>
<td>5.4</td>
<td>17.2</td>
</tr>
<tr>
<td>Zug</td>
<td>Baar</td>
<td>6.0</td>
<td>5.0</td>
<td>6.0</td>
<td>17.0</td>
</tr>
<tr>
<td>Zürich</td>
<td>Dietikon</td>
<td>6.0</td>
<td>4.9</td>
<td>6.0</td>
<td>16.9</td>
</tr>
<tr>
<td>Neuchâtel</td>
<td>Neuchâtel</td>
<td>6.0</td>
<td>5.4</td>
<td>5.4</td>
<td>16.8</td>
</tr>
<tr>
<td>Schaffhausen</td>
<td>Schaffhausen</td>
<td>6.0</td>
<td>4.8</td>
<td>6.0</td>
<td>16.8</td>
</tr>
<tr>
<td>Zug</td>
<td>Zug</td>
<td>6.0</td>
<td>3.8</td>
<td>6.0</td>
<td>15.8</td>
</tr>
<tr>
<td>Valais / Wallis</td>
<td>Sion</td>
<td>5.7</td>
<td>4.1</td>
<td>5.7</td>
<td>15.5</td>
</tr>
<tr>
<td>Thurgau</td>
<td>Kreuzlingen</td>
<td>5.7</td>
<td>3.5</td>
<td>6.0</td>
<td>15.2</td>
</tr>
<tr>
<td>St. Gallen</td>
<td>Wil</td>
<td>6.0</td>
<td>3.2</td>
<td>5.8</td>
<td>15.0</td>
</tr>
<tr>
<td>Zürich</td>
<td>Dübendorf</td>
<td>6.0</td>
<td>2.9</td>
<td>6.0</td>
<td>14.9</td>
</tr>
<tr>
<td>Bern / Berne</td>
<td>Biel/Bienne</td>
<td>4.3</td>
<td>4.9</td>
<td>5.5</td>
<td>14.7</td>
</tr>
<tr>
<td>Fribourg/Freiburg</td>
<td>Bulle</td>
<td>4.2</td>
<td>4.4</td>
<td>6.0</td>
<td>14.6</td>
</tr>
<tr>
<td>Vaud</td>
<td>Yverdon-les-Bains</td>
<td>5.7</td>
<td>5.7</td>
<td>3.1</td>
<td>14.5</td>
</tr>
<tr>
<td>St. Gallen</td>
<td>St. Gallen</td>
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<td>5.0</td>
<td>4.4</td>
<td>14.2</td>
</tr>
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<td>Fribourg</td>
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<td>4.3</td>
<td>4.8</td>
<td>13.7</td>
</tr>
<tr>
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<td>Renens</td>
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<td>4.3</td>
<td>5.3</td>
<td>13.3</td>
</tr>
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<td>4.1</td>
<td>6.0</td>
<td>12.9</td>
</tr>
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<td>6.0</td>
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<td>12.8</td>
</tr>
<tr>
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<td>Nyon</td>
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<td>4.0</td>
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</tr>
<tr>
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<td>6.0</td>
<td>12.5</td>
</tr>
<tr>
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<td>3.2</td>
<td>6.0</td>
<td>11.8</td>
</tr>
<tr>
<td>Bern / Berne</td>
<td>König</td>
<td>1.4</td>
<td>4.2</td>
<td>5.4</td>
<td>11.0</td>
</tr>
<tr>
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<td>Thun</td>
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<td>6.0</td>
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</tr>
<tr>
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<td>8.0</td>
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<td>7.9</td>
</tr>
<tr>
<td>Aargau</td>
<td>Wettingen</td>
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<td>0.0</td>
<td>3.6</td>
<td>4.2</td>
</tr>
</tbody>
</table>
5.3 Public ownership of the utilities

According to the results of the study, there are 27 utilities operating in the 31 cities, without taking into account big energy companies such as Romande Énergie and Groupe E. The public sector controls 25 of these utilities: 19 are companies of which the public sector owns the totality or the majority of the shares, five are departments or public institutions of the city’s administration: Technische Betriebe Kreuzlingen, SINyon, Yverdon-les-Bains Énergies, Gemeindewerke Horgen, and Stadt Wädenswil Werke; and SIGE is a Local Governments Association. The other two are EWJR, which is a private company and the City of Rapperswil-Jona owns 20% of the shares; and WWZ, a company of which 30% is in hands of the public sector. Hence, 90.3% of the cities of the study are served by publicly owned or managed utilities, and out of those, 78.6% are served by a public utilities company.
The seventeen companies that are fully owned by the public sector, are municipal owned enterprises (MOEs), of which 64.7% have a City as only shareholder. These are: Ewwag, ESB, EWB, Sinef SA, Energie Wasser Luzern AG, Sgsw, Tb-Wil, Werkbetriebe Frauenfeld, Glattwerk AG, Energie Uster AG and Stadtwerke Wetzikon. SH Power is owned by two municipalities, SIE SA by four, Limeco by eight, ESR by 17 and Viteos SA by 27 (even if together Neuchâtel and La Chaux-de-Fonds retain 83.8% of the shares).

Figure 50: Number of utilities belonging to each model: public company 100%, company with more than 50% of public ownership, private company, local government association and in-house.

5.4 Multi-utilities serving adjacent municipalities

There is a wide range of services offered by Swiss urban utilities. Most of them are suppliers of drinking water, electricity and natural gas (and biogas), as well as network operators; and
some of them are also energy producers. District heating networks are being developed and operated by many of them (sixteen of the utilities have or are developing district heating networks). Telecom services, such as TV and optic fiber internet connection are also part of some services portfolios (they are found in fifteen of the utilities), sometimes in collaboration with specialized companies of the sector. In terms of mobility services, no case was found where urban utilities are operating urban public transport systems and their role in this field is likely limited to the provision of energy for vehicles (charging stations for electric vehicles and natural gas refueling). Moreover, they are sometimes responsible for other local services such as street lighting.

In the study, the provision of six types of services was examined: electricity, water, natural gas and biogas, heating, mobility services and telecom services. Regarding the three most common services: supply of electricity, drinking water and natural gas, eighteen of the twenty-seven utilities provide the three of them. And another six supply at least two of them. Electricity is supplied by 89% of the utilities, and natural gas by 78%.

The number of utilities offering the different types of services is summarized in Figure 52. Almost half of them (45%) offer services in all areas: electricity, water, gas, heating, mobility and telecommunications. About 30% cover four or five of these types of services. Only two are not multi-service utilities: the LGA in Vevey-Montreux, SIGE, which only works with water, and SIE SA, in Renens’ area, which is exclusively a supplier of electricity.

![Figure 52: Number of utilities by number of types of services they offered](image_url)

In terms of territorial coverage, the number of communes served by each utility vary depending on the service, but the range of coverage is between one and thirty municipalities, which are in most cases neighboring communes. For five of the utilities, it is
not clear the maximum number of municipalities they serve, but the majority, fifteen of them, serve between one and ten communes. There are only three that have just one city and the three of them are departments of the city’s administration: Kreuzlingen, Horgen and Wädenswil. Another seven have a greater area of service of up to thirty-one communes.

![Figure 53: Number of utilities by number of municipalities served](image)

Natural gas and biogas networks are the ones that tend to have a greater territorial expansion, followed by the water distribution network. The supply of electricity appears to be more restricted to the city the urban utility belongs to, and fewer neighboring communes in some cases, but very rarely more than ten.

The three utilities that are a department of the city’s administration (Technische Betriebe Kreuzlingen, Gemeindewerke Horgen and Stadt Wädenswil Werke) do only cover their municipality. Also, the LAG SIGE, is active only in the ten communes that are part of the association. With respect to the ones managed directly as a public institution of the City, SINyon and Yverdon-les-Bains Énergies, they both serve their city and a few neighboring ones. The area of service of the private companies, EWJR and WWZ is not clear, but goes beyond their city. Out of those owned by a single municipality, the ones owned by the bigger cities core of big agglomerations are the ones with a more extensive area: Energie Wasser Bern and Energie Wasser Luzern. Tb-Wil has similar coverage but only for telecom services, but in contrast, it supplies electricity and water only in Wil. For the rest of utilities owned by a single city, eight is the maximum of communes where they operate.

Furthermore, we observe that since many Swiss utilities have been transformed into companies, they are steered according to economic and profitability principles. Nevertheless, in general, they still work closely with municipal governments, and therefore
are active stakeholders in policy processes, mostly related to environment and sustainability. For instance, Werkbetriebe Frauenfeld role in Frauenfeld’s “Energy City” strategies is specially highlighted by the City, as it contributes to the consumption of green energy and encourages changes in consumer behavior with personalized energy consultancy services (Energie Schweiz, n.d.). Energie Thun is also identified by the City of Thun as an active supporter in the implementation of the energy strategy (Energie Schweiz, 2019). In its website, SH Power states: “The fact that our customers are majority owners of our company results in a special customer / supplier relationship” (SH Power, 2019b), which exemplifies again the interlacing of these companies’ activities and the City’s interests.

5.5 The relevance of language and location

In his study on the cultural aspects of the choice of local service delivery model, Wicht identifies language as representative of cultural differences in Switzerland (Wicht, 2016). Hence, in this case study, language has been selected as one of the elements relevant for assessing the utilities scenario in each of the cities. In twenty-two of the cities, German is the main or only official language, while French is in the other nine. Hence, 71% of the cities of the sample are German-speaking while only 29% are French-speaking. In terms of population, the German cities represent 73.5% of the population of all the cities of the sample and looking at the urban agglomerations involved, 87.3% of the total population of these agglomerations is German-speaking. Regarding the utilities of the study, 19 are in the German-speaking area and eight on the French-speaking side.

The Athias-Wicht municipal survey (Wicht, 2016) showed that private contracting for delivery of local services is 60% less likely to happen on the French-speaking part of Switzerland. It should be noted however that the survey included local services that go beyond the utilities, such as road maintenance, public transportation, snow cleaning, refuse collection and disposal, school canteens, and parking control among others. Due to the unbalanced representation of the French-speaking part of Switzerland and the German-speaking one, there might be inaccurate to draw conclusions about connection between the language area the city belongs to and the model of local service delivery. Still, results will be commented, but without making any generalization about the connection between the model of provision and the language. The results of the study go in line with the idea that French-speaking cities are less prone to contract-out or have presence of the private sector: two of the six in-house providers are in French-speaking cantons, and also the LGA; and the rest of utilities in this side of the country are all fully publicly owned companies.
In the financial situation ranking based on the three indicators self-financing of net investments, investment effort/investment rate, and net debt ratio, fourteen of the seventeen top ranking municipalities are German-speaking.

The location appears to be relevant not in terms of if it is located in the German- or French-speaking area of Switzerland, but rather in terms of where in the scheme of urban agglomerations the city falls. According to the Swiss Statistical Office (Federal Statistical Office, 2018b) 18 out of the 31 studied cities are core of an urban agglomeration. The analysis shows that the only four cities that do not have their own local utility, these are Köniz, Emmen, Kriens are Baar, are all part of an urban agglomeration but not the core of it. They are served by the main city’s utility company in all cases. However, there are nine cases of non-core mid-size cities in the study that have their own utility.

5.6 Links between population growth, financial situation and utility model

The 31 cities selected for the study have a population between 20,000 and 100,000. The growth since 1991 in each of them varies widely independently of their size. The average growth between 1991 and 2017 ranges from 5.2% in La Chaux-de-Fonds to a maximum of 147.9% in Sion (due to mergers), and 51.7% without mergers in Baar. The twelve biggest cities of the sample have a public company as urban utility, and all the alternative less dominant forms belong to the smaller cities. In particular, four out of the five cities where the utility is directly a department of the city or a public body dependent of the city, are among the seven smallest municipalities with a population under 22,000. The data shows also that the utilities offering services in all the six areas examined tend to belong to the bigger cities of the sample, while the ones offering limited number of services are concentrated among the smaller size cities. And something similar happens with the territorial coverage: the ones serving the greatest number of municipalities correspond mostly with the cities that are at the top in terms of population.

For the cities with historical financial data, there is no observed relationship between the average growth of the city in the period between 2001 and 2017 and their financial situation in average in that period. Apparently there is no connection either between the financial situation in 2001-2017 and the city being core of an agglomeration. What can be observed are certain patterns on the periods of steepest population growth. In particular, four of the German-speaking cities: Thun, Köniz, Schaffhausen and Frauenfeld, have had stronger yearly average growths from the year 2006. And they are also the ones with the best financial situation average between 2001 and 2017. The position in the financial situation
ranking elaborated based on SF, IE/IR and ND does not match with the average financial situation of the municipalities between 2001 and 2017. For instance, Thun and Köniz are among the lowest ranking cities but their average financial situation has been very good. Also, no clear connection between the position in the financial ranking and the model of service delivery is observed. The only aspect that can be related is that nine of the best ranking cities are among the ones with utilities covering the most number of communes.

Due to the dominance of publicly owned utilities and the very limited presence of other models of service provision, in particular, private companies and contracting-out, no further relations are identified between the cities’ and the utilities’ features.
6 Summary and conclusion

With the analysis of thirty-one Swiss cities and the urban utility companies’ scenario operating in the selected urban areas, this thesis evaluates what is the governance framework for energy local services, the current situation in the provision of local services associated to energy in Switzerland and if there are opportunities for other companies beyond the traditional publicly owned urban utilities, also referred to as services industriels and Stadtwerke.

The literature review about public-private partnerships focuses on the different meanings attributed to the concept, and shows that there is a wide variety of agreements and collaboration schemes that fall under this term. Literature that deals with PPPs in local services is limited, and most of it focuses on water-related topics. With regard to energy, most of the PPPs literature centers its attention on the electricity reforms that took place in many countries from the last quarter of the twentieth century. From there, two currents of literature are found: on one hand, the one that deals with PPPs in the energy sector in developing countries and on the other hand, PPPs in the renewable energies sector. Often, these two topics intersect. In the case of Switzerland, PPPs are strongly associated with private financial initiatives for the development of infrastructure projects but the opportunities for PPPs in the country are more diverse, if the specificities of the context are taken into account.

Hence, a review of the context under which utilities operate in Switzerland was carried out in the third chapter. The principles of federalism, subsidiarity and fiscal equivalence govern the country, and the Swiss political and administrative systems are characterized by a multi-level governance structure where powers are well balanced between the three levels of government, but also between political actors and other stakeholders. Local governments, despite some concerns about their loss of autonomy, retain significant power and independence and are in most cases the exclusive responsible authorities in the provision of local services. The great fragmentation (there are over 2000 municipalities in the country) and small size (almost 60% of them have less than 2000 inhabitants), plus financial difficulties in the 1990’s, have led to restructuring processes in the last couple of decades. Specifically, mergers of communes have occurred often triggered by bad financial situations; and inter-municipal cooperation for the delivery of local services has increased between municipalities of all sizes.

As a result of the governance system and high level of autonomy of local governments, the provision of urban utility services is also significantly fragmented and concentrated at the
local level. Such services were traditionally produced in-house directly by specific departments of the cities’ administration. Following public management initiatives to encourage competition and bring private sector managerial aspects into the public sector, most of these in-house services have been corporatized. Consequently, a great heterogeneity exists in the models of provision of services associated to water, electricity and natural gas; but the predominance of the public sector remains.

Considering the literature and evidence found in the contextualization, the different aspects of cities and utilities that might be determinant in the opportunities for the private sector were identified. First, the size of the city appears to be of relevance and thus we have chosen to focus this study in medium-size cities, with a population between 20,000 and 100,000 inhabitants. The bigger cities are more prone to produce all services in-house or with MOEs, and they take advantage of service integration and economies of scale. Moreover, their area of influence often spreads to smaller municipalities, which might not have the resources (financial and/or technical) to provide all services in-house. Not only the current population, but also the population growth and the financial situation of the city have been identified as relevant. Financial constraints (which could be associated to population trends, as most of the municipalities’ income comes from taxes) are influential in the capacity of local governments to produce services in-house or to contract out. Location and language are the additional factors studied about the cities. A sample of 31 cities of the 40 Swiss cities that have a population between 20,000 and 100,000 was selected for the study. Thereafter, four elements were examined regarding the urban utility companies operating in the selected cities: model of service delivery, ownership structure, services provided and territorial coverage. These four defining features of the utilities in each of the cities picture the current schemes that are predominant in the provision of urban energy services, as well as its extension in terms of services and also in terms of the area of service. These features are essential in order to understand first, to which extent the private sector is involved in the delivery of urban energy services; second, the service areas where current actors are more dominant and those where they are less present, so as to see where new actors could contribute to the development of existing and new energy related services; and third, the extent to which current actors benefit from service integration and economies of scale.

The majority of the selected cities have a population of under 30,000 inhabitants, so the size of the cities tends to be small also within the range studied. These 31 cities represent less than 12% of the total population of the country, and over 50% of the country’s population resides in towns smaller than 10,000 inhabitants. However, the influence that the bigger urban cores and municipalities have over the smaller ones due to the advantages
that the size brings in terms of additional available resources and more efficient delivery of services that benefit from economies of scale adds to the reasons for focusing the study in medium-size cities. Furthermore, in terms of population, most of the cities have had very strong population growth in the last decade and even if the yearly growth has decreased in many cases in the last couple of years, the trend indicates that the demand of urban services has grown significantly and will continue to do so. There were mergers of municipalities in six of the cases, and more are planned for the following years, thus, contributing also to the hypothesis that smaller municipalities face difficulties with the challenges posed by the increased demand and complexity in the delivery of local services.

Regarding the utilities in the case study cities, only four of them do not have their own urban utility. The four cases are cities that are part of an urban agglomeration, but not the core. Still, there are another nine cases of non-core cities that have their own utility. What can be confirmed is that the great majority of municipalities’ utilities serve, except for those that are a department of the City, smaller neighboring municipalities, independently of the city being core or not of an urban agglomeration.

From the analysis it can also be concluded that the utilities in Switzerland are still strongly controlled by the public sector: mostly through publicly owned companies, but also by producing services in-house via departments of the city’s administration and public institutions. Publicly owned companies (which are 70% of the utilities studied) collaborate closely with the city and share their policy objectives and plans, however, being companies, they are also steered by profitability and business strategies. They are therefore not directly dependent of the city’s financial situation and it is, in most cases, the opposite way round: the city, as only shareholder in 65% of the public companies of the study, may be affected financially by the annual result of the public utility company. In any case, the case study cities’ financial situation is in average good and in terms of infrastructure, investment effort ratio appears to be excellent in the year 2017 (not too high nor too low in relation to the cities’ situation).

Only two of the twenty-seven utilities of the study are private companies, and in general, a very limited presence of the private sector is observed in the direct provision of local energy services. Due to the prevailing position of the present utilities and their strong ties to the public, rather than by competing with the present traditional actors, the opportunities for new actors and the private sector might be more related to complimentary services where the current utilities are less dominant or lack expertise and to collaborations with them for the development of specific projects. Despite the corporatization strategies and modernization of the utilities, the fact that these companies are still young (many have been
corporatized in the last couple of decades) and strongly tied to the public sector managerial and decision-making processes, leaves room for competition but also cooperation in areas where innovation and fast technical expertise are key. For instance, in line with developing the local energy policies, renewable energies are at the core of the utilities’ activities and are being subject to very intense development and investments; and in the telecommunications sector, optic fiber is being installed in most of the cities. In such topics, collaboration with specialized companies and group holding companies of the main utility or bigger ones is already taking place. In contrast, a lack of ICT innovative projects as well as smart city initiatives are rarely present in these cities and even less part of the utilities’ services and projects. Moreover, as the current urban utilities are strongly rooted in the territory they operate in, the private sector could find gaps where they could contribute in activities that do not rely on a strong territorial link and also those that could benefit from concrete expertise even if it comes from other territorial areas.

German-speaking cities are significantly more represented in the study than French-speaking ones, so conclusions involving the language factors are not determinant. Public and in-house production are present on both sides and in addition to the utilities, big regional and national energy companies are active in both geographical areas.

Finally, business customers appear to be as relevant as households and individual customers in many of the utilities, as well as for the cities. As cities get much of their income from taxes, attracting companies to base their operations in their territory is highly beneficial for them. Hence, energy services produced by alternative private actors might also enjoy a wider range of opportunities in areas where there are several target customer groups and where business clients are more numerous.

Future research to contribute to the question initially posed could focus in two topics. First, the big utilities that have not been studied in this thesis and the big energy companies, the relationship between them, business core activities and what kind of collaborations do they have with the private sector, if any? Second, a detailed look into energy-related services that municipalities would be interested in contracting-out instead of assigning them to the local utilities.
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