

**A response to the Paris Agreement—What types  
of measures should be implemented in Geneva to  
leverage the potential of the private sector in  
mitigating environmental impact?**

**Bachelor Project submitted for the degree of  
Bachelor of Science HES in International Business Management**

by

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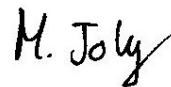
## Declaration

This Bachelor Project is submitted as part of the final examination requirements of the Haute école de gestion de Genève, for the Bachelor of Science HES-SO in International Business Management.

The student accepts the terms of the confidentiality agreement if one has been signed. The use of any conclusions or recommendations made in the Bachelor Project, with no prejudice to their value, engages neither the responsibility of the author, nor the advisor to the Bachelor Project, nor the jury members nor the HEG.

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Geneva, June 30, 2018

A handwritten signature in black ink, appearing to read 'M. Joly'.

Matthias JOLY

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## Executive Summary

The Paris Agreement is the most ambitious response that has been given to global warming by the international community to date. Upon its ratification, the vast majority of countries has agreed to undertake considerable efforts to limit the rise of global temperature to well below 2°C. Recent research has often underlined the crucial efforts that will be required from national and subnational actors in order to have a chance to achieve this objective. Cities especially have a significant role to play in these mitigation and adaptation efforts, not only due to their very high contribution to global greenhouse gases, but also to their close understanding of businesses' capabilities and needs in responding to climate change.

Although most signatory countries have already adopted action plans to reduce their national greenhouse gas emissions, they often have trouble defining the concrete role of subnational actors in climate action, and to take ambitious measures to leverage these actors' potential, technical knowledge and expertise in global warming mitigation.

This research examines what types of measures should be implemented in Geneva, Switzerland in order to reinforce climate action in the private sector. To that end, action empowering business actors is assessed, and an array of smart practices is tested to determine how they could be put in place, with regards to the local political context, needs and opportunities.

Although climate action is generally well advanced in Geneva, the findings suggest that additional measures should be implemented, pursuing a clearer definition of the private sector's role, and aiming at leveraging its capabilities. Consequently, recommended practices consist of financial instruments pursuing the electrification of energy sectors; information display policies promoting cleaner purchasing behaviors from consumers; restrictive measures to curb the rise of aviation-related emissions; sectoral public-private partnerships; as well as binding measures to reduce waste externalities.

Indulgent and non-binding methods have been the preferred way of addressing climate change in Geneva until today. Although these types of practices do have a role to play in mitigation and adaptation initiatives, it has become clear that they will not be sufficient to reach the objectives set. Indeed, more ambitious and binding measures are needed to enforce the polluter pays principle, internalize the externalities that result from production and consumption activities, and guarantee the preservation of our planet, for future generations to benefit from its resources.

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# 1. Introduction

The Paris Agreement signed in 2015 represents a significant milestone in the international community's response to climate change. 195 countries have agreed to undertake considerable efforts that aim at limiting the rise of global temperature to well below 2°C compared to pre-industrial levels. The agreement also aims at fostering international cooperation and making countries more resilient to climate change (United Nations Treaty Collection 2018; UNFCCC 2015a, Art. 2). The objectives set are ambitious, and their fulfilment will require various stakeholders to cooperate with national governments in taking substantial actions that reduce their environmental impacts. In this process, the involvement of cities is particularly crucial due to their very high and rising contribution to global greenhouse gas (GHG) emissions (Fong et al. 2014, p. 7), and to their ability to understand the local population's and businesses' concerns, as well as create optimal conditions for them to take part in global warming mitigation.

Switzerland signed the Paris Agreement and its Federal Council subsequently launched the revision of its national legislation on CO<sub>2</sub>, for which parliamentary debates should start in 2018 (OFEV 2017g, p. 26). A process of consultation preceded the elaboration of this legislation project, during which all cantons and a number of communes, as well as many representatives of the private sector, were asked to give their stance both on the ratification of the Paris Agreement and on the legislation project on CO<sub>2</sub> (OFEV 2017c, p. 5; 67). This shows Switzerland's strong intentions not only to include the regional jurisdictions into the effort to mitigate climate change, but also to put a great emphasis on the private sector, which massively endorsed the commitments of Switzerland toward the Paris Agreement (p. 17; 18). Besides, expectations that are set upon subnational actors to join the efforts against climate change are high, as per the different action plans adopted by the State at various levels (Swiss Federal Council 2016, p. 61; 64-65; SCDD 2015b, p. 30-31). Nonetheless, other than mentioning their responsibility, no clear framework is often pronounced on the measures they should implement to that end.

Consequently, this thesis will concentrate its scope on climate action conducted in Geneva, which is one of the main urban areas in Switzerland. The goal of this project is to assess how public entities organize their local efforts to include the private sector in their fight against climate change. More importantly, it aims at determining what additional measures should be implemented in order for the city's private sector to play its part in reaching the objectives of the Paris Agreement.

Following this introductory part and a presentation of the Paris Agreement, this report is structured into four main chapters. An overview of the existing measures is first conducted at the Confederation, cantonal and communal levels, before assessing these measures' implications. An array of smart practices is then presented in order to explore what types of instruments are being implemented successfully in other nations and cities. Finally, additional measures that can be put in place in Geneva are discussed, taking into account their relevance and feasibility, in light of the local context.

## **1.1 Literature review**

The Paris Agreement has been widely considered as an unprecedented milestone in the last few decades of response to global warming. Most analyses view its objectives as ambitious and requiring global actors to reach a superior level of action to achieve them. While this treaty was welcomed as the most extensive and ambitious to date by many world leaders, NGOs and experts (Vidal et al. 2015; WWF 2016; Oxfam International 2016), studies report that efforts need to be considerably boosted, especially in the few years following ratification, in order to have a chance at reaching the objectives set (Jeffery et al. 2015, p. 4; Rogelj et al. 2016, p. 634). Moreover, exceeding—and even solely reaching—the temperature increase of 2°C, or even 1.5°C, is predicted to create disastrous effects over the planet's resources and human activities. This may include extreme weather events, health issues, losses in labor productivity, mass migration and threats for economic activities (Schleussner et al. 2015; Jacob et al. 2018; OFEV 2017a).

Additionally, studies find that non-state action will be decisive in determining the success of global policies as a response to global warming. Climate action is no longer a solely political issue, but must be integrated by all actors of society in order to take advantage of each sector's capabilities, consider its needs and create synergies between them. Rogelj et al. (2016) suggest that “*supporting and enabling national and non-state action will be critical*” in view of “*the recent unprecedented engagement of [...] businesses, citizens and religious organizations*” (p. 637). Another study from the UNEP (2015, p. 27), which aggregates non-state actions from numerous reporting platforms, showed that:

*“Committed action from existing non-state climate initiatives involving cities, regions, companies and sectors could deliver emission savings of 2.9 GtCO<sub>2e</sub>. For comparison, the impact of government pledges in 2020 is 5–7 GtCO<sub>2e</sub>.”*

Of course, these assertions should be brought back to their 2015 context, which was just before the signature of the Paris Agreement, since which both government pledges and

non-state initiatives have proliferated. However, they allow us to grasp the potential of non-state actors in combatting global warming, which already proved to be strong a couple of years ago. In substance, these actors have the opportunity to take individual actions that imply significant reductions in GHG emissions, along with governmental measures, which themselves often involve cities and/or businesses.

Significant indicators show that cities are nowadays the most important contributors to climate disruption in geographical terms. More than half of the world's population now lives in cities, and the UN forecasts this proportion to increase to 66% by 2050 (United Nations 2014, p. 1). Moreover, studies from international agencies suggest that urban areas are already responsible for 70% of global CO<sub>2</sub> emissions (International Energy Agency 2016, p. 3; Kirk et al. 2016, p. 92). Measures planned and implemented at city-levels are therefore crucial in order to keep the global temperature increase well below 2°C. In fact, the C40—a conglomerate of cities focused on tackling climate change at urban levels—states that *“action within urban areas would deliver around 40% of the savings needed to achieve the ambition of the Paris Agreement”* if they followed C40's action pathway (Kirk et al. 2016, p. 92). It then becomes clear that without action implemented within cities' perimeter, meeting these very demanding objectives will be impossible (p. 7; Watts 2017).

Urban areas also constitute the ideal vectors of change in the planning and implementation of effective measures to mitigate climate change. Indeed, regions and municipalities are often the closest public stakeholders to businesses, financial institutions and individuals in terms of climate-related risks identification and action for mitigation or resilience (Bulla et al. 2014). Thus, the inclusion of these non-state actors in such measures is essential, in order for governments to be able to reduce the impact of human activity on the planet's climate (Aschkenazi et al. 2012, p. 6). In the last few years, independent initiatives from subnational authorities such as regions or cities have been flourishing (Bulla et al. 2014, p. 9), which shows that these entities sometimes take the reins of climate action. In the US for instance, more than 50 cities have been signing the Chicago Climate Charter, by which they pledge commitments to the Paris Agreement, despite the fact that their country is withdrawing from the treaty (City of Chicago 2017).

Besides, the private sector is considered to be able to help provide expertise, innovation and financing means to governments in order to conduct investments in new or existing infrastructure (Bennet et al. 2000, p. 12). Such infrastructure adaptations will be widely necessary for cities to adopt more sustainable practices (Koppenjan, Enserink 2009, p.

284), hence the importance of assessing what types of partnerships with the private sector can prove to be beneficial for governments, and what mechanisms make them successes or failures. Recent studies and reporting platforms also show more and more cooperation between actors from different sectors, such as national and subnational governments, private entities, NGOs or universities in the governing of climate change, mainly in the form of experimentation (Bulkeley, Castán Broto 2013, p. 372-373; CDP 2017).

Finally, several studies conducted over the last decade have called for further research in the area of subnational climate action, with regards to a mode of governance that is flourishing and brings its share of opportunities and uncertainties. Notably to be explored are the following issues:

- The different forms of policies that are adopted from one city to another (Bulkeley 2010);
- Their different geographical/political contexts and their transferability (Bulkeley, Castán Broto 2013; Bauer, Steurer 2014);
- *“What is the direct effect of sub/nonstate climate action on the climate problem”* (Hale 2016, p. 19);
- To what extent are binding, harder measures emerging and how can local partnerships facilitate them (Bulkeley 2010; Bauer, Steurer 2014);
- The interactions between sub-state action and national policies (Hale 2016);
- The different interests that are served through urban climate experiments (Bulkeley, Castán Broto 2013).

This project does not intend to comprehensively address one of these points in particular. It will rather offer some elements that are part of the answers, to the extent that the specific city of Geneva will serve as a case study within the global context of subnational climate action that targets the private sector. Thus, we will attempt to explore these issues in light of the existing policy in the city and of what could be implemented additionally. The approach taken to address these issues is described in the next chapter.

## **1.2 Problem statement**

We have considered the extent to which the Paris Agreement sets unprecedented, ambitious goals to address climate change, and also that part of the measures to achieve them lies in the hands of subnational actors such as regional entities, cities and private businesses.

Research has been rather abundant in the last few years regarding the global role of cities in the responses to climate change. Some studies have focused on assessing the impacts urban action can have in absolute terms, while other have attempted to forecast whether current national pledges will be sufficient to reach the objectives set. They concluded that the inclusion of all sectors of society would be required to allow global warming to be treated in an integrated manner. Lastly, research has also showed how action is organized between the various actors present in cities.

Attending the One Planet Summit, held in Paris in December 2017, has allowed me to witness how the international community legitimately agrees on the fact that the time left to act is extremely short. Global ambitions are progressively being translated into national objectives, which must be in turn assimilated by subnational actors and produce concrete measures to reduce GHG emissions. While the Swiss government has formulated the need for cantons, communes and the private sector to work hand in hand with national authorities (Swiss Federal Council 2016, p. 61; 64-65), the concrete expected role for each of these actors is often lacking. It is now necessary to extend the work done up to now and to attempt to understand what measures are the most prone to reducing the environmental impact of cities. Determining how the various aforementioned actors can organize for climate action to be efficient, relevant to each local context, and successfully play their part in the race against global warming, will also prove to be decisive in the near future.

Considering these points, the research gap to be filled in this document consists of applying these interrogations to the urban area of Geneva, Switzerland. The goal is to determine what types of financial instruments, regulations, partnerships or other innovative measures could be put in place to optimize the role of the local private sector in contributing to a city with reduced GHG emissions.

## 2. Analysis

### 2.1 *Research methodology*

The approach adopted to address the research objectives essentially relies on qualitative research methods. First, secondary data has been collected, analyzed and synthesized in order to depict a relatively comprehensive picture of what practices the Confederation, the canton of Geneva and the local communes have been putting in place to this day to reinforce climate action in the private sector. The analyzed existing literature mainly comprises action plans, regulations and sectoral guidelines from various public entities. In order to capture the very dynamic state of climate action, plans and strategies that are still under elaboration or discussion—such as the revision of the federal Law on CO<sub>2</sub>—have been included in this outlook. Documentation has also been used in order to identify smart practices that are in place in other countries and cities, and to examine the feasibility of these measures in Geneva, as well as their potential implications. This includes official public communications, media reporting and institutional reports.

In a second phase, interviews have been conducted in order to address the second research objective. On the one hand, the goal was to explore what types of smart practices are being considered, tested and implemented outside Geneva. To that end, one interview in particular focused on investigating the approach of the French government in tackling the emissions resulting from business processes, as it comprises many novel practices, which result from European or national initiatives. On the other hand, the interviews conducted allowed to test the selected smart practices regarding their relevance, potential implementation, as well as how they are perceived in the local affected milieux of Geneva. To that end, interviews targeted decision makers from public sectors, as well as representatives of economic actors.

Due to the extensive range of climate action and the widely different forms measures can take in the mitigation of global warming in the private sector, the smart practices retained should not be viewed as exhaustive. Rather, they have been selected based on their application to businesses, the potential they have in GHG reduction, as well as their local relevance and feasibility. In that sense, they constitute interesting material to determine what methods could be favored in order for climate action to be more ambitious in the private sector.

In terms of geographic scope, this project explores public policy that affects the urban area of Geneva, which boundaries can be defined in different ways and are influenced at various levels of the governmental spectrum. Therefore, it seems important to specify what geographic region and levels of jurisdiction will be considered in this paper, when referring to “Geneva”. Public policy in Switzerland is shared between three different levels of jurisdiction, each “layer” having an important and distinct governmental role: the Confederation, the cantons and the communes—also called “municipalities”. The Swiss constitution restricts the Confederation’s role and guarantees the cantons’ sovereignty, each one having its own constitution (Swiss Confederation 1999, Art. 3; Art. 51). The communes’ autonomy is also ruled by the Swiss constitution (Swiss Confederation 1999, Art. 50). This system of shared competences implies a rather decentralized power in Switzerland: every legal entity is subject not only to the federal law, but also to the local policies from the canton and communes in which it operates. These can notably differ from one place to another.

Consequently, climate action is studied from different geographic perspectives in this thesis: not exclusively policies of the canton of Geneva, and of the different communes within that canton—such as the cities of Geneva, Vernier, or Carouge for example—, but also of federal competences, as the Confederation’s policies affect certain environmental aspects to a large extent as well.

## **2.2 Implications of the Paris Agreement**

### **2.2.1 Overview of the Agreement**

The Paris Agreement was discussed and adopted at the COP 21, which took place in Paris between November and December 2015. This Conference of the Parties is held annually by the 197 Member States of the UN Framework Convention on Climate Change since 1995 (UNFCCC 2018a). While it represents a unique milestone in the international response to climate change, the Paris Agreement fits into a progressive process of realization and action with regards to global warming, which began in the 1980s and was then more developed during the 1990s. This long phenomenon of successive awareness, willingness to change and action-taking was conditioned by the development of scientific evidence with regards to climate change. As Le Treut et al. stated in their Historical Overview of Climate Change Science (2007), *“it was not possible to detect anthropogenic warming in 1980”*. Our ability as humans to scientifically link our activities with global warming only came a decade later, with studies such as Wigley and Raper’s (1990) and Stouffer et al.’s (1994). This helps explain why the international community’s reaction to climate change has not truly produced concrete actions such as legally-binding agreements before the 1990s. The creation of the UNFCCC in 1992 is one of the first steps toward international cooperation to respond to the issue of climate change, while the Kyoto protocol, which entered into force in 2005, was the first agreement to provide legally-binding emission reduction targets. This agreement aims at holding developed countries accountable for their largest shares in global GHG emissions and is also reviewed annually as part of the Conferences of the Parties.

The COP 21 in Paris gave birth to a landmark agreement, in part because the treaty both addresses the mitigation of global warming—that is, responding to its causes, being mostly GHG emissions—and the improvement of resilience toward the effects of climate change. Another factor that makes it a considerable step in the global willingness to combat climate change is the fact that the majority of countries—both in absolute terms and regarding the proportion of global emissions—have agreed over these decisions. As at March 30, 2018, 175 Parties have ratified the Agreement, out of the 195 that have signed it (United Nations Treaty Collection 2018). Those signatory countries account together for 99.76% of global GHG emissions (UNFCCC 2015b). By precaution, the emissions of the United States of America could be excluded from this number, as the US government has been announcing its intention to withdraw from the Agreement and to end the implementation of its nationally determined contribution (The White House

2017). The US account for 17.89% of global GHG emissions. Taking this factor into consideration, the countries that ratified the Agreement account for 81.87% of the total GHG emissions (UNFCCC 2015b).

The Paris Agreement aims at “*strengthening the global response to the threat of climate change*” (UNFCCC 2015a, Art. 2 par. 1), with three main objectives:

- Maintaining the rise in global temperature since pre-industrial levels well below 2°C, while pursuing additional efforts to limit this global increase to 1.5°C.
- Fostering the adaptability and resilience to the impacts of climate change, as well as low greenhouse gas emissions development, without compromising food production.
- Making finance flows consistent with this latter objective.

The Paris Agreement contains key principles on how Parties should respond to global warming, as well as the types of strategies that will be implemented in order to reach these objectives. While equity is an important principle of the Agreement that should be reflected in the implementation, the treaty also accounts for the differentiated responsibilities of the signatory Parties, as well as for each country’s respective capabilities depending on national circumstances. In that sense, nationally determined contributions (NDCs) of each Party constitute a key ingredient to the success of the Agreement, and allow every country to reflect its particularities, strengths, constraints and needs within its action plan, together with domestic measures to achieve them. An NDC shall be set and communicated by each Party every five years. This national objective states the efforts of each country, reflecting its “*highest possible ambition*” with an emphasis on progression over time (UNFCCC 2015a, Art. 3; Art. 4). Another essential principle of this Agreement is the line that is drawn between developed and developing countries, and special protective considerations that are provided for the countries that are the most vulnerable to the effects of climate change, such as small island nations. While developed countries are expected right from the entry into force of the Agreement to set out targets regarding reductions in their national emissions, the national contexts of developing countries are especially accounted for as to the time frame within which economy-wide GHG emissions reduction schemes should be set (UNFCCC 2015a, Art. 2; Art. 4).

The Agreement sets out the following key points as important measures that will be needed for a sustainable low carbon future. First of all, the threshold of 1.5°C to 2°C temperature increase will require Parties to “*reach global peaking of greenhouse gas emissions as soon as possible*” and to sharply reduce them thereafter (Art. 4 par. 1). To this end, countries aim at achieving a balance between anthropogenic emissions and

the removal thereof through the preservation of sinks and reservoirs (Art. 5). This removal process can namely be achieved through forests, which have a high potential for removing large amounts of CO<sub>2</sub> from the atmosphere (Kirschbaum 2003, p. 2), provided they are not subject to a process of deforestation or degradation, in which case their carbon footprint can be positive (Brown et al. 1995, p. 776). Voluntary cooperation between countries in the implementation of their NDCs is also recognized to “*allow for higher ambition in their mitigation and adaptation actions*” (UNFCCC 2015a, Art. 6 par. 1). Such cooperation is encouraged through the creation of a mechanism under the authority and guidance of the Conference of the Parties and on the basis of both market- and non-market-based approaches to climate impact reduction (Art. 6). In terms of adaptive capacity, resilience and reduction of vulnerability to climate change, the Paris Agreement states that all Parties “*should engage in adaptation planning processes*”. They are expected to strengthen their cooperation in this area by “*sharing information, good practices, experiences and lessons learned*”, “*strengthening scientific knowledge*” and “*assisting developing countries*”. All Parties also have the duty to communicate regularly in this matter by establishing and updating their “*priorities, implementation and support needs, plans and actions*” (Art. 7). Additionally, the Agreement requires Parties to engage in strengthened cooperation in pursuit of improved public climate change education and awareness (Art. 12).

Finally, transparency, measurement of global progress and compliance are provided for in Articles 13, 14 and 15. Parties must report information on mitigation, adaptation and support, and each of them shall undergo international review. A mechanism of compliance is also established, which consists of an expert-based committee, whose aim will be to facilitate the implementation as well as promote transparency in a non-adversarial and non-punitive manner. Once again, this process should be conducted with a particular attention to each Party’s specificities and capabilities. The assessment of collective progress toward the achievement of PA goals takes place every five years as of 2023, in the form of a *global stocktake* (Art. 14). This periodic milestone allows States to be informed of this progress with regular support and guidance on their actions, with the aim of enhancing international cooperation.

Support to developing countries in financial terms (Art. 9), technology development and transfer (Art. 10), and capacity building (Art. 11) is to be provided by developed countries in order for both their mitigation and resilience action plans to be more ambitious, and for a more effective implementation of the Agreement.

### 2.2.2 Application to subnational authorities

After reviewing the Paris Agreement's goals and objectives, as well as its terms of implementation, it is important to investigate and assess how the actions will be planned and implemented locally. We have been noticing that special attention is purposely given to each country's capacities and needs, but how is each entity supposed to specifically implement climate measures within its national boundaries? Answering this question will help us define what the role of cities should be in the Paris Agreement, in order to apply it to the local jurisdictions of Geneva.

When addressing the role of cities in the mitigation of climate change, one should first examine their responsibility in causing this phenomenon. More than half of the world's population now lives in cities, and the UN forecasts this proportion to increase to 66% by 2050 (United Nations 2014, p. 1). Moreover, studies suggest that urban areas are already responsible for 70% of global CO<sub>2</sub> emissions (International Energy Agency 2016, p. 3; C40 Cities Climate Leadership Group 2016, p. 92). One can argue measures planned and implemented at city levels are therefore crucial in order to keep the global temperature increase well below 2°C. Just as each country has specific needs, threats and capacities when it comes to climate change, so do subnational authorities such as local regions, states or cantons. This is especially true for Switzerland, due to the high extent of political decentralization that characterizes the distribution of powers in this country. In other words, the fact that Swiss cantons and cities hold a high degree of responsibility in most political areas means that some climate decisions, laws and measures will be taken at these local levels, hence the importance to grasp the role intended by the Paris Agreement for local authorities as such.

First of all, we can observe that the Agreement provides countries with general principles regarding the involvement of subnational entities in the mitigation and adaptation to global warming. The PA recognizes the need for engagement of all levels of government within States. Decision 1/CP.21—which is the document of adoption for the Paris Agreement—also promotes regional cooperation to mobilize cities and other subnational authorities for stronger and more ambitious climate action (UNFCCC 2016a, p. 3).

A few more specific guidelines are set regarding different areas of action. The first of them concerns the creation of a *“mechanism to contribute to the mitigation of greenhouse gas emissions”* (UNFCCC 2015a, Art. 6). The entities targeted here are *“public entities authorized by a Party”*, which can include subnational authorities such as Swiss cantons and communes, for instance. The same article also encourages Parties to use existing non-market approaches in order to foster public sector

participation in implementing NDCs. Regarding the second global goal of the PA, adaptation to the effects of climate change is recognized as affecting all local, subnational and regional dimensions of countries, among others. The Agreement draws attention on the fact that increased levels of mitigation action will undeniably lead to reduced needs for mitigation in the future (Art. 7). In the area of support to developing countries, the Agreement invites non-state Parties to also take part in this assistance on a voluntary basis with financial resources, which means cities might theoretically help countries that have special needs in achieving their NDCs (Art. 9). In terms of contribution to the provisions in the first few years of implementation, decision 1/CP.21 unfolds a specific capacity-building workplan for the years 2016-2020, with the aim of “ensuring the highest possible mitigation efforts in the pre-2020 period” (UNFCCC 2016a, par. 105). Cities and other levels of governments are called to identify opportunities to strengthen their capacity of mitigation, share their experiences and suggestions with national authorities, as well as facilitate the implementation of national policies and practices by working closely with them (par. 73, 109, 118).

Moreover, the Conference of the Parties calls on cities to unite their efforts to the global action through GHG reduction and measures that reduce their vulnerability to climate change. These individual efforts can be registered on a special online platform: the *Non-State Actor Zone for Climate Action*. Such actions respond to the formally-recognized needs for strengthened knowledge, technologies, practices and efforts of local communities (par. 133-136). Lastly, paragraph 136 reinforces the important role of incentives for GHG reduction in the involvement of non-State actors. Tools such as domestic policies and carbon pricing are mentioned.

This inventory regarding provisions for cities and local authorities allows us to draw two conclusions. First, other than recognizing the role of subnational authorities in the mitigation of and resilience to climate change, the PA does not formulate the concrete role of those local entities, nor does it mark off the limits of their jurisdiction, that is, in what sectors should cities be responsible for policies and measures. Second, this means that actions by cities entirely rely on each country's policies in the matter and for the moment, full interpretation for the implementation of the Paris Agreement is given to the States. More specifically, we can conclude that the nationally determined contribution of Switzerland should significantly determine the efforts of Swiss cities when it comes to specific local measures. The implications of these NDCs and the next steps of implementation of the Paris Agreement will be discussed further in the section *Achieving the objectives*.

### 2.2.3 Role of the private sector

Provisions regarding the role of the private sector in implementing the Paris Agreement are very similar to those that apply to subnational authorities. Indeed, the aspects of including various actors in mitigation, resilience and support to developing countries may also apply to business sectors. The UNFCCC fosters holistic and integrated measures that include all actors of societies, for example through non-market approaches that aim at enhancing private sector participation (UNFCCC 2015a, Art. 6).

However, the Agreement does not especially make more precise specifications regarding the role of the private sectors in each country's contribution, other than the following few points. First, introductory principles mention that the Agreement should be implemented with consideration to the transition of the workforce. Then, Decision 1/CP.21 on the adoption of the Agreement provides guidelines on the inclusion of the private sector in the climate action of countries. Those state that the private sector and financial institutions can and should help mobilize stronger and more ambitious climate action through enhanced regional cooperation (UNFCCC 2016a, Introductory remarks). This should be done, in part regarding pre-2020 action, through cooperation between Party and non-Party stakeholders for the latter to share their experiences and suggestions (par. 109); by welcoming individual efforts of non-Party stakeholders and registering them on the *Non-State Actor Zone for Climate Action* open platform (par. 117); by providing opportunities for high-level engagement of non-Party stakeholders (par. 109; 120); and by providing incentives for the reduction of emissions, such as domestic policies and carbon pricing (par. 136).

### 2.2.4 Achieving the objectives

At this stage, it is important to note the current advancement of the NDCs and what the next steps are as to how States will implement the provisions of the Paris Agreement. Countries were requested to submit their first nationally determined contribution “*no later than when they submitted their respective instrument of ratification*” of the Agreement (UNFCCC 2016a). As at March 30, 2018, 169 Parties have submitted their intended nationally determined contributions (UNFCCC 2018b). However, part of the implementation plan will be defined by the PA rule book, which is still under establishment by the Parties of the UNFCCC. It should be finalized by the end of 2018, probably during COP 24 which will take place in Katowice, Poland (UNFCCC 2016b; Minet 2017). This action plan is crucial, as it will constitute “*the foundation for much of*

*the work related to implementation of the Paris Agreement by Parties*” (UNFCCC 2017a, par. 18).

To this day, several studies have been conducted on the feasibility of the Paris Agreement, in light of the INDCs submitted by signatory countries. Rogelj et al. (2016) synthesize some of these studies and provide several temperature scenarios depending on the level of ambition of the international community and the achievement of the objectives set. With a probability of 66%, they conclude that if all countries conformed to their INDCs, global warming would be indeed limited, either between 2.9 and 3.4°C if unconditional measures were implemented exclusively, or between 2.7 and 3.1°C if conditional measures—i.e. those that require specific resources such as financial or technical support to be available—were implemented. On the other hand, continuing with current policies in place would lead to a rise in temperatures of 3.4 to 3.7°C, while a business-as-usual pathway would cause temperatures to increase by 3.9 to 5.1°C globally. These different scenarios are reflected in figure 1, with a comparison to the temperature objective that is set by the Paris Agreement.

These conclusions clearly show the urgency of this phenomenon and more ambitious NDCs and action by countries will be needed in the future in order for them to be compatible with the PA objectives of 2°C. Also, the opportunity for limiting warming to 1.5°C already seems deeply compromised (Rogelj et al. 2015). Although countries are on their way to lowering GHG emissions and global warming, current efforts will not be sufficient. They will need to be greatly and rapidly accelerated with ambitious measures, as the world is very far from complying with the Paris Agreement objectives at the moment.

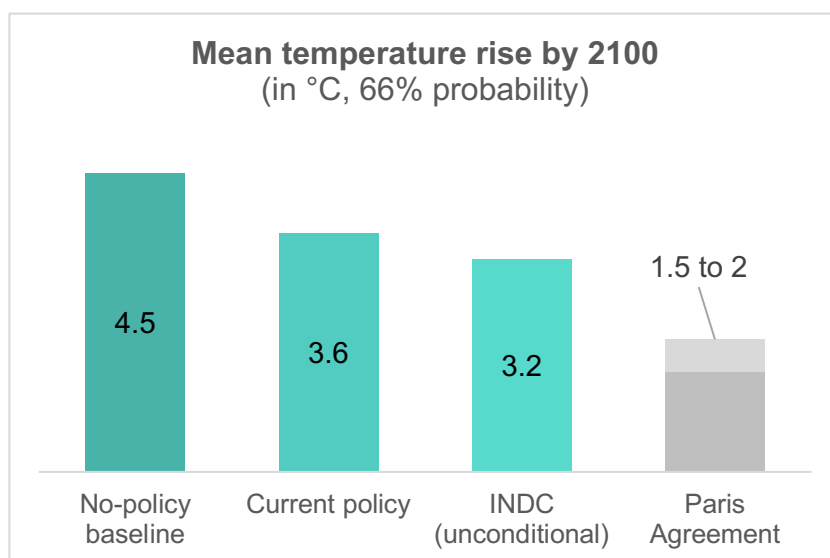
Another very interesting conclusion is reached, stating that *“additional national, sub-national and non-state actions is required to maintain a reasonable chance of meeting the target”* (Rogelj et al. 2016, p. 631). In other words, researchers agree that the objectives are very ambitious and will require drastic measures if we want to limit warming to below 2°C. The requirement of the Agreement that states NDCs have to be more and more ambitious year after year will absolutely need to be fulfilled. Finally, public policies regarding climate protection must be much more inclusive, in particular toward subnational authorities, the private sector and financial institutions.

Negative impacts of an increase in temperature superior to 2°C or even 1.5°C would likely be disastrous in terms of natural, human and financial consequences. Some natural habitats, such as the poles, glaciers and the great barrier reef, are already endangered

today, while extreme weather disasters happen more and more frequently around the globe. Human risks include considerable numbers of future refugees due to global warming—some international organizations warn about several hundreds of millions of displacements (Sunjic 2008). Research has also shown that the severity and frequency of extreme weather events are directly worsened by climate change in the majority of cases, and cause thousands of deaths and billions of dollars of economic damage (Energy & Climate Intelligence Unit 2017). Food production and water availability also constitute critical needs of which supply will be compromised in case temperature increase is surpassed by more than 2°C, especially in developing, warmer and drier regions. However, developed countries such as Switzerland are not spared either and will also have to face some disastrous effects of climate change, as well as considerable mitigation and adaptation costs (OFEV 2018, p. 18).

The following chapters review the plans, policies and measures that target climate change in Geneva, with a particular focus on those that are aimed at or affect the private sector.

**Figure 1 – Global temperature forecasts according to different scenarios**



Source: Adapted from Rogelj et al. 2016, p. 634

## 2.3 Confederation policy

In this chapter, the concept of sustainable development is briefly cited, as defined by the Swiss Confederation. The core of the climate policies in place at the federal level is then reviewed, in line with the objectives of the Paris Agreement. This is important in order to understand the broader context of local policies that are in place in Geneva, as well as the national directives that affect private businesses locally.

Climate policy in Switzerland takes root in the concept of sustainable development, which began to be discussed and implemented in the law during the 1990s. This concept is included in the Federal Constitution since 1999 as one of the supreme goals of the Confederation (Swiss Confederation 1999, Art. 2 par. 2). The definition of sustainable development that is retained by the Swiss Federal Council—and widely recognized as accurate—is *“development that meets the needs of the present without compromising the ability of future generations to meet their own needs”* (Swiss Federal Council 2016, p. 12; World Commission on Environment and Development 1987, p. 37). It is then undeniable that the protection of the earth, as well as the fight against global warming constitute a crucial part of sustainable development. Indeed, climate change compromises the ability of future generations to meet their needs, be it food, water or shelter among others. Hence the important commitment of the Confederation to *“the long term preservation of natural resources”* (Swiss Confederation 1999, Art. 2 par. 4).

The Art. 73 and 74 of the Constitution state the following:

*“The Confederation and the Cantons shall endeavour to achieve a balanced and sustainable relationship between nature and its capacity to renew itself and the demands placed on it by the population.”*

*“The Confederation shall legislate on the protection of the population and its natural environment against damage or nuisance.*

*It shall ensure that such damage or nuisance is avoided. The costs of avoiding or eliminating such damage or nuisance are borne by those responsible for causing it.”*

These principles imply the responsibility for the State, at different institutional levels, not only to ensure the adequate utilization of natural resources, but also to take measures against global warming as a phenomenon that may create long-term damage for the population.

The next sections aim at depicting the strategies of the Confederation in terms of climate action, according to the different political sectors affected and the types of instruments

used. The goal is to be as comprehensive as possible concerning policies that apply to the private sector, particularly at the local level and within urban areas.

### **2.3.1 Sustainable Development Strategy 2016-2019**

In line with the above constitutional articles, the Federal Council lays down its action plan for sustainable development every four years, the current one applying to the years 2016-2019. This action plan constitutes the foundations of what is recommended by the Federal Council in terms of sustainable development, giving the medium- to long-term political priorities in the matter. The present objectives are directly inspired by the 2030 Agenda for Sustainable Development of the UN (Swiss Federal Council 2016, p. 6). They are meant to become more and more aligned to the seventeen Sustainable development goals (SDGs) contained in that global Agenda (p. 5). Thus, the Strategy 2016-2019 encompasses the three dimensions of sustainable development—economic, social and environmental—tackling most of the aspects covered in the Paris Agreement under the latter dimension.

The Strategy discusses the issue of implementation of sustainable principles at the different levels of government, including cantons and communes. It also takes into consideration partnerships that will be needed with the various actors of society, such as the private sector, civil society and stakeholders from scientific fields of study (p. 65-66). In this matter, the Federal Council has been organizing a process of consultation that lasted six months, prior to the elaboration of this strategy. The goal was to assess the *“interests, points of view and objectives with regard to sustainable development”* of the stakeholders that will be at the heart of these public policies (p. 5). Indeed, sustainable development and its objectives are very broad, and the constraints, aims and levels of engagement of various stakeholders need to be evaluated before being able to draw up nationwide policies that will affect them all in different terms. Considering climate change, two different citizens—e.g. the top manager of a company in the city of Zurich and a farmer living in the Graubünden Alps—will be affected in significantly different ways by this phenomenon in the future, both individually and in their businesses. For instance, farmers might need solutions that will help them mitigate future risks of droughts, while business workers might be concerned by the risks for their employees to suffer from heat peaks in the summer caused by the phenomenon of urban heat island. The Federal Council has been drawing medium-term objectives from various stakeholders' insights. The measures proposed to the Confederation are laid down in this *Sustainable Development Strategy*.

The report thus not only serves as a strategic plan for the activities of the Confederation, but also provides a “*reference framework for other actors*” (Swiss Federal Council 2016, p. 6). In that sense, it mentions the concept of synergies between public entities, which are encouraged, while diverging objectives should be identified and resolved where possible (p. 57). The report also emphasizes the fact that cooperation between public authorities—Confederation, cantons and communes—and actors from the private sector will be important. It also states the Federal Council’s wish to better coordinate the implementation of sustainable development at a national and international level. Moreover, it calls for the creation of monitoring systems that include non-state measures, as well as a proper communication of the results (p. 10).

Concerning the sectors of action, this strategic plan targets nine different themed action areas that encompass the 2030 Agenda’s 17 SDGs, without necessarily adopting the same structure. Four of these action areas can be considered as directly related to the objectives of the Paris Agreement:

- Consumption & production (#1)
- Urban development, mobility & infrastructure (#2)
- Energy & climate (#3)
- Natural resources (#4)

On the one hand, sectors number 1, 2 and 3 contain activities that directly contribute to global warming through GHG emissions. On the other hand, sector number 4 is linked to the PA objectives because the preservation of some natural resources, such as forest lands, is essential in order to reduce the amount of GHG in the atmosphere (UNFCCC 2015a, Art. 5). In addition, the objectives of “*enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change*” (UNFCCC 2015a, Art. 7) are evidently sought after within the areas of *urban development, mobility & infrastructure* and *energy & climate*.

The Federal Council considers the dissemination of this sustainable development plan as a key step for cantons and communes. They should implement these principles as well as establish their own policies in order to contribute to the 2030 Agenda and the SDGs. The Strategy emphasizes on the necessity for cantons and communes to integrate these sustainability principles throughout their activities and responsibilities, without considering sustainable development as a separate activity (p. 66). The Confederation fosters cooperation between the different levels of government through three main concrete tools. First, the use of the exchange platform called *Sustainable*

*Development Forum* allows local authorities to benefit from the Confederation's technical support and activities. Second, a support to specific initiatives is given through the *Sustainable Development Promotion Program*, as well as the ability to share knowledge and experience on best practices and to monitor progress through the *Cercle Indicateurs* network for cantons and cities. Third, a couple of projects are being examined to foster cooperation between key cantonal decision bodies and the Confederation. This is namely done through a new joint program, which aims at drafting the local terms of implementation of the *Sustainable development strategy*; the creation of intercantonal structures on the matter; and the joint participation to the European Sustainable Development Week (p. 62).

Regarding the involvement of the private sector in the implementation process of this Strategy, much still needs to be determined. While the Federal Council encourages a broad inclusion of all different sectors, both public and private, the consultation of these stakeholders has only been done during the preparation phase of the strategic plan yet. However, it is mentioned that partnerships between them are encouraged and should be focused on the sectoral levels before being extended to policies at the national level (p. 66).

### **2.3.2 The Swiss intended nationally determined contribution**

In order to place climate action undertaken by Switzerland into the context of the Paris Agreement, it is also important to consider its first nationally determined contribution, also called INDC. It was submitted by the country on the same day as ratification of the Agreement, on October 6, 2017 (OFEV 2017d). The global commitment of Switzerland is to “*reduce its greenhouse gas emissions by 50 percent by 2030 compared to 1990 levels*” (UNFCCC 2017b). This is translated into a reduction of 35% by 2025 as well as an average reduction of 35% over the period 2021-2030. Covered in the reductions measures are the following greenhouse gases: “*CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFCs, PFCs, SF<sub>6</sub>, NF<sub>3</sub>*”, emitted in the sectors of “*energy; industrial processes and product use; agriculture; land-use, land-use change and forestry; waste*” (p. 1).

The implementation of this first NDC will be based on the revision of the federal Law on CO<sub>2</sub>. Supporting measures will be discussed and organized, some of which are built on existing strategies (p. 1). The new project of law is discussed in the next section.

### 2.3.3 Revision of the Law on CO<sub>2</sub>

Following the INDC of Switzerland, the Federal Council launched the revision of its national legislation on CO<sub>2</sub>, for which parliamentary debates should start in 2018 (OFEV 2017g, p. 26). As for the *Sustainable Development Strategy*, a process of consultation preceded the elaboration of this legislation project, during which all cantons and a number of municipalities, as well as many representatives of the private sector were asked to give their stance both on the ratification of the Paris Agreement and on the legislation project on CO<sub>2</sub> (OFEV 2017c, p. 5; p. 67). This shows Switzerland's strong intentions, not only to include the regional jurisdictions into the efforts to mitigate global warming, but also to put a great emphasis on action conducted by the private sector, which massively endorsed the commitments of Switzerland toward the Paris Agreement (OFEV 2017c, p. 17-18).

This revision project targets a global temperature increase inferior to 2°C (Federal Council 2017). Furthermore, sector-specific objectives may be set by the Confederation, as well as for other emissions resulting from the use of fossil fuels. This project also specifies that the Confederation may set other reduction objectives in partnership with specific groups of companies or business organizations. In the sector of buildings “*CO<sub>2</sub> emissions resulting from fossil fuels [are to be] reduced in 2026 and 2027 by 50% on average related to 1990*”, which is under the cantons' responsibility (Art. 8).

The Law on CO<sub>2</sub> provides the conditions of execution required to reach these objectives. First of all, a role is given specifically to the Swiss cantons to enact new standards for new and existing buildings (Art. 8). Second, measures are taken in the sector of private vehicles to ensure that touring cars, delivery vehicles and some agriculture vehicles respect specific limits of emissions (Art. 10). In addition, three more extensive sets of measures are enacted in relation with the use of fossil fuels.

The first one is an emissions trading scheme (ETS) in the form of an instrument of emission quotas that can be exchanged in case of excess in emissions—also known as cap-and-trade system. Simply stated, this mechanism requires companies that operate in specific sectors of emissions—some of them still to be determined by the Federal Council—to restrain to specified quotas of GHG emissions, lest they be compelled to purchase additional emission rights to a less-emitting operator, or to pay CHF 220 per ton of CO<sub>2</sub>-equivalent generated. (Art. 18-26). Thus, this system operates under conditions of market economy and aims to limit GHG emissions to a certain level in industries that are particularly subject to high emissions. It is worth noting that the Swiss ETS should be combined to the system of the European Union, allowing Swiss and UE

companies to be set on equal footing and aligning both CO<sub>2</sub> prices. The legislative process for coupling these two systems is currently underway and should come into effect by 2020 (OFEV 2017f, p. 2).

The second set of measures is a compensation system for any entity that sells fossil fuels. The principle states that such activities should be compensated by certificates and by releasing renewable fuels for consumption (Federal Council 2017, Art. 27).

Finally, the third set of measures comes in the form of a simple tax on CO<sub>2</sub> levied on the fabrication, production, extraction and import of fossil fuels. The amount of this tax is set by the Federal Council between CHF 96 and 210 per ton of CO<sub>2</sub> (Art. 31). Several provisions exist allowing some operators to benefit from tax refunds with strict conditions. Among them are operators that have committed to an emission reduction scheme with the approval of the Confederation (Art. 33-34). The use of revenues resulting from this tax is also supervised by this legislation project. Recipients may be cantonal programs for emission reductions in the stationary sector, geothermic projects for heating production and programs aiming to foster technologies that reduce GHG (Art. 39-43). The potential part of tax revenues that is not allocated in such ways may be redistributed to the population and companies (Art. 41).

As a conclusion notice, one should remember that this revised law still depends on the Parliament to be accepted, meaning that any measure or objective could be negotiated and modified.

### **2.3.4 Revision of the Law on Energy**

Before carrying on with the presentation of policy at the cantonal level, we will mention a final piece of legislation that has also been recently in the process of revision: the Law on Energy. This legal text was approved by popular vote on May 21, 2017 under the title *2050 Energy Strategy* and entered into force on January 1<sup>st</sup>, 2018—along with nine novel or revised legal orders in the same area of law (Office fédéral de l'énergie 2017b, p. 1). The Law on Energy rules the principles that should be followed by authorities, energy suppliers, designers, manufacturers and importers of installations, vehicles or energy-consuming devices. They should ensure that energy is used in an efficient and economical way; that an important part of the energy supplied is covered by renewable energy that should be increased over time and with a good energy-cost ratio; and that costs of energy are covered as much as possible by the polluter pays principle (Assemblée fédérale de la Confédération suisse 2016, Art. 5).

This latter standard is applied as a general principle in the *Swiss Federal Act on the Protection of Environment*, and states that “*any person who causes measures to be taken under this Act must bear the costs*” (Assemblée fédérale de la Confédération suisse 1983, Art. 2).

The revised version of the Law on Energy implies new measures that should contribute to reaching its objectives and have been adopted by the Parliament. Some of them have been discussed earlier on, as they affected the new Law on CO<sub>2</sub>. However, a few specific measures should be raised here as they concern the private sector. In the domain of energy reduction and efficiency, it is intended for old, mechanic electricity meters to be replaced by innovative, smart meters (Federal Council 2008, Art. 8a). This may very well imply the necessity to call on private companies for technology development and operation. Besides, the Confederation has recourse to public invitations to tender for projects that aim at reducing energy consumption in industries, services and households (Assemblée fédérale de la Confédération suisse 2016, Art. 32). Research is also supported by the Confederation and can lead to financial contributions to actors who engage into R&D in the sector of geothermal energy, notably (Art. 33). Regarding the development and maintenance of renewable energy installations, the Confederation has facilitated the process of authorization and offers subsidies to encourage retribution and investments into renewable energy projects (Art. 12, 14, 19).

Measures concerning nuclear power have not been discussed in this section due to their relatively low contribution to GHG emissions. However, one can note that the *2050 Energy Strategy* legislates on the progressive abandonment of this type of energy in Switzerland (Assemblée fédérale de la Confédération suisse 2018, Art. 12a).

## **2.4 Cantonal policy**

In this chapter, we review the cantonal measures that constitute the efforts of Geneva when it comes to climate change, continuing with the same specific approach toward the private sector.

The canton of Geneva has been the first Swiss canton to pass a *Law on public action for sustainable development*, also known as Agenda 21. This bill was adopted as a response to the engagements taken by Switzerland at the UNCED in Rio de Janeiro in 1992 (Grand Conseil de la République et canton de Genève 2016, p. 1). It works as a global framework for the *Cantonal service of sustainable development*, which oversees its application and provides guidance to the various actors on the cantonal territory through a *Concept of sustainable development* (Art. 3). However, sustainable development and climate protection in particular find their roots directly in the Constitution of the canton. Contrarily to the Swiss Constitution, it includes an article on climate action, which reads: “*The State implements policies proper to reducing greenhouse gases*” (République et canton de Genève 2012, Art. 158). This suggests the aim of the canton to put climate amid its conducting principles and to make it an integrated objective, throughout the different political sectors of public administration.

This notion of integrated implementation can be found in the Agenda 21, which states that the entirety of activities managed by public authorities should follow an objective of sustainable development (Grand Conseil de la République et canton de Genève 2016, Art. 1). The department in charge of sustainable development is accountable for applying this law and ensuring that action is consistent and cross-disciplinary (Art. 3). Moreover, cooperation between the canton, communes, neighbor cantons and frontier territories is required in order to put this action plan in motion (Art. 8; 10). As usual, the three aspects of development are sought: economic efficiency, social solidarity and ecological responsibility (Art. 1). We will now concentrate on the latter sphere, with regards to the objectives of the Paris Agreement.

Action on the basis of the cantonal Agenda 21 is articulated around two main layers. First, the *Cantonal concept of sustainable development (CCSD)* constitutes the strategic objectives that will lead to a sustainable management of Geneva and its region (Art. 4). Second, the *Action plan*, which provides the concrete measures to achieve the CCSD (Art. 5). Climate change mitigation benefits from a separate action plan—the *Cantonal climate plan*—which is dedicated to the two objectives of reducing GHG emissions and adapting to climate change. Concretely, the canton has adopted the objective of reducing GHG emissions by 40% between 1990 and 2030 (SCDD 2015a, p. 21).

As mitigation of climate change is viewed as an integrated, interdisciplinary activity, related objectives and measures can be found throughout the departments of the State of Geneva—e.g. the *Department of environment, transports and agriculture*; the *Department of urban planning, housing and energy*, etc. Consequently, an assessment of climate action undertaken by the canton will now be presented throughout the different sectors, with the aim of identifying what role is intended for the private sector, and what are the tools, policies and partnerships in place to “*support and encourage [companies] to integrate the principles of sustainable development*” (Grand Conseil de la République et canton de Genève 2016, Art. 10). This analysis will be conducted on the basis of the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (Fong et al. 2014), which is widely adopted globally to report emissions of urban communities—such as by over 7,400 cities as part of the Global Covenant of Mayors for Climate & Energy (2017). This standard classifies emissions according to six different sectors: stationary energy, transportation, waste, industrial processes and product use, agriculture, forestry and other land use, and other scope 3 emissions (Fong et al. 2014). Moreover, this inventory method is very similar to the UNFCCC reporting guidelines as per decision 24/CP.19 (revision 2014), with only two main exceptions. On the one hand it allows the separation of the UNFCCC’s energy segment into stationary and transportation subsegments. On the other hand, it regroups agriculture and land-use, which is more convenient for the scope of this report due to the relatively low applicability of these matters to the private sector (UNFCCC 2014). Finally, we will consider what measures are being undertaken in terms of resilience to the adverse effects of climate change, as per the second goal of the Paris Agreement.

### 2.4.1 Stationary energy

The reduction of GHG emissions in the stationary sector is globally covered by the buildings axis of the *Cantonal climate plan* (CCP), with the objective of reducing the dependency of buildings on fossil fuels and of promoting the use of renewable energies (SCDD 2017, p. 10). This sector makes use of several principles and policies to achieve these two objectives. First, the CCP mentions 11 measures that are either planned or already in the process of implementation (p. 11). This first set of measures should allow a reduction of CO<sub>2</sub> emissions by 29% by 2030. They cover building insulation and efficiency in temperature regulation—i.e. heating and cooling—as well as programs for innovative sources of energy—i.e. renewable energies. The types of measures included are subsidies; specific partnerships with public entities (e.g. SIG); efficiency programs; and awareness programs for households and companies. Second, another series of

measures is provided aiming at reducing CO<sub>2</sub> emissions in the stationary sector by another 15%. These additional measures partly affect the private sector to the extent that they concern all buildings including offices and industrial premises. They aim at banning fossil fuel heating and fostering clean current production in newly-constructed or renovated buildings; reducing the fossil fuel consumption of new heating systems; and encouraging the construction of buildings that are autonomous in terms of energy (p. 12).

Concrete measures in place in the domain of stationary energy are mostly subsidies that exist under various forms and incentivize different types of behaviors that imply energy savings. Again, the private sector is concerned as well as the civil society and public institutions to the extent that these instruments target all kinds of buildings on the territory. First of all, the canton is allocated every year by the Confederation a budget to incentivize projects—either construction or renovation—that improve the energetic efficiency of buildings (Office cantonal de l'énergie 2018). This amount is 75% financed by the federal tax on CO<sub>2</sub> and allows the State of Geneva and SIG—the electricity, water and gas provider in Geneva—to reward new climate-friendly installations such as insulation of walls, roofs or windows; solar panels; and heat pumps (p. 2). In 2018, the budget obtained by the canton of Geneva amounts to CHF 32 million for this program (p. 1).

Another vast and significant program that contributes to lowering GHG emissions in the stationary sector is called *Programme éco21*. It was launched in 2007 by SIG and consists of an extensive program of assisted energy savings for all types of stakeholders. Companies in particular can benefit from professional advice and monitoring, as well as practical tools for reduction measures in their buildings. SIG offers experts that help businesses assess their energy consumption as well as plan, implement and monitor progress in terms of energy savings. It also provides trainings for the private sector and several types of incentives to reduce electricity or energy consumption, such as subsidies and financial support for quality standards processes—e.g. for obtaining ISO 50001. Éco21 aims at supporting management teams in the implementation of an energy management system and at incentivizing low-energy realizations. The program claims it has allowed the canton to avoid 113,000 tCO<sub>2</sub> (SIG 2018b).

A specific policy around the label Minergie ® allows owners of buildings with high energy performance to benefit from real-estate tax exemptions in the canton of Geneva (Office cantonal de l'énergie 2014). These measures particularly target actors of the private sector that manage the construction or renovation of real estate properties. Moreover, the association Minergie itself was founded as a partnership between members of public entities, companies and citizens (Association Minergie 2018).

Finally, renewable energy is encouraged and incentivized through two specific measures. The first one allows any building owner interested in installing solar panels to get initial subsidies at a federal level (Pronovo AG 2018a) and for any owner of renewable energy systems—hydraulic, solar, wind-powered, biomass and geothermal—to apply for retribution subsidies, that is, being able to sell back extra-produced electricity. However, due to limited means at their disposal, these programs are nowadays very difficult to obtain and are allocated based on a waiting list (Pronovo AG 2018b). The second measure is specific to the canton of Geneva and mostly applies to the private sector. It is a cantonal fund that aims at developing renewable energies and projects for energy savings (Grand Conseil de la République et canton de Genève 1999). The benefits allocated can greatly vary in the sense that the program depends on a special public commission that assesses every application based on various criteria such as the aims pursued, the profitability, the duration of each project and their expected energy consumption. They can notably be granted as loans, tax or fee exemptions and subsidies, of which the amount is determined by the commission (Art. 7).

## **2.4.2 Transportation**

This second sector of emissions is tackled by the axes of *Mobility* and *Urban planning* within the CCP, with two main aspects: modes of transportation and their respective efficiency. Indeed, the canton aims at increasing the use of non-motorized modes of transportation and public transportation, while reducing the climate impact of motorized vehicles thanks to technological improvements. Current measures, either already implemented or under implementation, should already bring a decrease of CO<sub>2</sub> emissions of 16% by 2030 (SCDD 2017, p. 13). Additional measures provided by the CCP must reinforce non-motorized modes; reduce the proportion of diesel vehicles in public transportation; foster electric vehicles; study and implement a concept of Smart Mobility in Geneva; and take into account climate issues in freight road transportation. These should account for an additional reduction of 16% in CO<sub>2</sub> emissions (p. 14). Concrete policies that should help leverage the engagement of the private sector focus on incentives; private promotion; the development of infrastructure; shifts in

transportation habits—e.g. home-work distances—; technological solutions; and the rethinking of how companies organize their shipping (p. 15)—e.g. through e-commerce, sharing company vehicles, non-motorized shipping, incentivizing less-polluting vehicles, etc. (*fiches* 2.1-2.5).

Besides, the canton's plan with regards to transportation is laid out in more details in the documents *Mobilities 2030*, *Action plan for non-motorized mobility 2015-2018* and *Strategy of electric mobility 2030*. We will now explore the opportunities and duties laid out in each of these reports for the business sector.

#### **2.4.2.1 Mobilités 2030**

“Mobilités 2030” is the long-term strategy of the canton of Geneva for the whole sector of transportation. It establishes the objectives of the State Council regarding how to respond to the growing needs for mobility in the canton; how different modes of transportation should evolve and coexist; and what modes should be favored over others with specific measures (Direction générale de la mobilité 2013). The document outlines three main steps that should be implemented respectively around 2020, 2025 and 2030 in order to invest in the most promising sectors, relieve the most saturated geographical areas and means of transportation, and optimize journeys around the territory (p. 6).

First, an urban train line—named Lemman Express—will connect the two cantons of Geneva and Vaud with neighboring France is under construction, along with several accompanying measures (p. 46-47). Second, capacity-building measures will be conducted on the belt highway, the central station and public transportation with tramways (p. 48-49). Third, the realization of a major bridge will connect the two banks of Lake Geneva (p. 50-51). These substantial projects may bring tremendous opportunities for the private sector. However, another aspect seems just as important in essence for the private sector: the canton expects and calls for new, emerging practices in mobility for the years to come and wishes to respond with adaptation (p. 6). Hence the importance of identifying the role and measures intended for business actors in these emerging strategies, in light of the integrated goals resulting from climate change principles. However, such action is rather scarce in the strategic document.

While a short paragraph at the end of the report (p. 86) does call for all actors to join public entities in implementing this strategy, only a few measures can be considered as truly aimed toward business actors. A few management measures concern company policies that aim at encouraging alternative modes of transportation to motorized vehicles. In that sense, the report states that companies should avoid offering their

employees free parking space, in order to discourage them from choosing the car as a mode of transportation (p. 19). Another important point is made regarding individual companies' plans for transportation: they can create an important leverage effect in fostering public or non-motorized transportation and should be encouraged (p. 38). In this matter, a document was created in 2004, jointly between the cantons of Geneva and Vaud, and addressed to companies. It contains specific information on how to implement such company plans (Canton de Vaud, République et canton de Genève 2016; Prina 2018, app. 4). Public parking space in the streets is also tackled in *Mobilités 2030* and should be diminished to favor privately-managed parking lots, among other types (p. 69).

Finally, important considerations are expressed as a framework for professional transport and for transportation in the tourist industry. Professional traffic such as delivery or taxi services are to be facilitated in the city center compared to individual traffic (p. 63, 74). A lack of proper conditions for traffic is especially recognized in these areas, which justifies special provisions to facilitate the delivery of goods and passengers. Consequently, public infrastructure such as parking and delivery spaces should be adapted to such issues; emissions coming from freight road transportation should be minimized; and itineraries should be more studied and standardized. Rail should also benefit from improved conditions of transportation for goods, while innovative vehicles are to be fostered (p. 74). The canton also witnesses the proliferation of e-commerce and thus postal delivery, which requires greater capabilities and creates more GHG emissions. Infrastructure should also be improved in this domain, such as through exchange points, innovation in vehicles and service developments. These strategies correctly identify recent trends in modes of transportation and the requirements they induce. They will need to be translated into concrete actions and measures to foster the participation of businesses. One can expect it to be the case as part of the "*Plan directeur multimodal*" and the different *Sectoral action plans* that are meant to be developed within the next few years, some in revision of the previous ones (p. 11).

#### **2.4.2.2 Existing sectoral plans**

In addition to the vast *Mobilités 2030* strategy that draws general objectives for all the different types of transportation, several sectoral plans exist to define the priorities of the canton. This subsection briefly covers what stands out of these plans for the private sector in four modes of transportation: combustion car, electric car, bicycle and public transportation.

First of all, it is important to note the cantonal strategy in place to foster low-emission private vehicles. It follows a system of bonus-malus that rewards owners of cars emitting less than 121 g of CO<sub>2</sub> per kilometer with a 50% reduction on their vehicle tax, while owners of cars emitting more than 200 g of CO<sub>2</sub> per kilometer get a tax raise of 50%. Companies can specifically get other types of tax exemptions—up to full exemption for delivery vehicles for example (Direction générale des véhicules [no date]). Moreover, the engine power of all vehicles is also factored into the calculation of vehicle tax, which means more powerful vehicles—which emit more as a matter of fact—are taxed more heavily (Service cantonal des véhicules [no date]). One can consider those financial instruments as affecting the private sector for two reasons: first because they partly directly concern professionally-owned vehicles; and second because they have an effect on the market for private vehicles. Thus, this tax system drives consumers to take advantage of the more advanced types of technology in the automotive industry, in terms of engines with lower fossil fuel consumption and emissions.

In a second phase, measures aiming at the adoption of electric vehicles on the territory should also be considered. They are separated into two types of measures, the first one being public infrastructure policies and the second one consisting of financial instruments aimed at making the acquisition and usage of electric vehicles more attractive. On the one hand, the canton of Geneva is building new infrastructure for electric vehicles to facilitate their adoption, in particular via charging stations. Some of them include partnerships with the private sector, though their management and conditions of operations are still being discussed (Direction générale de l'environnement 2017, p. 27). While part of the charging stations for electric cars should be privately installed in households, some vehicle owners are unable to do so. Thus, the State of Geneva wishes 1,300 charging stations to be installed on the streets for easier access (p. 22). This creates interesting opportunities for private companies. Indeed, the construction and management of these public stations may function under public concessions under the conditions of free market and open competition (p. 27). Examples of these opportunities are already numerous. Some shopping centers try to install charging stations; businesses in the electricity sector—e.g. ABB, Schneider electric and some Swiss startups—take advantage of this market development; and some gas stations such as SOCAR also enter the business of charging stations (p. 8). Meanwhile, this industry also represents an interesting example of public-private and B2B partnerships that begin to flourish, including publicly-controlled companies such as SIG and the *Fondation des Parkings*, and private actors as part of the *EVite*, which assembled private companies willing to offer public charging stations throughout the country (p. 8). On the other hand,

a set of financial instruments is also being implemented. While the State is not willing to offer subsidies on the purchase of electric car itself, other subsidies and free services do exist that are meant to be extensive. Some of them require federal policies and laws to be adapted, which means that Geneva is willing to position itself as a pioneer and defend them in front of the Confederation and other cantons. Full tax exemptions are intended on private grid installations (p. 28), while since 2018, vehicle taxes are waived for owners of new electric vehicles for three years (Office fédéral de l'énergie 2018). Additionally, owners of electric vehicles may benefit from free recharge in public parking lots—while recharge in street stations will probably be charged—and company fleets of electric vehicles may also get significant benefits in terms of exclusive access and parking space in some urban areas (p. 29). Once more, these policies partly concern the private sector as they imply the potential development and generalization of technological progress that arises from businesses, such as startups in electricity sectors and corporations from the automotive industry, or even petroleum industries seeking to reinvent themselves through cleaner energy sources.

Third, the use of bicycles is a transportation mode that Geneva wishes to widely encourage as well. Two concrete measures go along this objective in the private sector. An important one is that a complete guide has been issued for different stakeholders, among which companies, to support them in creating bicycle parking installations. This means that businesses can benefit from specific guidelines to foster the use of this mode of transportation among their employees. The second one offers ready-for-use solutions to companies, allowing their employees to use electric bicycles with renting and maintenance services. These services are offered by a nonprofit association called *Genèveroule* which partners with the canton of Geneva as well as several communes and companies (Genèveroule [no date]).

Finally, also noteworthy is to recognize a significant project that has emerged in the sector of public transportation under the name of TOSA. This world premiere that originated in Geneva features state-of-the-art technology in the form of a new bus relying solely on electricity, which recharges in 20 seconds at each bus stop (République et canton de Genève 2017). It is currently being tested on a bus line in Geneva. Even more relevant to our topic is the way this venture has been conceived, constructed and operated as a partnership between key actors. The canton and the Confederation represent the public interests together with SIG and TPG—both publicly-controlled companies—while the fact that private company ABB Sécheron SA has been taking care of the technical parts illustrates an interesting public-private partnership.

### **2.4.2.3 Geneva international airport**

It seems important to dedicate a few paragraphs to the issue of the Geneva international airport due to its significant contribution to the GHG emissions inventory of Geneva. In effect, this airport was responsible in 2016 for 23% of the total emissions of the canton—1,346,285 tCO<sub>2</sub>e in absolute number (SCDD 2015a, p. 11). This sub-sector alone is the second heaviest in GHG emissions—only after residential buildings which account for 24%—and represents more than half the emissions in the whole transportation sector (p. 10). Emissions that have been accounted for are those resulting from all passenger flights departing from Geneva.

Admittedly, the international significance of this airport must be taken into account in order to assess the responsibility of the canton of Geneva in those emissions. Indeed, inhabitants of the canton only account for 22% of the passengers of this airport (SCDD 2017). The vast majority of passengers come from other regions, namely other Western cantons of Switzerland, French departments of Haute-Savoie and Ain, but also passengers from all over the world (p. 10).

Thus, emissions objectives concerning the airport of Geneva have been separated from the *Cantonal climate plan* for two main reasons. First, the airport is under the shared responsibility of the canton, the region and the Confederation. Second, emissions resulting from aviation activities are not regulated under the Kyoto protocol of 1997 and this issue has not been tackled either in the Paris Agreement. As the traffic of the airport has been growing rapidly over the last years, the objective of the canton is to bring emissions back to the level of 2014 by 2030. Future technological progress and improved fuel efficiency are relied upon in order to compensate the expected continuing growth of the airport's activities. Nevertheless, this stabilization objective is recognized as an important challenge for the aviation industry (p. 26).

A financial instrument is currently leveraged by the Geneva international airport in order to encourage airlines operating in Geneva to lower their flights' GHG emissions. Airlines pay a tax on GHG emissions which is calculated according to the emission coefficient of their aircraft engines (Geneva Airport 2018, p. 11).

### 2.4.3 Waste

The waste policy of the canton is laid out in the *Waste management plan 2014-2017*—still in effect today (Commission de gestion globale des déchets 2015). Objectives seeking to engage the private sector in waste reduction were to improve the awareness of companies for waste matters, and to recycle 70% of companies' urban waste by 2017, with the following main measures:

- Implementing the polluter pays principle (p. 16)
- Developing programs for collecting and recycling specific types of waste from companies (p. 17)
- Deploying “*Éco-contrats*” between communes and companies, i.e. business-tailored partnerships that allow a company to contribute to the reduction, recycling or elimination of the waste it produces. (p. 20)
- Fostering industrial ecology through the creation of “*Écoparcs*”—i.e. local industrial parks that allow several companies to regroup their waste (p. 30)

### 2.4.4 Industrial processes and product use

Unlike the first two sectors we have examined, no binding measures are provided in the area of product use and consumption, which are the two segments that correspond to our *Industrial processes and product use* sector. Action in this sector contains measures of awareness, facilitation and development of tools for the private sector. In the absence of binding measures such as taxes or restrictions, and with the continuation of business-as-usual practices, the canton expects an increase of 5% in CO<sub>2</sub> emissions until 2030 in the area of product use and consumption. However, novel measures planned as part of the CCP could allow Geneva to reduce the global CO<sub>2</sub> impact of product use by 31%. Some of these measures are aimed toward the private sector: education of personnel in the catering industry; and creation of a framework against planned obsolescence. Moreover, a comprehensive guide has been issued by the canton of Geneva in partnership with the canton of Vaud and several communes, with the aim to create awareness among companies and foster green B2B supplies. The *Guide of sustainable professional procurement* helps companies assess the durability of a wide array of products and make procurement decisions that take into account environmental factors.

Finally, the Best for Geneva program is an individual initiative that seems worth mentioning as well in this sector, as an innovative program especially aimed toward companies. Its purpose is to foster sustainable practices among companies in the canton via two simple and free steps. First, companies may assess their practices' impact on the environment, their employees and society in general. Then, they may complete their registration and benefit from resources and workshops organized by the State of

Geneva, in order to improve their CSR practices. Thus, the tool not only concerns climate action, but the three aspects of sustainable development: economic, social and environmental. It is the result of a partnership between 25 organizations, among which the canton and the NGO B Lab (B Lab 2018).

#### **2.4.5 Agriculture, forestry and other land use**

This sector shall not be developed further in this paper as it lies outside the scope of research. Indeed, rural land use does not intrinsically affect urban areas and only to a small extent the private sector. However, suggestions for further research will be mentioned toward the end of the chapter *Smart practices*.

#### **2.4.6 Adaptation and resilience**

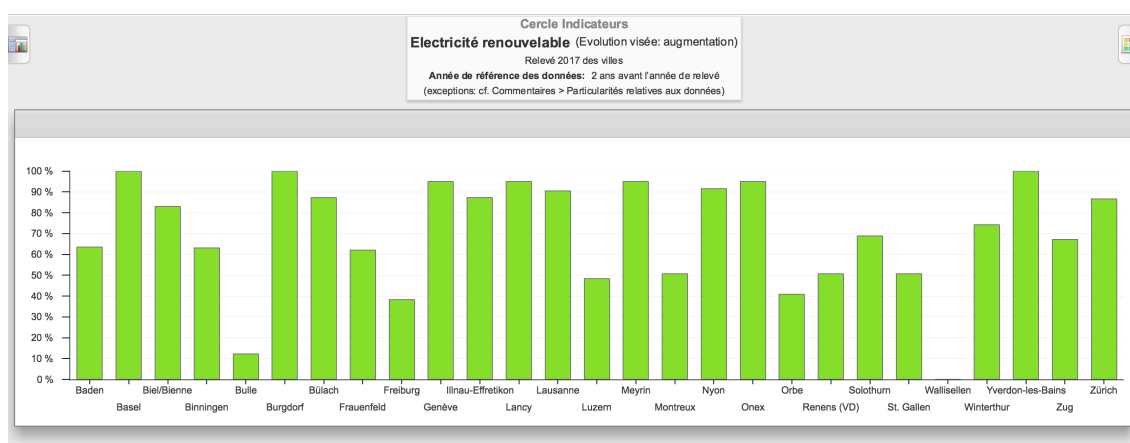
The regional strategy of adaptation to the effects of climate change is laid out in the second part of the CCP. Contrarily to what could be imagined at first sight, Geneva is not unaffected by the global warming phenomenon, and public policy will certainly need to be adapted in order to protect the local population from its effects. The private sector also has a role to play in this objective, first as it is one of the actors that will suffer from economic and organizational impacts (SCDD 2017, p. 28), but also as a dynamic sector that can provide solutions, technology and technical knowledge on the subject of climate resilience. Measures in this matter aim at adapting to the effects of climate change in the areas of urban planning, health and biodiversity (p. 20-25). However, from a private sector point of view, not much is intended. One might possibly foresee business opportunities and duties in the areas of urban construction to mitigate the phenomenon of urban heat island (*fiche 4.3*; Zinder 2018, app. 2) and for future installations to be more resilient to extreme weather events (*fiche 4.4*). One could also imagine business implications in future water management (*fiche 5.3*).

## 2.5 Communal policy

Communal competences in the canton of Geneva are mainly established in the Constitution and the *Law on the administration of communes*. The Constitution states that “*The canton assumes the tasks that exceed the capacity of the communes*” (République et canton de Genève 2012, Art. 133). Besides this provision, the communes are free to organize their own legislation and activities in many sectors, including how they respond to climate change and its effects, within the limits of their competences vis-à-vis the Confederation and the canton. Many communes on the territory have adopted their own communal Agenda 21, sometimes called *Durability charter*, in response to the engagements taken by Switzerland at the UNCED in Rio de Janeiro in 1992. It is the case for example in large cities of the canton, such as Geneva (2018), Onex (2004) or Plan-les-Ouates (2005), but also some smaller communes such as Troinex or Cologny, have published such charters, which often come in the form of a list of advice for eco-friendly practices. Such practices have been encouraged by the canton since the early 2000s with a practical guide intended for the communes on how they could develop communal Agenda 21 programs (Département de l'intérieur, de l'agriculture et de l'environnement 2002).

Noteworthy as well is the level of cooperation and transparency between communes through various methods and programs. First, some of the bigger communes of the canton—i.e. Geneva, Lancy, Onex and Meyrin—participate in the program *Cercles indicateurs* of the Confederation, which is a reporting platform that allows communes to compare their performance in environmental matters, among other topics (Office fédéral de la statistique 2015). Indicators such as the percentage of renewable energy, electricity consumption, and air quality can be visualized in order for cities to compare themselves to a benchmark and determine which sectors should be prioritized. Figure 2 shows an illustration of the *Cercles indicateurs* platform, where the rates of renewable energy in the electricity mix of all participating Swiss communes can be compared. We can see that all four communes that participate from the canton of Geneva benefit from a very high proportion of renewable energy.

**Figure 2 – Illustration from the *Cercles indicateurs* platform**



Source: Office fédéral de la statistique 2017.

Second, another platform exists, at the cantonal level this time, and allows communes in Geneva to report environmental measures they undertake. This platform, called *The environment platform of communes of Geneva*, is an initiative from the local “*Association pour la sensibilisation au développement durable à Genève*” appointed by the canton, and regroups the vast majority of communes on the territory. A total of 1,832 actions have been indexed from 39 out of the 45 communes of Geneva, in part in the sectors of climate change mitigation and resilience (ASDD 2018).

Third, some communes enter in partnerships between one another in specific projects. One example to mention which is linked with industries and product use is the program *Réparer plutôt que jeter* (“Fixing rather than throwing away”) in which five communes of Geneva have been cooperating for an awareness campaign on the life cycle of goods. The goal is to encourage and support consumers to try and fix their old or broken objects before tossing them out, which can reduce waste and decrease consumption of raw material—and GHG emissions, as a matter of fact. An online platform has been created to that effect, allowing people to locate manufacturers that can repair items of all sorts (Service Agenda 21 – Ville durable 2018).

### 2.5.1 Communal objectives

We will now attempt a brief overview of the climate policy of Geneva at the communal level of authority, continuing through the lens of the private sector. We will first consider the objectives and measures in place in the city of Geneva as it represents a large part of the canton’s and urban area’s population, and also because the municipality

possesses one of the most comprehensive sets of policies due to the central importance it endows.

First and foremost, the environmental goals of the city of Geneva are defined within the *Roadmap of the administrative council 2015-2020* (2016, p. 3):

- Fighting waste; encouraging sane modes of production and consumption
- Promoting a high recycling rate
- Facilitating mobility through non-motorized and public modes of transportation

Globally, the city is willing to lead the way in the global race toward better energy practices. As for the Confederation and canton, the commune of Geneva holds the basic principle that eco-friendliness should be expressed as a deeply integrated process throughout all the different sectors of public policy, all the way to tourism and economic promotion (Service de l'énergie 2014, p. 4).

Within the scope of its membership to the Covenant of Mayors for Climate and Energy (2010), the city of Geneva has adopted a series of objectives to reduce carbon impact and improve energy efficiency. First, the two overall goals to be reached by 2050 are to become neutral in CO<sub>2</sub> emissions and to cover 100% of the needs for heating energy with renewables. To achieve these ambitious targets, the city has set a milestone in 2020, by which it aims at a reduction of 20% in CO<sub>2</sub> emissions, as well as to cover 20% of energy needs for heating with renewable energies (Service de l'énergie 2014).

Along with this membership, the city has been recognized by the European Energy Award as a *Cité de l'Énergie GOLD*, which is an international label that rewards energy and climate protection activities within cities (Association European Energy Award 2017). Within this framework, the city of Geneva has a duty of measuring and reporting its energy actions and their results.

### **2.5.2 Communal actions**

Regarding the concrete measures in place, the city of Geneva specifically acts on several aspects that directly or indirectly touch the private sector. A first set of measures is laid out in the city's action plan for energy and climate policy, which currently concerns the years 2014-2018 and will be renewed this year. First of all, the city accompanies the private actors in the construction and renovation of buildings on the territory, particularly in order to improve energy efficiency and foster renewable sources (City of Geneva 2014). In that sense, guiding principles are transmitted to professionals in the sector, such as architects and energy providers (p. 5); and legislation is aimed at facilitating low-energy installations, such as smart lighting (p. 6) as well as the monitoring of energy

performances in buildings (p. 31). The city also creates project groups that include private actors in order to facilitate discussions around the creation of neighborhoods with low energy consumption needs (p. 10). Regarding solar energy, the city aims at building ten power stations through public-private partnerships (p. 13). Finally, it also aims at integrating adaptation principles within the different public departments in order to create awareness in urban planning projects (p. 15). The success of this measure would mean that the city includes the factor of adaptation to climate change throughout its partnerships with the private sector, particularly in terms of urban planning needs.

In addition to its energy and climate policy, the city has put in place other measures that affect private actors in more specific sectors. They are briefly mentioned hereafter.

### ***2.5.2.1 Rethinking public buildings***

We have just been exploring how the city of Geneva aims at reducing the environmental footprint of its buildings. Policy that regards public infrastructure is especially aggressive in this domain, as the city is willing to take the lead over external stakeholders and show them the way to go about this issue (City of Geneva 2014, p. 11). As the city renovates older public buildings such as schools and housing, it often requires private partners or company services to implement high performance standards. Examples of this reside in solar panels installations, innovative heating solutions or insulation (Service de l'énergie 2017).

### ***2.5.2.2 Sustainable projects subsidies "G'innove"***

The city of Geneva grants subsidies, under certain conditions, to organizations that provide and implement innovative solutions in the area of sustainable development. These subsidies aim at fostering innovative thinking, public-private partnerships and initiatives that bring economic, social or environmental benefits to the local society. Private companies and associations regularly receive such incentives for solutions like a cooperative grocery shop that reduces packaging waste, an association that works with local companies and recycles materials that are usually thrown away, or a study on the climate impact of a potential urban cable car in Geneva (Secrétariat de G'innove 2018).

### **2.5.2.3 Feeding the city**

The program *Nourrir la ville* put in place in Geneva aims at promoting local food, creating awareness on what are sane eating habits, and developing urban agriculture spaces. The city of Geneva believes that these aspects can optimize the environmental footprint of consumers among multiple other benefits. The private sector is encouraged to take action in this sector, namely by taking advantage of local ingredients in the food industry—e.g. the GRTA label—, as well as by taking part in urban agriculture projects facilitated by the city (Service Agenda 21 – Ville durable 2017).

### **2.5.2.4 Regulation on waste management**

While the city of Geneva organizes the collection and recycling of several types of wastes for households, medium and large companies must entrust private organizations with their collection and recycling of waste. This regulation thus creates opportunities for private businesses in the waste industry and particularly in recycling activities for industrial types of wastes such as construction waste, food waste and natural materials such as wood or garden waste.

## 2.6 Analysis of existing measures

We will now conduct an analysis of the climate policies that have just been presented, and of its potential effects on the private sector, in perspective with the local climate footprint. This analysis is summarized in the form of a SWOT table, before addressing each point of strength, weakness, opportunity and threat in a paragraph, for further explanations.

**Table 1 – SWOT analysis of existing measures**

<p><b>STRENGTHS</b></p> <ul style="list-style-type: none"> <li>— Strong, official recognition of climate urgency; political willingness</li> <li>— Sustainable development principles anchored in the law (constitutions, local Agendas 21)</li> <li>— Major objectives set with strong integration in all public sectors</li> <li>— Extensive awareness programs (public, private &amp; civil sectors)</li> <li>— General policy propitious for business</li> <li>— Willingness to lead the way in climate action</li> <li>— Recognition of the need for inclusion of all actors</li> <li>— High share of renewable energies</li> </ul>	<p><b>WEAKNESSES</b></p> <ul style="list-style-type: none"> <li>— Poor definition of private sector's role</li> <li>— No consultation of business representatives for the Climate cantonal plan</li> <li>— Agenda 21 not clearly documented in some communes (incl. city of Geneva)</li> <li>— Slowness of political decision and implementation</li> <li>— High climate footprint</li> <li>— Very high amounts of waste per capita</li> <li>— Lower recycling rate in Geneva v. Swiss average</li> <li>— Very high emissions in aviation sector, weak plans to mitigate them</li> </ul>
<p><b>OPPORTUNITIES</b></p> <ul style="list-style-type: none"> <li>— Innovative and dynamic economic/educational environment</li> <li>— Force of the direct democratic system</li> <li>— Room for more public-private partnerships</li> <li>— Need for developed countries that lead the way for the wide adoption of smart practices</li> <li>— Prosperous market for adoption of clean techs</li> <li>— Additional regulations regarding industrial processes</li> </ul>	<p><b>THREATS</b></p> <ul style="list-style-type: none"> <li>— Inertia vis-à-vis the speed of global warming phenomenon (esp. in Switzerland)</li> <li>— Failure in clear delimitation of public competences (Confederation – canton – communes)</li> <li>— Higher centralization in Geneva undermining local, specific measures</li> </ul>

Source: author.

*The bibliography of each bullet point is referred to thereafter.*

### 2.6.1 Strengths

First of all, it is important to note that the recognition of the global warming phenomenon has been significantly increasing in the last years, globally leading to a strong political willingness to correct this danger and to adapt to its impacts. This is also the case in Switzerland and locally in Geneva.

This political willingness has been very rapidly expressed into words. The adherence of Switzerland to international agreements regarding sustainable development and climate change—such as the UNCED at Rio in 1992 and the Kyoto protocol in 2003—has successfully been incorporated into laws and regulations at all political levels. Constitutions have been updated with special clauses for sustainable development and climate change, particularly in the Swiss and cantonal constitutions. Moreover, sustainable development principles were anchored in local regulations thanks to communal Agendas 21.

Fast forward to today, fundamental objectives have been set in response to the Paris Agreement, on the one hand from a general standpoint—i.e. for the Confederation, to reduce greenhouse gas emissions by 50% between 1990 and 2030; for the canton, to reduce GHG emissions by 40% between 1990 and 2030; for the city of Geneva, to become neutral in CO<sub>2</sub> emissions and to cover 100% of the needs for heating energy with renewables by 2050. On the other hand, action plans that touch the different areas of emissions have been formulated—such as in transportation, stationary and product use segments. The Confederation, the canton and communes mostly consider mitigation of and adaptation to global warming—being an important segment of sustainable development—as a global activity that should be integrated into every sphere of public policy. We have been able to observe a public will to transcend traditional boundaries of political delimitations and to implement measures in almost all sectors of society that either create greenhouse gas emissions or might be affected by global warming in the future.

Positive as well is the fact that awareness toward climate change has been greatly emphasized by the State and local authorities among public and private entities, as well as individuals in the civil society. We have been able to observe this through the numerous programs at the disposal of the canton and communes in Geneva to make businesses sensitive about concrete actions and themes that can have an impact on greenhouse gas emissions and environmental footprint.

Another strength is the general propensity to doing business in Switzerland and in Geneva. This state of affairs is important to mention because it depends to a great extent on public policies that apply to businesses. Furthermore, an attractive business environment for companies can create tremendous opportunities for entrepreneurs, startups and existing companies that are willing to launch into more eco-friendly activities or innovative business models, which might improve the city's capability to respond to climate change.

Also noteworthy is the announced willingness of several public entities to lead the way in climate action and serve as models for other countries or cities to follow. This can be observed in the city of Geneva in particular, but also at the Confederation level. As we will see in the section *opportunities*, several aspects of climate action are built around countries or cities that play leading roles. The UNFCCC even recognizes this need for exemplarity among countries.

Climate public policy in Geneva also strongly encourages all actors of society to engage in the mitigation of climate change. This is a clear recognition that is made in several action plans, at the Confederation, cantonal and communal levels. The private sector, NGOs and associations, the scientific community, as well as the civil society are often recognized as vital actors whose participation is mandatory for climate objectives to be achieved. Indeed, not only do they have their part of responsibility for the causes of climate change, but they can also be part of the response to the phenomenon. This means that the concept of climate change not only relies on one sector or entity, but on everyone, which may include the State, cantons, cities or communes, regulatory bodies, consumers, producers, companies, NGOs, households, etc.

Finally, the local penetration of renewable energies is also an important indicator that local policy has been successful in this sector. Indeed, 100% of SIG-provided electricity is renewable, which represents 90% of the market in Geneva (SIG 2018a; Le Temps 2016). Although this rate should not be mistaken with the proportion of overall energy—electricity being only part of the equation—, it is considerably higher than the total proportion of renewables in Swiss electricity consumption, which accounted for 54.9% of the national electricity consumption in 2016—115,075 TJ over 209,660 TJ respectively (Office fédéral de l'énergie 2017a, p. 3; 29). Continuing with the subject of energy, a sector which accounts for a major part of GHG emissions, it is also interesting to note that while total energy supplies in Geneva have been remaining rather stable between 1980 and 2016 (Office cantonal de la statistique 2017a, ws. 1), the proportion of electricity in the energy-mix has been rising steadily, almost doubling over the same

period, to reach 29% in 2016 (ws. 2). This is good news, on the one hand in light of the population increase of 41% over these 36 years—from 349,000 inhabitants in 1980 to 493,706 in 2016 (OCSTAT 1980, p. 1; OCSTAT 2017b, p. 9)—, and on the other hand because increasing the reliance of a population on electricity also increases the potential for renewable energies such as solar, wind and hydraulic; versus fossil fuels, such as coal, gas and diesel (Jacobson et al. 2017, p. 2; Kirk et al. 2016, p. 84). Lastly, one should also observe that CO<sub>2</sub> emissions from energy supplies in Geneva have been declining by 23%, from 2,094,405 tons in 1980 to 1,610,320 in 2016<sup>1</sup> (OCSTAT 2017a, ws. 3).

### 2.6.2 Weaknesses

Carrying on with the weaknesses of these local policies, important observations must be made about the means and measures to achieve the objectives set, particularly when it comes to engaging the private sectors, giving it the required means and setting the proper policies. In this domain, one can note a partial lack of concrete propositions—which might hopefully be temporary due to the recent nature of climate action. Public entities need to define clearly what role is expected from companies, financial institutions, sectoral industries, etc., and more importantly, to create the corresponding framework of laws, financial instruments and partnerships for them to take part in the mitigation of GHG emissions and adaptation to climate change. The UNFCCC, the Swiss Confederation and the canton of Geneva have all successfully identified this need for inclusion of businesses (UNFCCC 2015a; Swiss Federal Council 2016; SCDD 2017). However, more concrete action is now needed from public entities at the local level to foster the assimilation of sustainable principles within company practices. Private sector initiatives do come in part from the economic actors that form this sector, but companies also need a strong public framework that empowers them and leads them toward cleaner practices versus business-as-usual. In effect, it is sometimes complex to differentiate “greenwashing” eco-friendly initiatives—i.e. those that merely serve public relation to create cleaner brand images—from the genuine, concrete measures that can truly reduce the environmental impact of companies. It is worth noting that the *Cantonal service of sustainable development* is to set up a specific action plan on the inclusion of the various actors of the Geneva territory (SCDD 2017). Ultimately, the global diagnosis for climate change and its causes has been successfully assessed; the deep requirements for leveraging private sector technologies, financing means, and

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<sup>1</sup> Indicators cited in this paragraph exclude the energy consumption and emissions resulting from solid fuels, the CERN and the aviation sector.

optimization of environmental impacts have been correctly identified; political willingness exists in Geneva and creates an interesting ignition for awareness and inclusion of businesses within territorial climate action. Nevertheless, this underway process can and should give birth to concrete actions in wider terms, that can contain legislation, financial instruments and public-private partnerships. Those will include the private sector in decision processes, foster and/or coerce businesses to adopt more GHG-efficient conducts, and maximize the added-value companies can bring to eco-friendly projects. Awareness and non-binding measures are nowadays the preferred types of practices to facilitate business relationships and economic activity; however, more binding and ambitious measures will have to be adopted in order to drastically reduce GHG emissions and be aligned with international, national, and subnational objectives that are very demanding.

Second, one should note that a priori, no consultation of the private sector was conducted in the process of establishing the *Cantonal Climate Plan* of Geneva. This decision is important because it suggests a lack of consideration of the interests, needs and opportunities of the private sector. The CCP took into account the emissions of each sector of society and consulted the different public departments of the canton to translate general goals into sectorial objectives (SCDD 2015b, p. 2; 12-16; SCDD 2017, p. 8). However, the documents do not mention any consultation of private companies or even associations representing business interests. This suggests that the canton could have missed out important insights and may not have made the effort to ask for private expertise on how local companies might partner with the State, as well as what framework would be needed for them to take actions that are as ambitious as possible.

A third key point to mention, within the scope of the city of Geneva, is the fact that no Agenda 21 charter as such has been drawn up by the city, though such a document is currently being enacted (Allal 2018). The local Agenda 21 is partly presented throughout multiple web pages on the city's website, but this is far from the Cantonal Agenda 21 that is formulated as a piece of legislation and clearly states the principles of sustainable development that guide the canton's activities. One can also notice that several communes in the canton follow the same concept of Agenda 21, in the sense that they do not have a formal document with guiding principles, though this can be understood due to the small nature of these communes, in comparison with the city of Geneva.

Another determining factor in the implementation of climate action is the slowness of political decision and action that can sometimes appear in Switzerland and in Geneva particularly. One can consider it to be the result of the very open democratic system in

place, which implies frequent voting consultations with a powerful population at the decisional level, and a very diverse spectrum of political parties. Such a political system possesses strong benefits relating to public policy—one of which will be developed in the section *opportunities*—, but it can also create political tension and inertia which needs to be taken into account in climate policy as public measures can take long periods of time before being implemented. An amusing illustration of this phenomenon is the famous Genevan case of harbor bridge project that has been under discussion for more than a century, and whose construction has still not begun to this day (Weck 2014). Thus, this phenomenon of political slowness may prove to be of importance, particularly when it comes to climate action. The reasons for this will be further explained in the section *threats*.

The environmental footprint of Swiss inhabitants can also be considered as a weakness and may be put in relation with the climate policy in use. According to the Global Footprint Network (2018), Switzerland has a carbon footprint of 3.48 global hectares per person, which is almost two times the global average of 1.77 gha per person. If all individuals on the planet had the same standards of living as the Swiss population, 3.3 planets would be needed to sustain human needs in resources, and CO<sub>2</sub> emissions are mostly responsible for this excess (Office fédéral de la statistique 2016). Assuming that the population in Geneva uses approximately the same amount of resources as elsewhere in Switzerland, these indicators suggest an important margin of progress in the domain of production and consumption of resources.

Another interesting indicator is the amount of waste per capita. Once more, the Swiss instance is no role model. Comparing the OECD country members allows us to observe that the average Swiss citizen produces 720.8 kilograms of municipal waste per year, which is exceeded only by Denmark, Norway and New Zealand—the European average being 490.4 kg in 2016. Moreover, the amount of waste per capita in Switzerland has been generally increasing over the last fifteen years, reaching a plateau only during the three last recorded years (OECD 2018). This shows a general trend for high quantities of waste, which will need to be firmly mitigated in the next years if climate objectives are to be achieved. Furthermore, even if high recycling rates were to be reached, consumption and disposal should be treated and reduced at their root because GHG emissions occur at most stages of a product's life cycle—including waste transportation and recycling. This implies that producer/consumer behaviors that create high amounts of waste—in particular of non-recyclable types—such as planned obsolescence, excessive packaging or the generalization of plastics use, should be combatted with effective measures.

Tackling the matter of recycling, we can also observe that the canton of Geneva proportionally recycles slightly less waste (46%) compared to the global recycling rate for Switzerland (52%) (Service de géologie, sols et déchets 2017; OFEV 2017e). This indicator should be put into perspective with neighboring countries for a bigger picture. The EU statistics office Eurostat (2016) states that 46% of waste is recycled at the EU level, which is identical to the Genevan rate. Local political willingness to improve the proportion of waste that is recycled has been skyrocketing in the last few years. This is due in part to the federal pressure, with threats of imposing the drastic tax on garbage bags in the canton if higher recycling rates were not reached. In the meantime, all other cantons have adopted this financial instrument (Chambaz 2018, app. 5; Carattini et al. 2016).

Finally, it seems also important to tackle the issue of regulations in the aviation sector. As mentioned previously, the GHG emissions of the Geneva International Airport account for 23% of the total emissions of the canton (SCDD 2015a, p. 11), which is simply gigantic. With this level of emissions, the aviation sector's room for improvement cannot be ignored, yet various factors seem to make the airport a secondary choice when it comes to the areas of emissions on which authorities are willing to direct their efforts. First comes the question of who is territorially responsible for these emissions, as the inhabitants of Geneva are far from being the only customers of the airport (SCDD 2017, p. 10). The State seems willing to distribute responsibility for these emissions as widely as possible—between the Confederation, the canton of Geneva, other cantons, but also France—and this is partly graspable due to the intercantonal and even international significance that the airport has. Second is the issue of international standards and agreements, which do not provide any potential solutions to mitigate aviation emissions and even mostly fail to recognize the issue, as it was mentioned a few sections earlier. The Swiss Confederation only relies on technology improvements to bring emissions back to the 2014 level by 2030, while the canton of Geneva settles for this objective (SCDD 2017, p. 26). Nevertheless, reviewing the historic national emissions of the aviation sector a priori does not predict a cleaner future yet. First, total emissions of air transportation have been generally increasing by 51.8% since 1990, from 3.09 tCO<sub>2</sub> to 5.08 tCO<sub>2</sub> in 2015 (OFEV 2017b, p. 23). This phenomenon is basically explained by an increase in the number of passengers by 126.4% over this period, reduced by an improved efficiency in fuel consumption per passenger of airplanes (p. 22). Consequently, the technological advances have not been enough to compensate the boom that has been happening in the use of planes as a mode of transportation. This suggests that achieving the GHG reduction objectives would require several conditions

to be met. First, technology will need to be significantly improved in the future in order to reduce the use of fossil fuels in aviation. Second, the number of flights will need to be maintained at a reasonable level in the next years in order to be able to reduce GHG emissions. As the Federal Office of Civil Aviation (2017, p. 15) forecasts an increase to 25 million passengers per year by 2030—versus 15.2 million in 2014, the base year set in the objectives (Geneva Airport 2014, p. 3)—this latter condition already seems compromised. In short, the striking quantity of aviation emissions sheds light on a crucial issue and is representative of a sector which international and national actors sometimes have trouble to monitor, supervise and take measures upon. In order to significantly reduce emissions, a balance has to be found between hopes of fuel efficiency improvements and a decrease in the overall amount of flights, and thus, passengers. The problem with this however, is that global CO<sub>2</sub> reduction needs to be undertaken extremely rapidly to maintain hopes of reaching the PA objectives. Indeed, the Agreement calls to “*reach global peaking of greenhouse gas emissions as soon as possible*” (UNFCCC 2015a, Art. 4 par. 1). This notion of urgency will be subsequently developed in the section *threats*.

### 2.6.3 Opportunities

The first opportunity one might raise is the fact that generally speaking, Switzerland and Geneva in particular possess strong economic and educational systems, often considered of highest quality throughout the world (Schwab 2017, p. 13). This also fosters dynamic and innovative environment, creating opportunities for businesses that aim at novelty. As action and technology development against climate change is a rather innovative industry, this argument can be considered as an important factor that public entities should take good care of, in order to maximize local contributions to cleaner practices. This environment for innovative businesses thus should be nurtured and leveraged through mechanisms such as greater cooperation with economic and academic milieux, a facilitative public framework, and developed public-private partnerships with businesses, which can bring added value to particular development projects.

Second, the direct democratic system in Switzerland can also be considered as an interesting opportunity for the potential legislation on climate to go one step further. Popular initiatives regularly make their way to the ballot box and interestingly create political debate on issues such as sustainable development, which push State actors to legislate on these topics. Over the last few years, the Swiss people was consulted on several objects that touch climate policy, such as the Law on Energy in 2017; an initiative

on nuclear energy and Green economy in 2016; and an initiative to replace VAT by a tax on energy in 2015 (Chancellerie fédérale 2018). This trend might prove to be a vector for more ambitious climate legislation in the next few years. An example of this is the project of law called the *Responsible Business Initiative* which was launched in 2015 by more than 60 organizations and will be subject to popular vote in due course (SCCJ 2015c). It calls for a notion of due diligence in the aspects of human rights and environmental impacts of Swiss businesses, both within and outside the national borders. If the text were accepted by the Swiss people, companies would be legally bounded to ensure that all aspects of their national and international activities respect human rights and environmental standards. This “*will enable victims of [...] environmental damage to seek redress in Switzerland*”, including when those damages result from businesses abroad that are controlled by a Swiss company. Therefore, in case of such lawsuits, Swiss companies will need to demonstrate that they applied due diligence and “*took all necessary measures to prevent the violations*” (SCCJ 2015b). This example shows the possibility for the Swiss law to be changed in a significant way by the population, which can be considered as an opportunity for the country to be subject to ambitious regulations or measures if its citizens decide to apply stronger environmental standards. Moreover, the initiative has pushed a parliamentary committee of the Council of States—the *Legal Affairs Committee*—to propose the idea of a counter-proposal to this law (SCCJ 2017). This shows the potential of this project to create political debate around matters that relate to the climate and CSR. Interestingly, the project has been backed by several actors from Swiss corporations (SCCJ 2015a), which also shows the interest of the private sector for a clearer public framework that supervises their activities.

To continue, one may argue that there is room for more public-private partnerships in the local urban planning landscape, which could benefit both public entities and businesses and decouple their forces in climate-based actions. This opportunity area is developed later on in the section *smart practices* as well as in the *discussion*, where we will explore the types of partnerships that would be especially relevant in Geneva’s context.

A clear trend that appears on the global stage for climate action is the aspect of shared responsibility between developed countries and those that are currently in the process of development. One can nowadays observe, in international discussions, the following premises: as economically mature countries have exploited in the past limited natural resources that create GHG emissions to sustain their needs and build wealth, so do

developing countries need raw materials to a certain extent in order for their economy to grow. It can seem unfair to those countries to be told to stop consuming fossil fuels and polluting resources when the riches of Northern/Western countries have stemmed from such practices. Two notions come in consequence of this observation. First, developed countries should cooperate with developing countries by contributing to their financial and technological needs to fight climate change and its effects, as recognized as an important principle in the Paris Agreement (UNFCCC 2015a, Art. 3; 4). Second, the PA also recognizes that respective objectives with regards to climate change have to be set with special considerations for each nation's capabilities and advancement (Art. 4). One can argue then, that more advanced countries should act as role models toward developing countries for many reasons, including more abundant financing means, the scarcity of resources and the fact that these economies have been fueling on fossil energies. This is especially the case for Switzerland, which is one of the most prosperous economies in the world in terms of GDP per capita (The World Bank 2018). For these reasons, one can consider that the country has an opportunity to lead the way in the adoption of smart practices on the global stage (Houmard 2018, app. 1).

This leads us to the ability of Switzerland to widely adopt clean technology in all different sectors, and more urgently in those that emit the greatest amounts of GHG emissions. It is also an opportunity that should not be underestimated. We have seen that the canton of Geneva already benefits from a majority of renewable electricity to power up households and some of the industries. Additional efforts may be welcome in other sectors as well such as private transportation, freight and heating.

Finally, more efforts can also be made in the sector of industrial processes. Interesting measures have been taken to reinforce awareness, when it comes to cleaner modes of production and consumption. More ambitious measures could possibly be undertaken with the aim of reducing producers' and consumers' climate impact in these domains.

#### **2.6.4 Threats**

A few threats that may undermine the ability to cure or adapt to climate change in Geneva can be identified. First, a plausible and concerning threat that can happen in the next years would be to see that mitigating and adaptation action reacts too slowly vis-à-vis the phenomenon of global warming. As mentioned at several instances, global warming is happening very quickly, in some places more than others, and will probably continue to accelerate in the next decades. MeteoSwiss has already been recording a national average warming of approximately 1.6°C since the beginning of the 20<sup>th</sup> century

(MétéoSuisse 2014, p. 6). Besides, most international organizations including the UNFCCC as per the Paris Agreement, agree that early action is crucial. Some experts announce that pre-2020 action will determine to a large extent whether or not the planet will experience a global warming of less than 2° or 1.5°C (Kirk et al. 2016, p. 18). The consequences of just a couple of additional degrees Celsius have been extensively forecasted and are not reassuring. In Switzerland, risks include for example, periods of extreme heat, droughts, urban heat islands, more frequent extreme weather events and falls in productivity (OFEV 2017a), while impacts may be even more considerable and deadly worldwide (IPCC 2014). These trends show the urgency needed to treat the global warming phenomenon. If authorities and subnational actors miss the chance to implement drastic, ambitious and efficient measures very quickly in order to reduce their GHG emissions, the time for action will pass and it will become more and more complex to treat these preoccupying issues. Thus, inaction or late awakening represent a threat that entails the necessity to reach full scale of action in the next few years already.

Another threat that could harm the efficiency of public action in Geneva would be an unclear delimitation of public competences. To avoid this phenomenon to take place, it is crucial that each public body at the three levels of competences—Confederation, canton and communes—take its full role in overseeing and reducing emissions in its different sectors, but also work closely with one another in adaptation efforts.

The canton of Geneva is known for being one that centralizes power to a very large extent. A study from RTS has attempted to measure this centralization via various indicators and reached the conclusion that Geneva was indeed one of the Swiss cantons where communes had the lowest budget and number of positions compared to the cantonal resources (Ambrus, Siggen Lopez 2014). This may induce a risk of restricting local measures at the smallest forms of power, by favoring action at the cantonal level for wider applicability. Therefore, such a phenomenon might need to be limited in order to encourage local actions that match at best the particularities of each commune or area. In a 2013 study, Bulkeley and Castán Broto developed the concept of *climate change experiments* conducted at the city level, which “*appear to be linked with specific contexts of urbanisation*”. One can suggest that this style of governance has the advantage to be successfully connected to the reality of the field. Small public entities should take advantage of local knowledge when seeking to address climate change, especially in some measures that may not be adequate for an entire canton due to each location’s specific needs, capabilities and contexts.

## **2.7 Smart practices**

This chapter presents some measures that exist either at a global level or in particular cities outside Geneva and aim at a better inclusion of the private sector in climate action. In no way is it a comprehensive list that presents all the best practices one can find throughout the world, which would fall outside the scope of this research. However, they can provide interesting examples to be followed, either due to their recognized success elsewhere or because of their smart way of solving a business issue related to climate impacts. Measures were selected based on three criteria. First is their connection to the private sector, as each measure has a direct or indirect impact on one or several industries. This is measured in the sense that it can empower non-state actors, take advantage of their technology and expertise, or incite them to comply with more ambitious climate standards. Also important is each measure's relevance to the local context of Geneva and Switzerland, which is a factor that will be developed further in the last chapter of this thesis, debating the feasibility of implementing these measures. Third is the potential they have in terms of GHG emissions reductions or adaptation to climate change. Toward the end of this chapter, opportunities for further research will be discussed, in order to suggest some additional practices that could be studied for local implementation.

### **2.7.1 Stationary energy**

#### **2.7.1.1 Electrification**

At the macro level of energy practices, our society needs to transition from a fossil economy to a renewable economy in order to lower GHG emissions, which are the prominent cause of global warming. One important process that makes it possible is electrification, which many researchers and institutions hold as crucial to allow this transition (DDDP 2015; Dennis 2015; Jacobson et al. 2017). This concept entails two main ideas. First, technologies that rely on combustion should be widely electrified—electricity being often considered as the most reliable renewable energy to be rolled out at large scale (Jacobson et al. 2017, p. 108; DDPP 2015, p. 7; Dennis 2015, p. 103). Second, the electricity mix should contain as much renewable energy as possible—i.e. mainly wind, water and sunlight electricity. Jacobson et al. (2017) for instance, propose a transformation roadmap and suggest that this electrification process needs to be “*virtually immediate*” and is “*far more aggressive than what the Paris agreement calls for, but are still technically and economically feasible*” (p. 108). Furthermore, they argue that benefits of undergoing such a transition are vast, from a massive contribution to limiting global warming to less than 1.5°C, to the avoidance of fatalities and of millions of

USD of costs linked to air-pollution, as well as the creation of millions of new jobs in renewable sectors (p. 119). This process of electrification is applicable to many different sectors of our economy where fossil fuels are still an important part of the energy mix. One example in the stationary energy is to use electricity instead of fuel oil to heat buildings, while ensuring buildings are provided with clean energy such as hydraulic electricity. Thus, electrification can be found in an important part of the measures presented thereafter.

## **2.7.2 Transportation**

It is important to note that the notion of electrification also has important implications in the transportation sector. Indeed, the current trends toward this transformation are to replace emitting and polluting fuels by electricity in this domain as well, notably through the reduction of diesel vehicles, the penetration of electric vehicles, and the switch from individual and motorized modes of transportation to non-motorized transportation and/or vehicles that can accommodate more passengers. In this section will be discussed these current trends and the specific measures that aim to reinforce them in order to reduce GHG emissions.

### ***2.7.2.1 Restrictions on diesel vehicles***

To begin with, we can cite the idea that has become increasingly popular over the last few years consisting of specific measures on diesel-powered vehicles. The conversation on diesel is representative of two types of problems: GHG emissions, which is the issue that interests us, and air pollution, which does not relate to global warming but creates massive health issues as well as other externalities (Landrigan et al. 2018). However, reviewing life cycle assessments conducted on petroleum and diesel vehicles shows only slight differences between both fuels in terms of GHG emissions (Helmets 2016; Poliscanova 2017), some even suggesting that petroleum cars can emit more GHG over their whole product life (Eriksson, Ahlgren 2013). Recent practices worth mentioning include the ban of older diesel vehicles in some German cities (Cremer 2018) and the targets of some European cities such as Paris and Madrid (Mairie de Paris 2018; Gallo 2016) to make their municipalities diesel-free or to restrain the use of the most polluting vehicles within the next few years.

### ***2.7.2.2 Carbon pricing on transportation***

Switzerland possesses one of the highest carbon prices on the planet (Métivier 2017, p. 3). As at 2018, it amounts to CHF 96 per ton of CO<sub>2</sub>, and this tax's ceiling is set to almost double in the next few months to CHF 210, provided that the new Law on CO<sub>2</sub> is accepted

by the Swiss parliament. These measures show the Confederation's willingness to align its objectives to those of the Paris Agreement and to take clear measures to that end. Indeed, policies that regulate this price on carbon are set to be dynamic and regularly aligned with levels of GHG emissions (OFEV 2016; Wuthrich 2017). Moreover, the Swiss ETS is levied on a substantial part of these global emissions.

Nonetheless, the transportation sector has been exempted from this tax since it has been levied, and recent political discussions show a deadlock to change this situation. This contrasts with some other countries, which do levy CO<sub>2</sub> taxes on their transportation industries, and sometimes even on aviation emissions (Métivier 2017, p. 3). On the one hand, a large coalition of left-wing parties and environmental associations has been pressuring the Federal Council to include gasoline in the fossil fuels that are concerned. On the other hand though, the Council has received severe oppositions from economic and road milieux, pushing it to abandon this measure several years ago (RTS 2009). Recent propositions on the new Law on CO<sub>2</sub> still aim at exonerating the transportation sector from this tax, preferring sector-specific measures, which some interest groups still criticize for not being ambitious enough (Wuthrich 2017).

### **2.7.2.3 Incentives for electric vehicles adoption**

Another important trend that we can observe in relation with the electrification process is the encouragement of electric vehicles. As technology in this domain is continuously being perfected in terms of autonomy, speed and recharge capacities, prices are decreasing, and demand proportionally rises in the vehicle mix of many markets (EEA 2016, p. 37; 48). According to the International Energy Agency, *"At this stage of electric car market deployment, policy support is still indispensable for lowering barriers to adoption"* (2017, p. 13). The agency divides existing policy support into five types of measures that foster electric vehicles adoption. First, research support, which *"is key to achieving cost declines and performance improvements"* (p.13). Second, targets, mandates and regulations that are meant to provide a *"clear signal to manufacturers and customers"* (p. 15) on the automotive market. Third, financial incentives can help bridge the economical gap between fossil-fuel and electric vehicles, not only as to the purchase price, but also in terms of total costs of ownership (p. 15), which represents a considerable factor consumers tend to look at when selecting a mode of transportation (Prina 2018, app. 4). Fourth, *"policies for increasing the value proposition of electric cars"* (p. 16-17) create incentives that make their use more attractive compared to traditional cars. They can take the form of both financial and non-financial benefits, and

are particularly effective when planned and implemented in a specific local setup, such as at a municipal level. Fifth and finally, the IEA considers fleet procurement to be another interesting tool at the disposal of public and private entities. Indeed, adopting electric vehicles at such institutional levels can send demand signals to the market, but also serve as role model cases for wider adoption by staff and customers for instance (p. 17).

An example that is often cited in the topic of electric vehicle penetration is Norway. The Nordic country is one of the most ambitious and aggressive in terms of public policies that favor the adoption of electric vehicles. The city of Oslo is an interesting case to study, as the municipality has developed an extensive array of measures covering all five types of policies mentioned above, making it a place particularly favorable to electric vehicles. It is worth noting that some policies were implemented at the national level, while other were put in place by the municipality. Owners of electric or hybrid vehicles benefit from partial or full tax exemptions—VAT, import tax, road tax, tolls or ferries, company car tax and registration tax—; subsidies for workplace charging installations; free public charging spots owned by the city of Oslo; the free use of bus lanes under certain conditions; and purchase incentives for businesses (Norsk elbilforening 2018; EAFO 2018b). These policies have been very successful and forced the government to begin revising the grant conditions for incentives in 2017. Consequently, some benefits may be delivered differently in the future and could be made dependent on each vehicle's level of emissions. (EAFO 2018a).

#### **2.7.2.4 Aviation**

As discussed earlier, GHG emissions resulting from air transport have been increasing significantly both in Switzerland and globally over the last few decades, affected by the wider accessibility and affordability of air travel. Growth prospects for the aviation industry suggest that this trend will continue for the next few decades, in terms of passengers transported and fuel emissions (Lee et al. 2009; Gudmundsson, Anger 2012). Nonetheless, we have also noted that GHG emissions for the aviation sector are often spared from national reporting methods and climate action plans. Moreover, the mitigation of GHG resulting from aviation was set aside in international agreements such as the Kyoto protocol and the Paris Agreement (SCDD 2017, p. 26.).

To this apparent lack of willingness to mitigate such emissions can be added the global fragility of policies in place to regulate the environmental impacts of air transport, even though regulations have been slightly evolving during the last few years. Two recent policies are worth mentioning. First, the EU has decided to include GHG emissions that

result from aviation activities in their emission trading system (ETS), which is on track to be linked to Switzerland's system (European commission 2016; ICAP 2018, p. 1). Thus, Swiss aircraft operators have been required to submit monitoring plans in order to prepare for their inclusion in the national ETS, and limit emissions (p. 2). However, this European piece of legislation is still under discussion, and the EU is set to only limit the emissions of flights inside the European Economic Area until further notice (European commission 2016). Such measures taking time to be implemented at the European level as they are quite unprecedented, they are even slower at the global scale. An international system to offset air traffic emissions is being discussed by the ICAO and should enter pilot phase by 2023 (ICAO 2016). The CORSIA system “*aims to stabilise CO<sub>2</sub> emissions at 2020 levels by requiring airlines to offset the growth of their emissions after 2020*” (European commission 2016).

At the regional level, many voices have been heard questioning the special allowances from which the aviation industry benefits. This is especially preoccupying when we compare the prices of flight tickets with train tickets, which NGOs sometimes call *unfair competition* (Mazzone 2018). Some associations demand existing policies to be aligned with commitments as part of the Paris Agreement, in order for externalities to be reflected on flight ticket prices (Castella 2018). Many observers such as political parties, climate NGOs, researchers, and transport associations, regret the fact that the VAT and the petroleum tax are not levied on international flights that depart from Switzerland, and some call for the implementation of a kerosene tax (umverkehR & CESAR 2018; Boss 2017). Regarding the Geneva airport specifically, some point out its phenomenal development and the negative effects it could bring on noise levels, air pollution, transport infrastructure and obviously, the climate issue. In that sense, 62 communes from Geneva, Vaud and neighboring France have gotten together this year to sign a negative advance notice against the development plan of the airport (Ville de Vernier 2018). The inherent principles of these measures and the framework in which they should be implemented will be studied in the *discussion*.

## 2.7.3 Waste

### 2.7.3.1 Garbage bag tax

Levying a tax on garbage bags is one of the most direct measures one can think of when it comes to applying the polluter pays principle. It usually drastically increases the price of garbage bags—e.g. CHF 1.95 per 35 liters-bag in the canton of Vaud (vaud-taxausac.ch 2018)—and aims at reducing the amount of non-recyclable waste people throw away. Switzerland is one of the countries in which this system is most largely implemented, as all cantons except Geneva have adopted this financial instrument to ensure they abide by the 50% recycling rate imposed by the Confederation (Touré 2018). In a 2016 research paper studying the effects of the garbage bag tax in all communes from the canton of Vaud, Carattini et al. concluded the following:

*“Pricing garbage by the bag (PGB) is highly effective, reducing unsorted garbage by 40% (arc-elasticity of -0.3), increasing recycling of aluminum and organic waste, without negative spill-overs on adjacent regions.” (p. 1).*

### 2.7.3.2 Plastics items ban

In order to reduce the amounts of plastics produced, thrown away, or eliminated, which often create heavy environmental impacts, some countries and cities turn to radical methods that consist of basic bans on particular objects made of these materials. Plastics do not only create pollution—which is a massive issue nowadays, particularly in the planet’s oceans—but also produces GHG emissions throughout the product’s life cycle, from the transformation of fossil materials to the elimination or recycling processes (Chaffee, Yaros 2007). The United Kingdom is considering banning the sale of plastics cotton buds and plastics straws, following the stance taken by Scotland a few months before. These decisions are intended to be followed by the other country members of the Commonwealth and have been proposed mainly out of a concern for marine pollution, which is expected to be drastically reduced with this simple measure (Department for Environment, Food & Rural Affairs 2018; Scottish Government 2018). In Switzerland similar moves have been taken by the city of Neuchâtel, targeting a plain plastics straws ban by January 2019 (Ville de Neuchâtel 2018).

France has taken a similar approach that targets plastics cotton buds, but also plastics bags, cosmetics with plastics microbeads, fragmentable plastics and expanded polystyrene containers. All of these product applications from plastics materials are in the process of being banned between 2016 and 2020 and France has committed to

bringing this legislation at the European level (Direction de l'information légale et administrative 2017; MTES, MEF 2018, p. 28).

### **2.7.3.3 Combatting over-packaging in supermarkets**

Cities and regional authorities around the globe also take measures to reduce plastics waste that results from the over-packaging of products. According to the association of plastics manufacturers PlasticsEurope (2018, p. 25), the packaging industry is the primary converter of plastics in Europe, with 39.9% of the total demand for this material. While the demand for plastics bags has recently been dropping by 80% over one year in Switzerland—thanks to unilateral decisions from supermarket brands to discontinue their free distribution—products packaging itself remains a concern on which brands often fail to communicate and take reduction measures (RTS 2017; Wurlod 2018). However, one should not underestimate the potential of unilateral moves by companies or groups thereof. Indeed, at the end of the day, they are often the most powerful actors in terms of the scale their climate actions may have over their own activities and GHG emissions. The example of reduction in plastics bags in Switzerland, conducted by Migros and Coop illustrates this perfectly (RTS 2017). It suggests that supply-side measures can be much more effective than governmental measures, provided that they are ambitious and widely implemented. It is when such business measures fail to be applied that subnational authorities should intervene via more binding measures.

Another measure that aims at reducing over-packaging in supermarkets is being considered in the cantons of Valais and Zurich. The idea is to require supermarkets to install unpacking platforms for their customers, giving distributors a powerful signal as they would bear the costs of eliminating or recycling this packaging waste if customers leave it on site. A postulate considering the application of this regulation has been accepted by the Grand Council of the canton of Valais, while *“the canton of Zurich has already validated a regulation to that end”* (RTS 2018; Savioz et al. 2017).

### **2.7.3.4 Hard-to-recycle waste**

The basic reason why not everything can be recycled is the fact that not all types of products benefit from a market for recycling. Materials that result from recycling processes sometimes do not find a buyer that is willing to reuse and transform these materials. Widespread resources such as PET from plastic bottles, cardboard, paper and aluminum are often valuable and can easily be part of recycling processes that aim at reaching circular economy. The recycling of more specialized materials such as home appliances or electronic items is usually made profitable for industries through the

collection of waste recycling fees, which include the cost of recycling within the price paid by the final consumer.

However, it is important to highlight the fact that any product can technically be recycled. In reality, the obstacles that prevent the recycling all products are more economic than material (Szaky 2016), due to the need for a distribution market and its profitability, which depend to a large extent on the quantities of materials available and the costs associated to the transformation of waste. In order to overtake these obstacles, some municipalities and public entities, but also corporations, have been partnering with private actors to create networks that make the recycling of particular materials possible. Some cities in Canada for instance, are installing public ashtrays to ensure cigarette butts are not thrown in the streets but collected and either recycled to create urban furniture items, or composted—depending on which part of the cigarette butt. Pilot projects have been developed through public-private partnerships in some areas of the city of Montréal, with the recycling company TerraCycle, and may spread to other areas of the city if it proves to be successful (SDC Vieux-Montréal 2016).

Similar collection networks have been put in place by the same organization in many countries throughout the world. Used office and school supplies for example can be collected in some public points such as organizations, schools and public administrations throughout Europe. Via a partnership with BIC, writing instruments are sorted and their materials are then turned into various products such as garden furniture or even paving stones (TerraCycle 2018b).

## **2.7.4 Industrial processes and product use**

### ***2.7.4.1 Product labelling***

Public awareness on our climate footprint plays a strong role in the strategies in place in Geneva, and more generally in Switzerland. The interviews conducted as part of the present research allow us to note that the climate education aspect is a privileged way to deal with global warming. Indeed, public awareness constitutes a soft strategy which holds high potentials in the minds of policy makers. We can observe this throughout almost all interviews conducted. While Mr. Houmard, Mr. Zinder and Mr. Chambaz highlighted that Switzerland follows a rather voluntary approach with non-binding measures for businesses and consumers, notably through awareness campaigns (2018, app. 1; app. 2; app. 5), simply observing the number of measures that aim at creating awareness in Geneva very quickly allows us to see that this is overall the preferred method for climate action, compared to more binding and drastic approaches. Moreover,

Mr. Forney and Mr. Ballissat (2018, app. 6) clearly insist on economic milieux' positions that making consumers aware of their climate responsibilities should be one of the privileged strategy for climate action, rather than binding measures affecting companies, which create more administrative constraints.

It is certainly true that consumers have a high impact on climate through their behaviors and choices, particularly when it comes to the types of products they consume. For example, some experts suggest that reducing our consumption of red meat would have a greater impact on our carbon footprint than abandoning cars, as the production of beef and meat in general consistently shows significant gaps in GHG emissions and irrigation needs compared to that of plant foods, which is relatively low (Eshel et al. 2014; Carrington 2014; Société Suisse de Nutrition 2010, p. 9). Regarding vegetables and fruits, LCAs suggest huge differences between production methods in terms of environmental footprint, depending whether products are bought in-season or not, as well as on their distances of origin. Buying in-season fruits or vegetables can produce tenfold less GHG emissions compared to products that have been transported by air (p. 5-6; Zhiyenbek et al. 2016). Therefore, climate education appears as a necessary and efficient solution in our free market economies. As people are free to buy what they want, and companies are free to decide what they will produce, the way we can influence these choices, apart from restrictive measures, is to make people aware of their environmental impacts and how they can mitigate them.

One way to do so would be through product labelling. Well known nowadays are organic or fair-trade labels. Some propose the application of such practices to the carbon footprint of products (Zinder 2018, app. 2), as well as other environmental indicators such as water consumption. To that end, the European commission has been experimenting for a few years with a series of regulation and pilot projects, to determine what types of environmental criteria would be relevant for product labelling, what are the best calculation methods for LCAs, and what types of products would be most suitable for wider implementation. Again, the example of France is worth mentioning here, as this country has been one of the most proactive in terms of experimentation and propositions to the EU. Compliance approaches have been adopted, aiming at reviewing and standardizing the different labels that exist nationally. The ADEME is in charge of organizing the display of information on CO<sub>2</sub> emissions over all types of products, while some other indicators depend on the industries concerned. At this stage, such measures are being implemented on a voluntary and progressive basis (INC 2017; ADEME 2018).

### 2.7.5 Further research

Due to the limited scope of this report, further research will inevitably be required in order to extend smart practices to all different sectors of emissions, but also to ensure that all types of societal actors fulfill their potential in global warming mitigation in the long run. Consequently, it can seem useful at this stage to provide further food for thought on the potential types of measures that seem feasible in the local Genevan context, but would require additional research in order to determine the constraints, political response and opportunities that should be taken into account to evaluate their potential for success.

In the area of stationary energy, which is a key segment of GHG emissions (SCDD 2015a), further studies may be conducted on the widespread difficulties that exist in Geneva—and in Switzerland more generally—to install more infrastructure for renewable energies. We have seen how the proper electrification of our society will be needed to achieve cleaner modes of consumption; renewable energies that involve the wider, rapid installation of solar panels and wind turbines in Switzerland will be a crucial condition for this process to happen, particularly to be able to respond to the increased demands in electricity the country will have to face. The role of the private sector and subnational authorities in facilitating this penetration could especially be investigated to that end.

Regarding transportation, public entities of the canton seem to have put a special emphasis these last few years on innovative technologies that could serve climate objectives among others, which is very positive. Examples include the TOSA public private partnership, the Sea Bubbles experiments and other pilot projects that are part of the Smart Canton approach. Research could be conducted in order to understand what factors make these experiments successful and scalable.

In the sector of waste, one interesting approach is notably considered by France as part of the national *Circular economy plan*. The French government reflects on how it can “*adapt taxation practices in order to make upcycling cheaper than waste elimination*” (MTES, MEF 2018, p. 26). Measures studied include the reduction of VAT tax on many recycling services or products. A similar approach could be studied in Geneva in order to determine what fiscal instruments could be put in place in the local or federal context in order to reduce the financial burden often faced by actors who are willing to recycle more.

The French *Circular economy plan* also presents measures that affect industrial processes and product use emissions. Some of them could be researched in the Swiss perspective, while other could also be envisaged in Geneva. Worth mentioning is the

whole reflection around how to end planned obsolescence, which has also been discussed in Geneva, creating the campaign *Fixing rather than throwing away*, presented earlier as part of the cantonal policy. To combat this type of practices that create important externalities in terms of raw materials, waste and pollution, a more profound reflection could be conducted in Geneva, notably to assess how one could require distributors to inform customers on the availability of spare parts or on the reparability of broken pieces, and to extend the duration of the legal warranty (MTES, MEF 2018, p. 7-8). In order to combat food waste, which also creates fruitless GHG emissions at different stages of the life cycle of products, the feasibility of binding measures in the food distribution industry could also be assessed in further research. Again, some strong measures are in the process of being implemented at the European level. Public entities in Geneva could consider new regulations for catering actors, such as the obligation to propose donation conventions toward NGOs, and to make public commitments against food waste. The revision of expiry date policies is also carried by France at the European level and could drive Switzerland to rethink its own policy in this sector (p. 20).

Local efforts toward better adaptation and resilience to the effects of global warming can also leverage the private sector's capabilities. This role could particularly be investigated further in order to determine how Geneva could take advantage of urban vegetation measures. Interesting practices in that sense include the plantation of trees across public spaces of cities, which not only helps reduce urban pollution and GHG emissions, but also contributes to the mitigation of urban heat island phenomena and creates opportunities for private businesses (Faruqi et al. 2018). The city of Sion in Valais is an interesting example to follow as it recently conducted, together with the Swiss Confederation, a whole program called *Acclimatasion*, with the aim to investigate and experiment how cities and private actors can better mitigate or adapt to climate change through concrete, smarter planning measures (Ville de Sion 2018).

The whole question of financing also falls outside the scope of this report, despite its crucial importance and the interrogations it raises as to the role of private funds in the transition toward cleaner climate practices. While Swiss capitals invested in sustainable portfolios have skyrocketed over the last few years, it would be relevant to investigate how financial practices could shift in order to significantly accelerate global climate action, especially in Geneva as one of the most recognized financial centers (Sustainable Finance Geneva 2018). The Paris Agreement raises such questions in its objectives and the international community puts more and more pressure on financial funds, among other actors, to divest from carbon-intensive industries and adopt higher standards that favor cleaner climate practices, for example through innovative financial securities such

as green bonds (Houmard 2018, app. 1; One Planet Summit 2017). Another measure that would be worth exploring in the Swiss context is the elaboration of non-financial reporting standards for corporations. Further research in this domain could be conducted on the feasibility of implementing in Switzerland the types of regulations that are now in force throughout the EU. In France for instance, these regulations state that large companies must include non-financial indicators in their annual report in order to be transparent on the social and environmental implications of their activities (Legifrance 2017). Such regulations may be interesting as they ensure investors and other stakeholders are better informed about the social and environmental impacts of the companies in which they invest.

Finally, research could also be extended on the possibility for the canton of Geneva, and/or local communes, to adopt standardized methods for the reporting and monitoring of their GHG emissions. Large organizations such as CDP and the Greenhouse Gas Protocol allow cities or regional entities to conduct such reporting with established standards (Fong et al. 2014). This could allow a better comparability between cities, and also to better track year-to-year progress in the cities' or canton's emissions. In this area, comparability between cities and countries may become increasingly important in the near future in order to be able to scale up local smart practices and determine sectors of emissions on which action should be prioritized.

Ultimately, in order to leverage and accelerate the full engagement of all non-state actors in climate action, the mechanisms for capacity building in this area should also be rethought. One could consider the creation of a specialized team of experts at the cantonal level, which would both comprise representatives of public and private sectors. This would notably help accompany the different public sectors—such as the SCDD, the DGE or the DGT—to keep track of smart practices that are implemented elsewhere. It would also allow private and public sectors work hand-in-hand to assess innovative measures' potential, impacts, constraints, as well as new partnership opportunities and the implications they would bring for companies. We have considered how public consultation processes often take time and require vast investigations to take into account the points of view of various types of industries. Thus, the creation of a capacity building team comprising public and private actors could not only allow smart practices to be scaled up and implemented more widely, but also facilitate consultation processes, and above all, reduce the time and risks induced by the existing mechanisms.

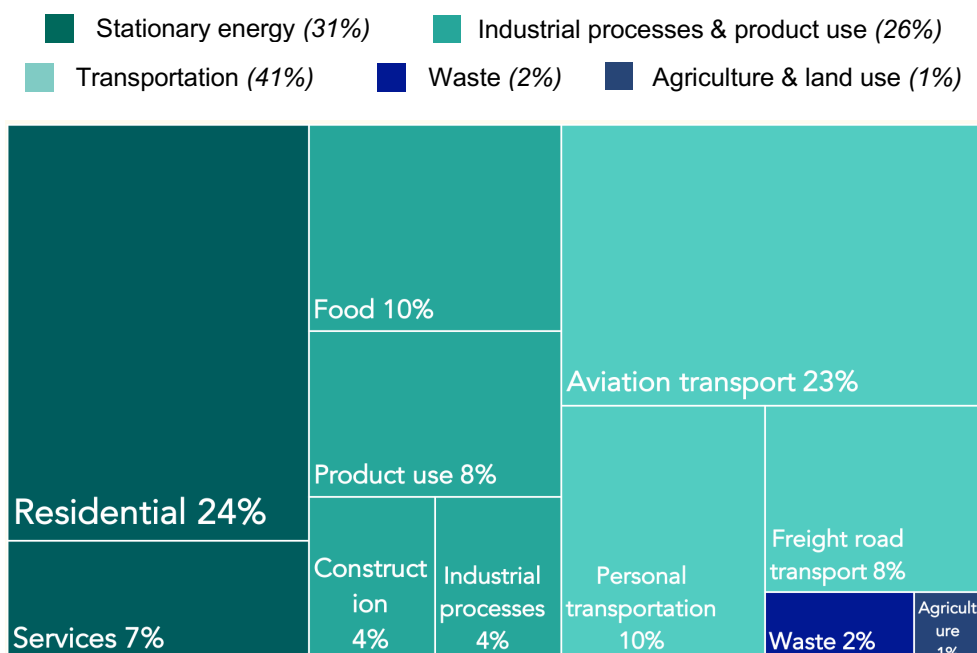
### 3. Discussion

After analyzing a selection of measures that seem promising in the scope of climate action, we will now focus on their potential implementation on the territory of Geneva. To this end, diverse factors will be discussed in order to determine whether the Confederation, canton and/or communes would be able, and should consider the deployment of these tools within their own jurisdictions. Not only will we discuss their feasibility, but also the challenges, opportunities and threats these smart practices could create, taking into account political influences as well as existing methods, whenever relevant.

As stated previously, these recommendations do not obviously constitute an exhaustive list of best practices; however, their use seems interesting to consider in the local context and may definitely yield positive results in terms of GHG reductions or adaptation to global warming. In a first phase, a dozen of tools that have been presented in the previous chapter are discussed in relative depths, in order to try to understand the implications of such measures in Geneva. Then, lessons are drawn from the consideration of these practices, and insights are formulated as to the interrogations that result from the potential implementation of these measures.

In order to consider the following proposed measures' potential effect in terms of GHG reductions, figure 3 shows the distribution of GHG emissions in the different sectors of the local economy. This graph relies on the carbon assessment conducted at the cantonal level in 2015 (SCDD 2015a). The terminology and the distribution of some sub-sectors have been slightly adapted in order to correspond to the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories method (Fong et al. 2014). At the end of chapter 3.1, table 2 evaluates and synthesizes what positive effects those measures could yield in each sector of emissions.

**Figure 3 – Sectors of GHG emissions in the canton of Geneva**



Source: adapted from (SCDD 2015a, p. 10)

### **3.1 Measures to reinforce climate action in Geneva**

#### **3.1.1 Transportation**

The reduction of GHG emissions in Geneva will necessarily have to include measures undertaken within the transportation sector, as this segment represents a significant part of the canton's total emissions—41% in total. This comprises emissions that result from three distinct types of movements. First, the importance of aviation in the total carbon assessment cannot be omitted, as it is accountable for 23% of emissions, even though the international scope of the airport must also be factored in this responsibility, as mentioned before. Second, individual transportation also largely contributes to the canton's climate impact, with 10% of the total GHG emitted on the territory. Lastly, freight transportation accounts for 8% of the emissions and also has a significant impact that should be mitigated (SCDD 2015b, p. 14; Prina 2018, app. 4). One should also note that these emissions are nowadays almost exclusively produced through the combustion of fuels (p. 16), meaning that the process of electrification and the adoption of renewable energies will have a major role to play in the climate transition of this sector, as it will be discussed subsequently.

### **3.1.1.1 Restrictions on diesel vehicles**

The issue of diesel fuel vehicles is significant, based on the sector's penetration and the externalities it has in terms of pollution and GHG. It is especially widespread in some industries of the private sector that require such types of reliable vehicles for their frequent movements, such as professional deliveries or freight road transportation (Prina 2018, app. 4). Nonetheless, the option of implementing direct measures that target these vehicles in the city of Geneva will not be discussed further for two reasons. On the one hand, we have seen that LCAs do not find significant differences between GHG emissions of petroleum and diesel vehicles, meaning that the problem should be discussed under the angle of air pollution, which falls outside the scope of this report. On the other hand, early investigation of options like banning old diesel vehicles or levying higher taxes presume potential difficulties in one single Swiss city like Geneva due to political animosity (Prina 2018, app. 4) and the fear of companies relocating to another canton, which is an important issue to consider when implementing new taxes or restrictions unilaterally (Zinder 2018, app. 2; Forney, Ballissat 2018, app. 6).

### **3.1.1.2 Carbon pricing on transportation**

As explained previously, Switzerland is one of the most progressive countries when it comes to carbon pricing. One problem however is the fact that transportation fuels are not subject to this tax on CO<sub>2</sub>. This issue poses real interrogations in terms of political opportunities that lie before the Confederation. Once more, it has to reconcile strongly diverging interests between anxieties for our transport emissions as well as our alignment with the Paris Agreement, and economic activities in the road sectors which campaign for more liberal policies to facilitate their activities. Here, one can suggest the Federal Council to carefully assess these interests and seek the political consensus in the matter, in order to respect the democratic process. However, considering the significant role played by the transportation industry in terms of national emissions—32.1% in 2015 (OFEV 2017g)—, putting a carbon price in this sector may definitely yield results that would bring Switzerland closer to climate targets (Prina 2018, app. 4).

### **3.1.1.3 Incentives for electric vehicles adoption**

We have seen how society must go through a process of electrification in order to rapidly abandon the use of fossil fuels. Within this scope, countries and cities encourage the adoption of electric vehicles, which have potentials for lower GHG impacts, provided that their energy sources are clean and do not depend on fossil fuels. Indeed, the ecological impact of these types of vehicles is better than which of petroleum cars over the use of the products, but it is the production, and elimination or recycling of their batteries, that

can counteract these benefits. (Messagie 2014; Hawkins et al. 2014; Nordelöf et al. 2014).

The canton of Geneva has begun rather timidly to encourage the purchase of electric vehicles and to facilitate their use in the city, over the recent years. However, the potential effects of these measures should be discussed, as well as what can additionally be put in place to foster this adoption. The market share of electric and hybrid vehicles in Switzerland is very low—2.55% (EAFO 2018c)—and the number of electric vehicles currently in circulation in Geneva, is piddling as well (Prina 2018, app. 4). This suggests that much more can be done in order to increase the penetration of this type of vehicles in our Swiss city. If we take the example of Norway previously mentioned, we can see that the Nordic country's electric vehicles market share amounts to 39% of new cars registered during the year (EAFO 2018a). Again, this suggests a rather high correlation between the extensive set of measures implemented at their national and urban levels, and their penetration rates that are among highest in the world.

Consequently, more ambitious measures can be considered in Geneva, while the local particularities and the industry's context should be kept in mind to ensure the success of their implementation. First, as for any public policy that needs financing, measures should be economically viable for the canton and communes. According to Mr. Prina (2018, app. 4), the fact that the canton currently finds itself in slight financial difficulties means that it could probably not afford high additional spending in transportation measures. Second, renewing vehicle fleets definitely holds potential for GHG reductions, but this should not come at the cost of more congested roads, or public transportation flows. Finally, the environmental impacts of replacing petroleum cars with electric ones should take into account the externalities of disposing of older, but functioning car units—that is, their successive second-hand use, recycling or disposal. Illustrating this with an extreme example, if overnight, all petroleum cars were replaced with new electric ones, the initial environmental impact would be huge due to the GHG emissions created through the manufacturing and shipping of new electric cars, as well as the disposal of all petroleum cars that were still in good conditions. This implies the fact that consumers should not necessarily replace their functioning petroleum car before it becomes unusable.

Considering those constraints, the canton could definitely employ new promising methods to foster the adoption of electric cars. First of all, incentives should be considered to facilitate the use of electric vehicles in the city. Those are perfectly plausible as the current proportion of electric vehicles in the overall inventory is extremely

low, meaning that the impact of such measures on circulation or public spending would be limited as long as this penetration rate is also low. In particular, allowing EVs to circulate on bus lanes should be considered. This would give an additional incentive to people to switch to EVs and reduce the opportunity cost of this consumer choice. For example, the canton could introduce this measure during a test phase on selected bus lanes where the effect on public transportation would be tolerable. A similar measure has been recently tested in Geneva, opening a couple of bus lanes access to motorcycles (DETA 2018). This suggests it could be feasible provided the federal, cantonal and communal entities affected agree on testing such measures, as their competences would overlap in some cases.

Pursuing the same goals, we could also envisage a broader tax exemption scheme for owners of electric vehicles. At the federal level, reducing VAT rate may be explored, while at the cantonal level, EVs could definitely be waived of vehicle tax for more than three years. Obviously, such measures require strong political willingness due to the public finance shortfalls they would create. However, the long-term benefits would include reducing negative externalities of petroleum cars such as CO<sub>2</sub> emissions and air pollution—which directly increases public spending for health issues. As mentioned previously, one of the huge barriers to the adoption of electric vehicles lies in the financial gap there is between EVs and petroleum vehicles. Total or partial tax exemptions constitute interesting measures that circumvent direct, on-purchase subsidies and help spread the financial burden of incentives on EVs over several years following the purchase.

Finally, solutions may be discussed with business milieux in order to foster the adoption of EVs fleets at the company level. Company mobility plans discussed with Mr. Prina are interesting in the sense that they create a voluntary dialogue between the State and companies to help them adopt more sustainable transportation practices (2018, app. 4). However, they are mostly tackled by the DGT through the lens of traffic optimization, which is necessary but insufficient for the wide adoption of EVs in business environments. One could imagine the integration of EV adoption to the objectives of these mobility plans. If financially viable for the canton, complementary measures should accompany these plans and optimize their efficiency. To that end, subsidies for the installation of recharging stations would efficiently accompany the implementation of mobility plans.

#### **3.1.1.4 Aviation**

As presented previously, we can say the international airport of Geneva perfectly illustrates a very sensitive global issue that often leaves decision makers helpless. Almost one quarter of the total GHG emissions in the canton are due to the airport's activities and although the objective is to mitigate them, little is planned as to how this can be achieved. This is representative of the global confusion that lingers on this industry. In short, emissions are not accounted for in international agreements, and policy makers mostly rely on the technical progress of planes to lower environmental impacts, despite the huge GHG increases the sector has undergone over the last few decades and the provisions for flight demand to continue growing.

Policies in Geneva aim at maintaining aviation emissions in a first phase, before making them drop back to 2014 levels by 2030 (SCDD 2017, p. 26). This strategy is inconsistent with the PA condition of reaching GHG peak as soon as possible, meaning that becoming compatible with this target requires the industry to achieve the following transitions—the first two requiring decoupling emissions from the increasing passenger demand.

- An increased fossil combustion efficiency
- Alternative types of energy—e.g. solar planes
- A decreased demand for flights

All of these three solutions hold potential to mitigate GHG emissions from air transportation worldwide, and each measure has a role to play in the transition to cleaner skies. Decoupling emissions from the demand seems to be a long-term issue, as technology and efficiency will take years to be developed before showing consistent and applicable solutions (Zinder 2018, app. 2). Thus, reaching the objectives set by the Paris Agreement requires restraining the demand that has been booming over the last few decades and years.

Some interviews conducted as part of this project provide clear insights on the subject: mitigating aviation emissions will require a coordinated, extensive set of measures that should not be undertaken only by a single country like Switzerland. Otherwise, individual measures would most probably create competition distortions between airports of different countries, and passengers may simply choose another cheaper or more convenient airport if they feel so—e.g. playing into the hands of the Lyon airport instead of the Geneva airport (Zinder 2018, app. 2; Forney, Ballissat 2018, app. 6). Keeping this in mind, solutions do exist at the international, national, and even regional levels.

At the international level first, Switzerland has to coordinate with other nations and press for the application of the polluter pays principle—which it holds as crucial—in order to reduce externalities created by flight services. The international community should consider the principle of applying usual taxes—VAT, kerosene, and/or even ticket taxes—on flight tickets in order to ensure the cost of negative externalities is transferred to passengers. This would also reduce the unfair competitive advantages the industry benefits from compared to other transportation means. As Switzerland cannot and should not go it alone, the country has to get its voice heard as part of the European regulations that are applicable and of its State membership at the ICAO. To that end, Switzerland could voluntarily join the pilot phase of the CORSIA system by 2023, which would help countries move forward with the creation of this ETS for aviation GHG emissions.

Second, we could consider the possibility for the Confederation to simply levy the standard petroleum tax on plane kerosene as well, which is not the case today, contrarily to the special tax on kerosene that is levied by the Geneva airport for instance (Zinder 2018, app. 2). Again, this would help ensure all transportation industries play with the same rules of the game and reduce unfair competition between rail, car and air transport, for example.

Finally, at the more regional level, the development of the Geneva airport should simply be restrained, as demanded by many communal and organizational actors of the canton nowadays, compared to what the future development plans of the airport forecast. Ensuring a number of flights per day is not exceeded would purely limit the negative effects of flights in the region, including GHG emissions but also air pollution, noise and traffic congestion. This measure would be simple, but could prove to be unpopular, which is why priorities need to be agreed upon by federal and cantonal authorities on what objectives should be favored: economic development of the airport or mitigation of environmental impacts. Again however, economic development would be favored in other innovative sectors that pursue cleaner practices, such as renewable energy or even other transportation industries such as rail. On the other hand, the impacts of global warming on businesses in the future will be disastrous if efforts to mitigate the phenomenon today are not undertaken.

### 3.1.2 Industrial processes and product use

Four segments of emissions that are accounted for in the carbon assessment of the canton should be attributed to industrial processes and product use:

- Food (10%)
- Consumption goods (8%)
- Construction (4%)
- Industry (4%)

Together, these segments account for 26% of the total GHG emissions resulting from activities on the cantonal territory (SCDD 2015b, p. 14; SCDD 2015a). This also represents a significant part of cantonal emissions, which should be addressed with mitigation measures. Displaying product information for consumers in a clearer and explicit manner is one of the measures that can potentially yield encouraging results.

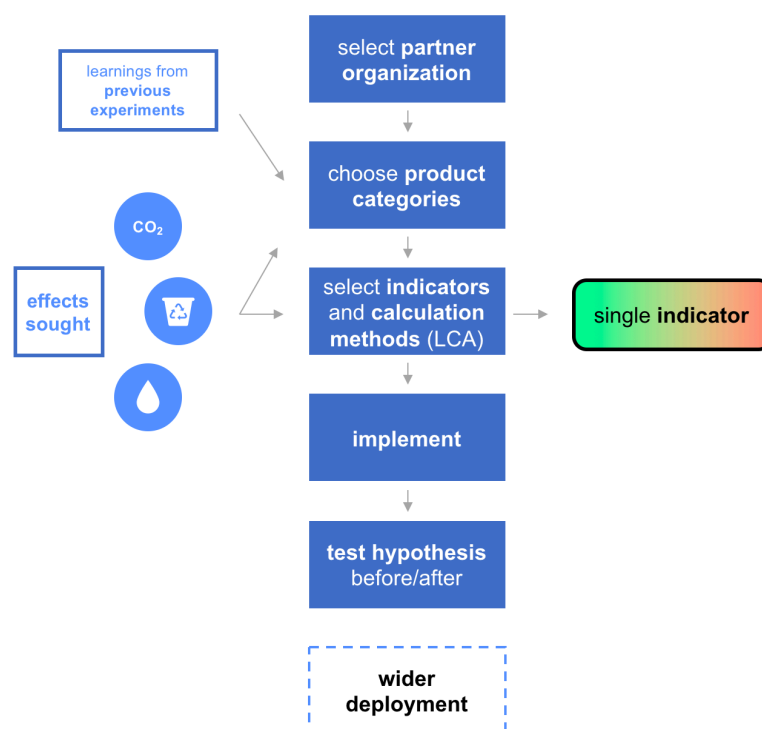
#### 3.1.2.1 Product labelling

As per the interview conducted with Mr. Zinder (2018, app. 2), small-scale cooperation with grocery stores in Geneva seems to be a good starting point for the implementation of ecolabels—i.e. ecological footprint labels. As per the pilot phases put in place by the European commission and countries such as France, the idea of ecolabels on FMCG for instance, is not new. In Switzerland, environmentally active associations such as the WWF (2017) even defend such measures, alongside even more drastic measures. A pilot program in that sense would probably constitute a brand-new experimentation for this type of ecolabels, as no other Swiss canton or city seems to have implemented this measure. This implies several conditions and constraints that should be considered, as many different factors would influence its success.

Figure 4 shows what the implementation process of an ecolabel in Geneva could look like, including key steps that should not be neglected. First, the State would need to find a voluntary partner in the distribution sector, which would be willing to participate in such a program. Indeed, it seems very unlikely that the canton would impose such a measure to all supermarkets for instance, without first testing the implications at small-scale (Zinder 2018, app. 2). A supermarket chain such as *Migros Genève* for instance could allow the project to be piloted locally and the measure to be tested in several locations of different types, sizes and target audiences. Second, the State together with the distribution partner would have to assess what types of products would be the most prone to yielding concrete results, that is, to show the label creates awareness and has an impact on customer choices. One should also determine what types of indicators

would bring consistently comparable information between products: while GHG emissions constitute a good indicator for the ecological impact of any type of products, other indicators such as water use, or the proportion of organically-sourced components, may depend on the sector. If multiple indicators are considered for a same product-label, the creation of a single-indicator combining them could definitely reduce confusion, together with visual elements such as color codes, scales, and/or pictograms. This is important due to the recent proliferation of labels, which will be helpful only if they do not induce additional confusion (Forney, Ballissat 2018, app. 6). Considering experiments that are already in the process of implementation—e.g. in countries of the EU—would definitely help the State direct its explorations, while conducting a consumer survey that compares reactions to different types of labels would also be of interest. Moreover, the indicators and products chosen should take into account the calculation methods needed—i.e. types of LCAs, most probably. It is important to select indicators that can be assessed consistently, all along the value chain of products. Critical questions include how to accompany the different businesses implied in the supply chain, and what types of products will ensure a smooth implementation in the beginning, for example by choosing fruits, whose air travel GHG should be fairly simple to assess alongside locally-sourced, seasonal fruits (Chambaz 2018, app. 5).

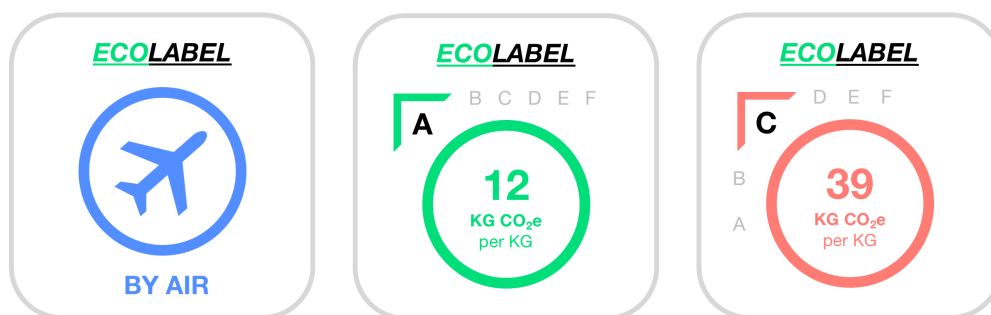
**Figure 4 – Implementation process of an ecolabel in Geneva**



Source: author.

Then, the hypothesis that such an ecolabel has an impact on consumer choices would need to be tested among customers. To this end, the most effective would be to follow a target group of variously-segmented consumers before and after implementation, looking for evolutions in their purchasing patterns over a long enough period of time. Finally, if results are promising, a progressively wider deployment could be envisaged, either through binding or non-binding measures, depending not only on further dialogue with the concerned industries, but also on the Confederation's point of view as well as popular and political support. Figure 5 presents three prototypes of ecolabels. The first one shows how a first label could be simply designed to state if a certain type of products has been shipped by air—which often represents the largest part of plant foods' carbon footprint and is not always mentioned on Swiss products. The other two examples show a possible application of carbon footprint information, displaying a color code, a rating system and the absolute quantity of GHG emitted, in order to help customers compare two different product footprints.

**Figure 5 – Three samples of ecolabels**



Source: author.

### **3.1.3 Waste**

The elimination of waste itself only accounts for 2% of the GHG emissions produced in the canton, which is very low compared to other sectors (SCDD 2015b, p. 14). However, one should not underestimate the potential of measures taken at this sectoral level, as the quantity of waste we produce and eliminate—which as we have seen, is especially preoccupying in Switzerland—creates consequences that go far beyond the mere process of elimination. In the perspective of circular economy, all waste that ends up being eliminated is the result of a product life cycle throughout which GHG emissions are created predominantly at all stages, such as extraction of raw materials, transportation, transformation, etc. In other words, whenever we succeed in reducing waste—e.g. from packaging—, we also reduce GHG emissions at all these life cycle stages; and this can either be achieved through measures of recycling or absolute waste reduction. Besides, reducing waste not only has a positive impact on GHG emissions, but also lowers human environmental impact in other areas such as pollution, which represents a massive externality for our society. For these reasons, the four measures discussed in the following subsections that address waste do have their importance as part of our climate and environmental good practices.

#### **3.1.3.1 Garbage bag tax**

The policy of garbage bag tax has always been a truly sensitive issue in the canton of Geneva. On the one hand, the Confederation has been pressuring all cantons to implement this measure in order to reach the target of 50% of recycled waste. Moreover, this measure has proved to be efficient, creating promising results where it was implemented and does not seem to produce great popular opposition, nor significant side effects after implementation (Carattini et al. 2016). On the other hand, the local mindset has appeared totally averse to the implementation of this measure in the canton of Geneva. The interview with Mr. Chambaz (2018, app. 5) gives interesting insights on the subject, allowing to understand the dominant political position currently in place. While the canton of Geneva has not yet reached the recycling target of 50%, and although the local rate is generally below other Swiss cantons, political measures have been flourishing over the last few years in order to avoid the garbage bag tax, also showing promising results as the recycling rate has never been this high (Service de géologie, sols et déchets 2017; OFEV 2017e). In particular, composting has been widely encouraged throughout Genevan communes via the distribution of free garbage containers in the last couple of years. Three political arguments can be found against the garbage bag tax measure. First, the population has been encouraged to recycle more via alternative policies that work relatively well in increasing recycling rates.

Consequently, “*introducing a tax today would [...] constitute a very bad way of rewarding people for their progress*”. Second, recycling infrastructure in Geneva seems quite developed, so the introduction of the tax would probably not benefit from the same infrastructure development cantons such as Vaud and Neuchâtel undertook at the same time. Finally, the political consensus has been diverting from this measure, with even the most ecological party *The Green* slowing down support for the tax recently. (Chambaz 2018, app. 5)

For all these reasons, recommending against the implementation of this measure seems reasonable. The local political context plays a big role in this case and should be truly considered, without trying to apply a one-size-fits-all approach to this issue. The objectives set seem attainable with a longer-term, consistent policy scheme that contents citizens, slowly begins to bear fruits, and seems acceptable to both local political entities and the Swiss Confederation until today. However, the application of this garbage bag tax to the canton of Geneva will probably not be abandoned by the Confederation if recycling rates do not continue to show promising signs of improvements in the next few years. This means, even though it does not make political sense to enforce this regulation today, that successive implementation cannot be excluded and should even be encouraged if it can bear fruits in the future to continue increasing recycling rates.

### **3.1.3.2 Plastics items ban**

Following the announcements to ban some single-use plastics items in some cities and countries, the canton of Geneva could very well engage in similar practices. Even though waste accounts for a small part of GHG emissions in the canton, the contribution of Geneva would be favorable to climate action to create awareness as one of the first urban areas to implement such drastic measures, but also in terms of combat against pollution. The unprecedented law project of the city of Neuchâtel, which should come to pass by 2019 (Ville de Neuchâtel 2018), shows that banning plastics straws for instance could definitely be envisaged at the city level of Geneva. It would be relevant to accompany such banning measures not only with awareness campaigns, but also through programs facilitating the adoption of eco-friendlier alternatives to these objects. Other types of plastics items for which banning measures would make sense include for example cotton ear buds, cosmetics with plastics microbeads, fragmentable plastics and expanded polystyrene containers. Regarding plastics bags, the reduction of single-use models is already truly underway in the canton, as the issue was tackled unilaterally by supermarket chains such as Migros, Coop and Aldi, which respectively decided to either ban or charge them (RTS 2017).

### **3.1.3.3 Combatting over-packaging in supermarkets**

The feasibility of requiring supermarkets to install unpacking platforms should definitely be studied, as discussed in the canton of Valais and implemented in Zurich. This would potentially help create awareness among the distribution industry, shifting some responsibility for waste from consumers to distributors. Indeed, regulations in effect in Geneva now require companies to take charge of the costs of elimination or recycling of their waste. The potential benefits resulting from such a measure not only include the transfer of waste externalities—as costs of elimination are currently borne by taxpayers as a whole. Being forced to accept package back would also urge distributors to rethink their packaging practices and reduce the waste they generate. Moreover, this new viewpoint on waste could help them favor recyclable materials instead of plastics. For example, over-packaged multiple packs of products, when they are discounted, could be reimagined and discounts could simply be applied at the cashier upon electronic scan of multiple products at once.

Supporting actions may ensure this measure is successfully implemented. First, a transition period will be required. The canton could meet with representatives of the branch and determine how a pilot phase could be imagined, which may begin on a voluntary approach. We could assume stores would be interested in participating to this pilot phase, as it would potentially give them a comparative advantage in strengthening their brand image, being the first companies to comply to new standards. Once the regulation has been implemented, auditing and advice sessions could be provided by the State for producers and distributors. They would help actors explore new ways of reducing waste, and the State entities could discuss with them the introduction of new recyclable materials, among other subjects. This is an important step, as diverging opinions exist on the question whether or not producers can really reduce store packaging. While distributors often argue they are unable to do so for legal, hygiene and supply chain reasons (Chambaz 2018, app. 5), other actors who have looked into the issue suggest that these constraints are mostly twisted and can definitely be overcome (Sandoz 2018).

This program could for example be implemented as part of the existing *Best for Geneva* platform, in the form of a special bundle especially designed for distributors and producers of fast-moving consumer goods. Finally, public entities could help create awareness among consumers by communicating on the matter, and on the benefits that would exist when leaving packages at shops, in the form of a nice gesture they can make to protect the environment.

### **3.1.3.4 *Hard-to-recycle waste***

The two smart practices presented previously that target hard-to-recycle waste could very well fit in the context of Geneva and represent interesting business models that could be extended to other types of objects in the future, if they are successful.

A small-scale partnership could be imagined between the Department of public education of the State of Geneva and the organization TerraCycle in order to recycle writing instruments in schools of the canton. Indeed, this recycling company offers, in partnership with BIC, the ability for any organization to become a collection point and allow anybody to drop their office supplies to be recycled. Admittedly, such a measure would not have a huge impact on GHG emissions of the canton, but the benefit from this operation would lie in the awareness it would create among children, who would be alerted on the issue of waste and given the possibility to act from a young age. Moreover, the infrastructure and business model are already available in Switzerland, meaning that schools in Geneva could very easily take part in this program (TerraCycle 2018a). Such pilot programs have their importance in the way that they raise awareness among the public and pave the way for other similar measures to be implemented at larger scale, and throughout all sectors of society.

Additionally, the city of Geneva could take inspiration from cigarette-recycling programs that are emerging across other cities. Cigarette butts often represent a conundrum for municipal cleanliness: in Switzerland, they account for 36% of the total litter cleaning costs, which amount to CHF 144 million per year (Berger, Sommerhalder 2011). In the city of Geneva as well, road maintenance services face huge challenges in the domain in terms of pollution, dirtiness, and the cost associated to the issue. Awareness and infrastructure measures have been progressively put in place to address this problem (Nydegger 2012). However, the issue of final waste is still not tackled. Instead of having huge troubles collecting cigarette butts and then incinerating them, why not reinforcing awareness and at the same time, recycling the waste produced? Again, this could be done through a partnership with TerraCycle which, as mentioned previously, also specializes in the recycling of cigarette butts into revalued objects and compost. This time, the cigarette recycling program is not available in Switzerland yet, meaning that all conditions of implementation would need to be defined. However, the city of Geneva could benefit from the experience of TerraCycle as this program has already been implemented successfully in several American cities. Finally, financing such a program would not require huge adaptation efforts, as all public trash cans have been equipped with ashtrays, which may continue to be used to that end (Barazzone 2015).

**Table 2 – Potential effects of proposed measures on emissions by sector**

<b>Emissions sector</b>	<b>% GHG emissions</b>	<b>Potential effects</b>	<b>Remarks</b>
Transportation	41%	Very high	<ul style="list-style-type: none"> <li>• Unprecedented tackling of aviation emissions</li> </ul>
Industrial processes and product use	26%	High	<ul style="list-style-type: none"> <li>• High impact of consumer behavior</li> </ul>
Waste	2%	Low	<ul style="list-style-type: none"> <li>• Relative potential effect on other sectors (i.e. industrial processes; transportation)</li> <li>• High potential effects on other issues (i.e. pollution, elimination costs, etc.)</li> </ul>
Stationary energy	31%	None	<ul style="list-style-type: none"> <li>• No measures proposed</li> <li>• Ambitious objectives (canton + city)</li> <li>• Very innovative sector and projects (e.g. GéniLac)</li> </ul>
Agriculture and land use	1%	None	<ul style="list-style-type: none"> <li>• No measures proposed</li> </ul>
Other Scope 3	n/a	None	<ul style="list-style-type: none"> <li>• No measures proposed</li> <li>• No account in cantonal carbon assessment</li> </ul>

Source: author; GHG emissions sectors SCDD 2015a, p. 10.

### **3.2 Synthesis of the discussion**

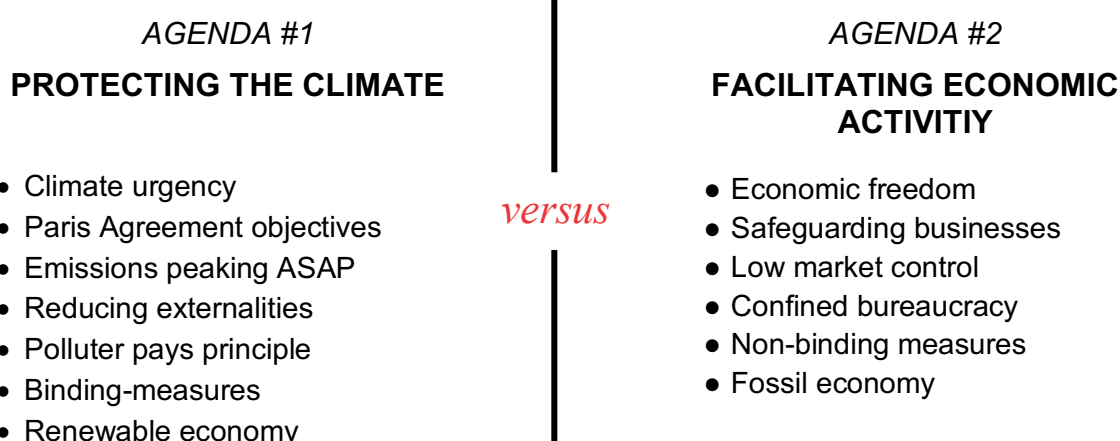
Our investigations and analyzes suggest several key findings regarding climate action in Geneva and the points that will be critical to address in the near future, if more ambitious measures are to be envisaged. We have seen that climate action is generally well advanced in Geneva, throughout many sectors of GHG emissions and particular industries. Objectives from the Paris Agreement have been assimilated and progressively translated into national, cantonal and even communal targets—e.g. through the Swiss INDC, Cantonal climate plan, and the adoption of Agendas 21, respectively. Current advances show that strategies and measures to achieve these local targets are well ahead, although some sectoral measures naturally take time to be implemented and are sometimes abandoned. This may be due in part to the very inclusive and direct form of the Swiss democratic process, as decisions take time and must often factor in all types of interests.

However, one should not settle for these ecological advances exclusively, which seem promising at first sight: as mentioned, many measures are still in development and have not yielded concrete results yet, which is partly due to the slow nature of climate action itself. In other words, many sectors have not yet seen their GHG emissions be reduced—some activities have even seen their emissions raise, such as aviation. It should be remembered that many experts constantly call for more ambitious strategies at the global levels, reminding us that achieving the PA objectives will be extremely demanding and requires efforts from all actors (Zinder 2018, app. 2; Rogelj et al. 2016)—i.e. national and subnational public entities, private businesses, investment institutions, NGOs and the civil society.

These factors considered, two main political agendas can be distinguished in public action, as they both affect in different terms the degree to which GHG emissions will be mitigated, to achieve the PA objectives. On the one hand, there is the agenda of climate urgency which, as we considered, has massively engaged the international community very recently. Governments have been realizing that time is running out for global temperatures to remain below 1.5°C, and as stated in the Paris Agreement, that we must “*reach global peaking of greenhouse gas emissions as soon as possible*” and sharply reduce them thereafter (UNFCCC 2015a, Art. 4 par. 1). On the other hand, there is the economic agenda advocated for by business milieux, which is also influenced by the liberal ideologies on which our society is based. This agenda looks on climate action with a favorable eye, as long as economic freedom is guaranteed, market control remains very low, and bureaucracy is confined (Forney, Ballissat 2018, app. 6).

These political agendas can be viewed from two different perspectives, which are represented in figures 6 and 7 below. Figure 6 shows how the climate agenda has often been confronted to the economic agenda up to this day, and both have been seen as strictly incompatible by policy makers and business milieux. In other words, the conservative view on climate action to date has been to keep both objectives separated and pursue one as long as the other is not undermined. Because ambitious climate action has been considered as potentially harmful for the economy, measures to limit GHG emissions have been kept relatively restrained.

**Figure 6 – The conservative view on climate action**



Source: author.

This nowadays creates continuous political tension, as policy makers have to weigh up diverging interests of national industries, political parties and international commitments. Should one favor climate urgency or let businesses take their time to transition to cleaner business models? Should one concentrate more on the achievements of our international GHG commitments, or on the national economic wellbeing? Should we opt for binding measures to supervise business climate actions or favor soft measures that limit constraints as well as the administrative burden; and will those be sufficient?

Studies on the future effects global warming will have on businesses seem more and more pessimistic due to the levels of temperature the planet is headed for in the next few decades. They also suggest that climate action to mitigate and adapt to climate change is necessary and salutary for businesses (Winn et al. 2010; Bulla et al. 2014). Again, this

asks the question: should emitters pay for these externalities right now in order to mitigate them, or will the societal costs be borne by future generations of businesses?

Those are all present questions that have to be answered and suggest the following conclusion: reconciling business and climate objectives is one of the most critical issue faced by our society today. The case of Geneva confirms it through the numerous policies studied in this paper, and the tradeoffs they create. Certainly, accompanying measures such as awareness campaigns, services to companies and voluntary business actions do have their role to play in climate mitigation strategies. However, the urgency of the global warming phenomenon, the drastic commitments taken by governments as well as subnational authorities, and the preliminary research on the potential impacts of the measures taken, concur to the fact that these measures alone will be far from sufficient.

Therefore, we can argue that the issue of reconciling environmental and business interests is nowadays tackled with the wrong approach. Businesses and all other societal actors—especially but not exclusively those located in critical regions such as developing countries, small islands, etc.—will necessarily have to pay the costs of greenhouse gas emissions sooner or later, either through the internalization of externalities today or due to the massive costs that will result from extreme temperature rises in the next few decades. Thus, the approach that should be favored is to scale up climate action right now with binding measures, incentives and partnerships that ensure all private actors add their capabilities to the global efforts against global warming. Obviously, industrial sectors that may suffer from this transition—e.g. businesses active in fossil fuel sectors—have to be accompanied by the State to succeed in abandoning their business-as-usual practices. However, jobs, economic opportunities and financial cash cows that are lost today will definitely and very rapidly be offset by thriving opportunities in other sectors such as renewable energies, electrification activities across all sectors, and innovative climate solutions—provided that we seize these opportunities today before we are forced to build up resilience because of climate disasters. In other words, the greatest danger for businesses today does not lie in the abrupt transition toward eco-friendlier practices they have to go through. It lies in the disastrous situations they will face in the next few decades if they do not undergo this ecological transition soon enough.

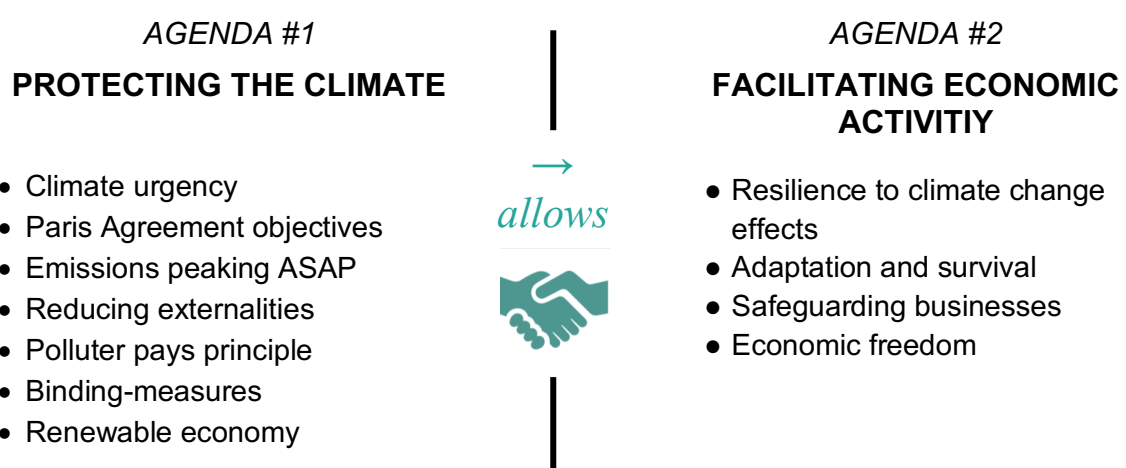
This reconciliation between climate and economic agendas is represented in figure 7 below. The modern view on climate action considers the second agenda—facilitating economic activity—as dependent on the success of the first—protecting the climate. Indeed, the wellbeing of our industries and businesses in the future will be strongly

impacted by the rise in temperatures. This means, ambitious climate action can be scaled up today in order to avoid or limit irreparable damage that will be done on our economic activities. This perspective is still in the process of adoption, but recent developments in international discussions on global warming already show that mindsets are evolving—be it simply through the binding measures adopted by countries as part of their NDCs.

While those ideological stakes are discussed, the consensus we have at a more local level lies in the fact that our planet is indeed getting warmer and that all actors will be required to join the response to climate change. This means, local action favoring partnerships is key, for which this thesis has attempted to provide concrete tools. The form this action can take has also been discussed, considering measures such as regulations, public-private partnerships, taxation, awareness campaigns and prohibition policies. The State in Geneva should also favor experimentation and the implementation of small-scale practices that may be deployed more widely in the future.

In democratic environments such as Geneva, the degree to which binding measures will be favored over more facilitative ones will be mostly determined by the political dialogue between decision makers, political parties, economic milieux and the population. In any case however, the degree of ambition of these measures will be highly decisive for the future of all actors on the territory.

**Figure 7 – The modern view on climate action**



Source: author.  
Picture: adapted from [Icons8](#).

## 4. Conclusion

This research has examined via what types of measures Geneva could respond to the Paris Agreement. Action empowering the private sector has been assessed, and an array of smart practices has been tested to determine in what terms they could be implemented locally with regards to the local political context, needs and opportunities.

The inclusion of all sectors of society in mitigation and adaptation efforts, including subnational authorities and non-state actors in particular, will constitute a priority in order to maintain global temperature below 2°C. Although climate action is generally well advanced in Geneva, the findings suggest that additional measures should be implemented, pursuing a clearer definition of the private sector's role, and aiming at leveraging its potential, technical knowledge and expertise in global warming mitigation. To that end, recommended practices consist of financial instruments pursuing the electrification of energy sectors; information display policies promoting cleaner purchasing behaviors; restrictive measures to curb the rise of aviation-related GHG emissions; sectoral public-private partnerships; as well as binding measures reducing waste externalities. Furthermore, long-term capacity building mechanisms should be reassessed in order for public actors to continuously benefit from the economic milieu's point of view, capabilities and scale—and vice versa. Cooperation practices need to be rethought to ensure a long-term dialogue on the constant evolution of smart practices and of their feasibility within the local context, especially in the next few years after the ratification of the Paris Agreement, which accelerated global efforts.

Indulgent and non-binding methods have been the preferred way of addressing climate change until today, especially in Geneva, where actors' considerations are often extensively weighed up in the elaboration of climate measures. Although these types of practices do have their role to play in mitigation and adaptation initiatives, it has become clear that they will not be sufficient to reach the objectives set. Indeed, more ambitious and binding measures are needed to enforce the polluter pays principle, internalize the externalities resulting from production/consumption activities, and guarantee the preservation of our planet, for future generations to benefit from its resources.

## Abbreviations and definitions

<b>ADEME</b>	Environment and energy supervision agency <i>“Agence de l’Environnement et de la Maîtrise de l’Énergie”</i>	<b>GHG</b>	Greenhouse gas
<b>app.</b>	Appendix	<b>HEG</b>	Geneva school of business administration <i>“Haute école de gestion de Genève”</i>
<b>ATE</b>	Transports and environment association <i>“Association transports et environnement”</i>	<b>HEPIA</b>	Geneva school of landscape, engineering and architecture <i>“Haute école du paysage, d’ingénierie et d’architecture de Genève”</i>
<b>B2B</b>	Business to business	<b>HFCs</b>	Hydrofluorocarbon
<b>CCP</b>	Climate cantonal plan <i>“Plan climat cantonal”</i>	<b>INC</b>	National institute for consumption <i>“Institut national de la consommation”</i>
<b>CCSD</b>	Cantonal concept on sustainable development	<b>INDC</b>	Intended nationally determined contribution
<b>CERN</b>	European Organization for Nuclear Research	<b>LCA</b>	Life cycle assessment
<b>CH<sub>4</sub></b>	Methane	<b>MEF</b>	Ministry of Economy and Finance <i>“Ministère de l’Économie et des Finances”</i>
<b>CO<sub>2</sub></b>	Carbon dioxide	<b>MTES</b>	Ministry of Ecological and Solidarity Transition <i>“Ministère de la Transition écologique et solidaire”</i>
<b>COP</b>	Conference of the parties	<b>N<sub>2</sub>O</b>	Nitrous oxide
<b>CSR</b>	Corporate social responsibility	<b>NDC</b>	Nationally determined contribution
<b>DDDP</b>	Deep Decarbonization Pathways Project	<b>NF<sub>3</sub></b>	Nitrogen trifluoride
<b>DGE</b>	General board of environment <i>“Direction générale de l’environnement”</i>	<b>OCEN</b>	Cantonal office of energy <i>“Office cantonal de l’énergie”</i>
<b>DGT</b>	General board of transportation <i>“Direction Générale des transports”</i>	<b>OCSTAT</b>	Cantonal office of statistics <i>“Office cantonal de la statistique”</i>
<b>EAFO</b>	European Alternative Fuels Observatory	<b>OECD</b>	Organization for Economic Co-operation and Development
<b>EEA</b>	European Environment Agency	<b>OFEV</b>	Federal office of environment <i>“Office fédéral de l’environnement”</i>
<b>EPFL</b>	Federal polytechnic school of Lausanne <i>“École polytechnique fédérale de Lausanne”</i>	<b>PA</b>	Paris Agreement
<b>ETS</b>	Emissions trading scheme	<b>PFCs</b>	Fluorocarbon
<b>EU</b>	European Union	<b>R&amp;D</b>	Research and development
<b>EV</b>	Electric vehicle	<b>RTS</b>	Swiss radio television <i>“Radio télévision Suisse”</i>
<b>FER</b>	Romandy enterprises federation <i>“Fédération des entreprises romandes”</i>	<b>SCDD</b>	Cantonal service of sustainable development <i>“Service cantonal du développement durable”</i>
<b>FMCG</b>	Fast-moving consumer goods		
<b>FTI</b>	Foundation for industrial sites <i>“Fondation pour les terrains industriels”</i>		
<b>gha</b>	Global hectares		

<b>SCCJ</b>	Swiss Coalition for Corporate Justice
<b>SDGs</b>	Sustainable development goals
<b>SF<sub>6</sub></b>	Sulfur hexafluoride
<b>SIG</b>	Industrial services Geneva <i>“Services industriels de Genève”</i>
<b>tCO<sub>2</sub>e</b>	Tons of CO <sub>2</sub> equivalent
<b>TJ</b>	Terajoule
<b>TPG</b>	Public transports Geneva <i>“Transports publics genevois”</i>
<b>UN</b>	United Nations

**UNCED** United Nations Conference on Environment and Development

**UNFCCC** United Nations Framework Convention on Climate Change

#### **Urban heat island**

The phenomenon that makes urban areas hotter than their surroundings due to the energy produced and retained in big cities.

**US** United States of America

**VAT** Value-added tax

**ws.** Worksheet

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**Table 3 – Bibliography of interviews**

Reference	Person and institution	Comments
Houmard 2018, app. 1	<b>Laurent Houmard</b> <i>Professor,</i> Fribourg school of management	<i>Appendix 1</i>
Zinder 2018, app. 2	<b>Rémy Zinder</b> <i>Director,</i> Service cantonal du développement durable, Geneva	<i>Appendix 2</i>
Cretegnny 2018, app. 3	<b>Yves Cretegnny</b> <i>Managing director,</i> Fondation pour les terrains industriels, Geneva	<i>Appendix 3</i>
Prina 2018, app. 4	<b>Alexandre Prina</b> <i>Director,</i> Direction générale des transports, Geneva	<i>Appendix 4</i>
Chambaz 2018, app. 5	<b>Daniel Chambaz</b> <i>General director,</i> Direction générale de l'environnement, Geneva	<i>Appendix 5</i>
Forney, Ballissat 2018, app. 6	<b>Yannic Forney</b> <i>Project Manager &amp; Managerial Secretary</i> Fédération des Entreprises Romandes, Geneva  <b>Olivier Ballissat</b> <i>Managerial Secretary</i> Fédération des Entreprises Romandes, Geneva	<i>Appendix 6</i>
<i>[no reference, nor interview transcript: interview for guiding purposes]</i>	<b>Priscille Ghesquière</b> <i>Department director</i> Office for responsible consumption and production, French Republic	<b><u>Interview purposes:</u></b> <i>Overview of France's policies in terms of industrial practices, notably corporate non-financial reporting, sustainable monitoring of companies, and circular economy</i>

Source: author.

# Appendix 1: Interview of Mr. Laurent Houmard

***Participant in the creation process of the Agenda 21, Fribourg, Switzerland***

*Phone call on May 3, 2018*

**What was your role in the formulation of the Agenda 21 in the city of Fribourg?**

I had a role as a citizen and contributor, among 300-400 participants from the civil society.

**What was the creation process of this Agenda?**

There have been plenary sessions, followed by more practical work sessions. The process began between 2001 and 2002 and was organized over 7 to 8 years officially. The project was then taken over formally by the city of Fribourg, which has then implemented the majority of actions that were intended in this Agenda 21. There is usually an office that supervises this process. Sometimes, it is outsourced to a private organization when the commune doesn't have the resources required. Fribourg had mandated an external agency for the coordination of this process.

**So, was it launched by the Canton and then taken over by the different communes of the canton of Fribourg?**

No, it was entirely done at the communal level, as for the majority of Agenda 21 documents. Most Agenda 21 to which I have participated or observed, were created by cities or communes. Geneva is particular because it is kind of a city-State. It is more complex than in other cantons. But Geneva started this process more than 10 years ago, it was one of the pioneers and has a long story in this domain.

**Was there a process of consultation of the private sector in this project?**

Yes, in the sense that citizens took part in the project, so they are related in a sense to the private sector. However, no businesses as such were consulted, only individuals. I have rarely seen business actors take part in the formulation of an Agenda 21. Then at a second stage, it is important to conduct a consultation from economic milieux. If a commune or city sets measures that relate to climate issues (e.g. energy or transportation), I can imagine one would integrate them in the discussion process, which is participatory. It can be interesting indeed, however the whole process is voluntary, so they would take part in such projects only if they feel interested or affected by such measures. Of course, one cannot force them to be part of it when the whole Agenda 21 process is voluntary. What is important is that they become aware of the global warming concerns. As soon as public entities talk about important actions that would be put in place, it often involves investments and can require new regulations. And once it arrives in the public political debate, companies, associations and actors will come and defend their interests, even if they are not formally invited. So, there is both a process of reaction and consultation. Obviously the more we can federate different actors, the better. If we can integrate important actors such as big companies in such processes it becomes interesting.

**In Fribourg, has a specific role been recognized for the private sector in action against global warming?**

Not formally I believe. Speaking about the Agenda 21, there has been a few actions that touched the private sector, notably in energy and transportation sectors. However, global mindsets were not the same 10-15 years ago as today, when it comes to climate change. The climate theme was not at the top of the discussions list, but it was considered among other issues when the Agenda 21 was drafted. It was probably not as explicit as today. Even in Switzerland, indicators have turned red recently, for instance by knowing that local warming now amounts to 2°C in Switzerland.

**In your opinion, what should be the role of the private sector in the fight against global warming?**

All actors are part of the issue, some more than others according to their impacts on the climate. The concrete industry for example represents 8-10% of CO<sub>2</sub> emissions globally. So, this industry's role for instance will be crucial if it can implement measures that decrease its environmental impact. In Switzerland, emissions on the national territory are not so high in this sector, however multinationals such as HolcimLafarge have very important impacts internationally. Then we have some industries such as chemicals or transportation—individual and freight—that have huge impacts proportionally. So obviously, we observe some industries that are willing to develop solutions with a lower environmental impact. Many companies are aware of this impact and go in this direction—not all, but there is a very strong trend. As to my personal opinion, the private sector is the main emitter of CO<sub>2</sub>—if we include private consumption of individuals, e.g. heating, buildings. So, the impact of the private sector is huge, and so must be its role in mitigating it. However, in Switzerland this role will depend on many factors and leverages such as awareness, regulations and voluntary action at many geographical levels. The new generation of citizens also has an important role to play.

**How has the Agenda 21 affected initiatives to protect the climate in Fribourg?**

It is very difficult to assess. But I would mention three main sectors: energy, transportation and urban planning. Green spaces were developed, as well as green routes for biodiversity. Non-motorized mobility has also been encouraged and many measures are currently being implemented in the city of Fribourg. We try more and more to keep cars out of the city, through the creation of P+R [park and ride – ed.] that allow people to leave their car at a parking and take public transportation. There is a clear willingness to put in place such strategies for non-motorized vehicles, and initiatives are launched mainly at the city level, but also at the cantonal level. This was clearly built on the consequences of the Agenda 21, among other influences.

**According to you, how can economic actors be leaders in the climate action?**

I would say economic actors have begun to become leaders in climate action in the last two years approximately. Many business actors take small actions, but what becomes interesting is the fact that some huge economic actors (e.g. multinationals in the US, Europe and China) have become aware of climate issues. It is not the majority yet, but some big opinion leaders begin to change. Then, it is important to differentiate between

what is said and what is really done, and a critical sense must be applied. However, a minority exists that involves big actors taking action.

Fundamentally, I believe companies should be leaders in the sense that they are exemplary. It is through the actions and the explanation of such actions that companies can take an important role.

Nowadays, public investors are more and more demanding on the reporting of key indicators such as CO<sub>2</sub> emissions, or indicators from the Global Reporting Initiatives. Then if large pension funds such as Blackrock or cantonal funds and banks in Switzerland begin to put in place severe selection criteria in their investments, huge influence can be obtained. Some initiative propose that pension funds refuse to invest in oil or gas industries. This can be a real and determining impact.

**So, this could allow States to align financial objectives with environmental objectives?**

Yes, it could have a huge impact. We currently see positions being taken by large funds or financial influencers that put pressure toward climate action.

**What is your personal feeling as to the types of measures that should be used by the State to encourage the inclusion of the private sector in environmental objectives? For example, through subsidies, incentives, taxes, regulations or public-private partnerships.**

Switzerland has adopted a strategy that is “so-so”, meaning, facilitative rather than punishing or coercive. So, one tries to regulate, incentivize and sometimes tax (such as through the waste bag tax). CO<sub>2</sub> certificates have been put in place by the governmental agency ANF. So, instruments and regulations do exist in Switzerland in various forms. Public-private partnerships are also encouraged, and I believe that such a combination of measures can be efficient. However, considering the urgency of the climate situation, is it enough? Parliamentary debates on the new Law on CO<sub>2</sub> are currently considering an increase in the tax on CO<sub>2</sub>. This is a real leverage for the Confederation and could be very efficient. I don't really see other measures that could be adopted, because the existing ones are efficient. Now we could be more radical in the extent of those measures, such as through emission limitations. We could also implement regulations that involve sanctions, as nowadays it is not the case yet—only taxes but not fines for example. I don't think the Confederation would go in a direction of important restrictions for companies. We are in a free market, but the Confederation also tries to adopt some rules for companies. Can we do more? Yes, we could always do more.

**Considering the objectives of the Paris Agreement, do you think that these measures are enough to achieve them?**

No, I don't think so. Everyone can begin to observe the effects of climate change today. But it is not only businesses' fault, nor is it only the governments'. It is a collective issue. What is also at stake today is this: will we one day manage to decouple resources and fundamentally reduce energy consumption, and not only be working on energy efficiency as it is the case today. The great issue today is that people consume more and more resources, because of numerous factors such as population growth and rising needs. As long as we don't manage to solve this issue, we will be heading for disaster. And this is

very difficult for the public to assimilate. Ultimately, measures are good but they're insufficient, and this is a problem of society that involves all of its different actors.

**What about measures that affect citizens and will indirectly foster better practices among businesses? Those could be for instance subsidies for electric cars or bans on goods that have high environmental impacts.**

Yes, we've seen in Switzerland a new action from Migros and Coop who decided to charge plastic bags. As a result, the reduction in consumption of such bags was remarkable. And this was not implemented by governments but directly by the private sector. So, we can see that private sectors do have a huge potential for impacts on consumption goods. In Switzerland, the Confederation could indeed ban such products such as plastic packages like in the UK, but we're in a setting that would create a lot of opposition. In Switzerland, it is a sensitive subject as we don't like prohibiting measures.

**But wouldn't such measures be necessary in order to reach climate objectives?**

Yes, it should be done but it is very sensitive to do so in a political culture such as ours. However, there are some political personalities that push for more drastic measures. For example, Doris Leuthard would probably be more restrictive if it wasn't for the parliament that controls the Federal Council and sees such measures as bad for the economy. Implementing such significant measures may definitely allow us to go faster in the right direction. Then the responses from the European Union are also important for Switzerland. We do have some interesting measures that put us well ahead of some other European countries, but some indicators are still bad, such as waste and consumption per capita, for example.

**Do you think some restricting measures would need to be implemented progressively?**

Of course, that is how it must be done. The Federal Council never jumps quickly to radical measures.

**And it can also be done at the local level. How about cantonal or communal experiences that could become smart practices and be reapplied elsewhere?**

Indeed, being very democratic is also one of our country's strengths where cantons and communes do have a lot of leverage as to their own policies and measures. I believe it is even more interesting to consider action at the more local level. Some communes in Geneva certainly have sustainability strategies that are more advanced than other. Onex is a commune that worked a lot on such issues, notably with former communal council member Mr. Longet who has a real vision of sustainable development and public entities' role.

**How can the State benefit from the expertise, technology and action scope of companies?**

I think the public sector relies on the private in many areas such as energy or urban planning. Public entities will provide infrastructure plans at different levels, notably cantonal and communal. Then many private actors are related to these urban planning programs, in the sense that companies on the field will provide knowledge and

technology. If we take the example of Smart cities—being how to leverage technological advances to improve information exchange, facilitate mobility, etc.—it is the private sector that brings in the required knowledge for the benefits of the State. This is done through partnerships and mandates to reach interesting solutions that allow us to reduce climate impact. In Fribourg for instance, the waste incinerator plant will soon be providing heating for nearly half of the city, exploiting waste heat to provide it for buildings. Turbines and pipes are being constructed for these matters, touching all types of buildings—public and private. It is done under public investments but also involves many companies. Other types of smaller partnerships are done in many sectors as well. In Geneva, one big project involves regulating buildings temperature by using water from the lake. This concerns several areas of the city such as the Paquis and Nations areas, under the coordination of the SIG.

**In your opinion, what should be the boundaries of public policy that targets the private sector? Should extremely ambitious measures such as the *Responsible Business Initiative*, or bounding, restrictive measures, be avoided?**

This question has a lot to do with personal convictions and philosophy, and eventually touches the question of what the State's role should be. I personally believe that the State should be more interventionist in Switzerland. The State does intervene in some areas, but regarding the issue of global warming, we should be even more aggressive and exemplary. We have this potential to be exemplary and we should seize it, which obviously involves costs, touching the competitiveness of our companies. But the State should indeed push the private sector to be more responsible in the true sense, in order to reduce its impacts. The *Responsible Business Initiative* is only a small window that concerns one area: the social responsibility of companies—multinational businesses mainly—regarding social and environmental damages. It creates the possibility for foreign people to launch lawsuits against Swiss companies that would be treated at the Swiss level, and not anymore in the country where the damage was done. It involves legal dimensions and is a rather complex issue. I am personally rather favorable to this initiative of course, but its implementation is not simple which is why it raises questions.

**Yes, some say it could create an additional level of bureaucracy and be unfavorable to small companies in that sense.**

Well I don't think it will necessarily affect small companies because they usually don't deal with a big part of their supply chain being located abroad. It is rather companies such as HolcimLafarge, Novartis or Nestlé that would be the real actors affected by this initiative, and they will probably combat it. But some large companies do not position themselves against such measures and are rather favorable to the possibility of people affected by their activities abroad having a voice against them.

**Indeed, it can be interesting when some companies are not unfavorable to more extensive measures or even constraints. It can even involve some positive effects for them.**

Yes, because they also become aware of the risks involved with these issues. Their brand image can be dramatically affected by previously uncovered damages. Corporations that are close to the final consumers become especially concerned nowadays, compared to companies such as Glencore that can feel less exposed to such risks.

## Appendix 2: Interview of Mr. Rémy Zinder

*Director, Service cantonal du développement durable, Geneva*

*Phone call on May 4, 2018*

**Could you please tell me about the activities you manage at the Service Cantonal du Développement Durable?**

We are responsible for the application of the Agenda 21 law at the cantonal level. We are essentially in relation with external stakeholders such as companies, NGOs, international organizations, and also the civil society. We develop methodological tools where we notably accompany companies through training and assessments, but also practical tools that encourage companies to adopt better purchasing practices, for instance. This is one precise sector, but we are active in many other areas such as food, consumption, etc.

**So, your sector basically touches many types of stakeholders?**

Yes, the general public in fact. We're in charge of promoting sustainable development generally, and we also work very closely with autonomous public entities such as the TPG and the Hopitaux Universitaires de Genève. We offer them different types of expertise as well as guides and trainings.

**At the regulatory level, you have supervised the Agenda 21. Have you also taken part in establishing the Cantonal climate plan?**

Yes, so this plan is also part of the Agenda 21 in its former version. The Grand Council has now asked the State of Geneva to elaborate a climate strategy in the form of the *Cantonal climate plan*. This plan has been created on the basis of two emissions assessments and comprises the strategy on the one hand and an action plan on the other hand, with 25 actions to be implemented over the period 2018-2022, which aim at achieving the objectives set. These actions do target a large audience, public sectors as well as companies and the civil society. The State essentially provides the legal framework, while the implementation relies on many different actors including the private sector.

**According to you, what should be the role of the private sector in the fight against global warming? Has a specific role been expressed in the Cantonal climate plan?**

Obviously, companies do have an important role, first in terms of production practices, but also in terms of adaptation to the phenomenon of global warming. We can already observe that the larger the companies on the territory, the more they tend to take into account climate risks within their business models, even when those risks are not necessarily present in Geneva. On our territory itself, there can be moderate risks such as extreme urban heat islands, epidemics or water level rises which are under control. But outside Geneva, there can be far greater risks to which even small companies can be subject and that are not particularly anticipated. Those can have wide impacts on their supply chain. The State of Geneva does have measures to raise awareness over these issues, such as through the Sustainable management meetings, organized with the Commerce Chamber and the Haute École de Gestion. We also work closely with the

*Direction générale du développement économique, de la recherche et de l'innovation*  
inside the canton. We seek to raise awareness among groups that represent economic milieux in Geneva, so that themselves can work with their members on these issues.

Another risk that is often forgotten is the potential for productivity drops during extreme heat crises, which could particularly hit the region of Geneva. In Switzerland, I believe the climate warming is nowadays twice as important as in the rest of Europe. Last year, Genevan vineyards were also deeply affected by hails which might have resulted from climate change as well. This represents losses of income for this industry, but also important overall costs for society due to the financial compensations that had to be paid.

**Do you think of industrial or commercial sectors that are particularly critical in terms of emissions or of the potential they have in reducing their climate impacts?**

The Geneva airport is a big stake. On the one hand, the State of Geneva is willing to reduce emissions by 40% while on the other hand, the airport forecasts huge increases in the number of passengers. So how are we going to do?

**Are some measures in place in this area?**

Yes, not under the State's competence but the global aviation industry makes a lot of efforts to reduce its environmental impact. However, we face contradicting objectives between economic and environmental aspects: the economy wants an increasing traffic with attractive costs while we realize the huge impacts this can have on the climate. GHG reduction objectives are set in terms of fuel efficiency, airplane occupancy rates, etc. Airplanes become more and more efficient in terms of fuel and noise as well.

**Do you think these measures will be enough with regards to the global trends for more passengers and flights?**

Well if we arrive to solar planes, it could do the trick. Commercial flights with solar technology will soon be tested. Of course, this will not replace kerosene overnight, but the technology does exist, and we now need political willingness for this to be successful in the future. As soon as we have the capacities to run solar planes, there is no reason we would not put it in place globally. The problem is, humans like business-as-usual practices, but the climate moves fast and once damage is done, we will not be able to turn back. Political actors also often think on the short term due to their agendas and it is difficult to take decisions with a long-term perspective.

**Could airport emissions be reduced by transferring externalities to the aviation industry directly? Petroleum taxes for instance are not applied to flights.**

Indeed, the aviation sector does not bear these taxes. By the way, I don't understand why it is not the case, but it would be good. Even emissions from air traffic are not accounted for in the Kyoto protocol. This sector is always excluded from emissions reporting methods. It is indeed a bizarre distortion. Valid explanations certainly do exist, but this could be a good track to follow and part of the solution. Flight prices then are not reflective of the external cost borne by society. Noise taxes do exist that allow the airport to undertake infrastructure measures in the area, but the issue of CO<sub>2</sub> emissions remains unsolved.

**Would you have examples of concrete measures put in place by the State of Geneva that encourage companies to cooperate in climate action?**

One example in the domain of building heating is the objective to discontinue fuel-oil heating. Companies will have to find other ways to heat up buildings, so they are directly impacted by such measures. Businesses are concerned by actions undertaken as part of the *Cantonal climate plan*. The State, for example, grants building permits and companies are necessarily impacted by the requirements set. They have to adapt to them in order to do business on the territory. Now, the action plan has been adopted in late 2017, so we are still in a deployment phase, which will take some time. We are implementing it step by step, together with economic milieux, by trying to cooperate with them and not fight against them. Discontinuing fuel-oil heating for instance will create an issue for companies that are active in this business. One of the actions planned is to accompany those businesses for the professional conversion of those that will lose their jobs. We will help them in their career changes together with the Employment office and not abandon them. Such measures are conducted in partnerships with industries and representatives of the economy.

**Do you have partnerships with economic agencies such as the CCIG?**

Yes, we do. Economic actors are represented within the Council for sustainable development. Three representatives of the economic actors are present among twelve members of civil society. Their role is to defend the interests of such backgrounds and to bring concrete solutions.

**Considering the commitments of Switzerland within the Paris Agreement, do you think existing measures will be enough to achieve the objectives? Taking into account the role of large cities such as Geneva in those global objectives.**

If all local objectives are met, we should reach the national objectives. That is the goal. Now, I cannot tell you that these will fully become reality. Many objectives at the national or cantonal level do not have the agreements of all actors yet, and lack financing. When one proposes to change legislation, there can be a popular referendum. So, there are elements which we absolutely do not control. That is to say, intentions and the action plans to reach those objectives exist, but many factors are out of the State's control. Moreover, many elements can accelerate the fight against climate change, it could be economic actors or could also depend on a sudden intensification of global awareness. On the contrary, many climate change sceptics such as Donald Trump could decide to slow down climate action. We have seen that his particular declarations have not had much effect on the rest of the world, but there would be a risk if many politicians also followed such ideologies.

That being said, climate scenarios are forecasts and it is very complex to predict whether the current measures will be enough at a global level. Many unforeseen events can happen in the future with regards to climate change, in a positive or negative way. We might also realize that humans adapt quite well to new climate standards which can create new opportunities such as at the agricultural level. This is why we should be ready to face any event, without making people panic.

**That is part of the precautionary principle adopted in many Agendas 21. As we do not know exactly what may happen, let us be more cautious than necessary.**

Exactly, because things could go wrong or worse than expected. Companies have realized this very well. They won't publicly communicate on this as it can constitute competitive advantages, but they do assess risks and take measures to mitigate them. Corporations develop risk scorecards that are simply tremendous. So, companies themselves apply the precautionary principle in order to be ready to protect their business models.

**Considering the global objectives set in the last few years, what is your personal opinion regarding more drastic measures that are sometimes proposed. How about bounding measures for companies, taxes or bans over some goods, for example?**

That is very good. These types of measures could be implemented at the Swiss level. In Geneva, we can propose legislation by joining forces with other cantons, but we cannot legislate on objects such as planned obsolescence for instance. In France and Italy, there are some laws in place to counter this dramatic issue. In Switzerland it would be interesting, but the implementation of such measures would be complicated in Geneva alone.

Then we always have to remember that banning some products at a cantonal level will make companies move to another canton. This is why such measures need to be national or international. However, some measures can be done at the cantonal level. Considering the creation of an "energy label" for consumer goods would allow consumers to compare the ecological footprint of each product. France has started to experiment this on some products and this could have a positive impact on consumer choices. We could start implementing this through a small-scale project with a partner on some products. This would allow people to realize that buying strawberries in December for instance, does not make any sense, environmentally-speaking. Comparing berries from Switzerland and Spain could give interesting results. Consumers have to understand that through their behavior, they are actors that can make a change. Supermarkets sell such products because there is a demand. We can observe that big brands are not very proactive. They make most of their choices due to their customers' demands. They can boast about ecological actions but in the end, those are taken because there is a market for this. Organic food exists in store shelves because of the consumers' demand for it. So, stores are indispensable partners with which we should cooperate, but at the end of the day, consumers are the ones among which we need to raise awareness and those who have the power to change.

**So, this energy label program could be implemented through a test phase at the cantonal level with a partner?**

Yes, we could consider this a reasonable action. We could very well propose these labels on certain types of products during a short period, while conducting surveys to test how the consumer responds. It is important to measure the impact before implementing it at a greater scale.

**What is the room for maneuver of communes regarding local measures they can put in place?**

Well, they have all the necessary latitude to do so. Obviously not in terms of road infrastructure for example, but communes do take a lot of action. There are fourteen to fifteen Agendas 21 in the canton of Geneva which include many interesting communal measures. The framework set by the canton on GHG emissions also affects them and they have to take measures in that sense. Communes such as Carouge, Lancy, Meyrin, Onex and the city of Geneva take many tremendous actions at the local level. The canton meets them a few times per year, but does not have an overall view of all communal measures. Then, there are some interactions between the OCEN and communal energy sectors. Some objectives also affect communes, such as under the Law on CO<sub>2</sub>.

**Does the State of Geneva currently offer some subsidies to companies to reduce their climate footprint in certain sectors?**

The GESDEC currently has a strategy to reduce waste in Geneva, and particularly to increase recycling rates in order to avoid people to be subject to the waste bag tax. I know it has an audit program that is subsidized to companies in order to help them reduce their amount of waste.

**In terms of public-private partnerships, does the State of Geneva have concrete projects in place for environmental matters?**

At the operational level, not that I am aware of. However, there is some level of cooperation with economic organizations at the strategic level. We also have some academic partnerships with the HEPIA, the HEG and the University of Geneva. For instance, the State is currently working with the HEPIA and the University on a project that aims at limiting the urban heat island phenomenon. The goal is to create a methodology at the urban planning level in order to take this issue into account. Different measures are being studied, such as revegetation, water or vegetal rooftops in order to combat existing heat islands and limit such effects in future construction projects. We would like to add the requirement of limiting this phenomenon systematically to the construction process of all buildings. The canton should set an example in its own buildings and then the goal is to train architects and urban planners for them to add these factors in their projects. So, this would completely affect some private sectors at the stage of building permits due to the requirements which will be set to obtain them.

## Appendix 3: Interview of Mr. Yves Cretegnny

*Managing director, Fondation pour les terrains industriels, Geneva*

*By phone on May 9, 2018*

### **What are the measures at the disposal of the FTI to facilitate sustainable practices among companies in the climate matter?**

We have been creating a program over the last few years, called “ÉcoParcs”. It aims at reducing the environmental impact of companies through various means. It comprises all environmental impacts, meaning it is not limited to CO<sub>2</sub> emissions exclusively. It concerns the “envelope” within which companies evolve, as we do not act on the internal operations of companies themselves. We are especially active on the buildings in which businesses are installed.

We work around five main axes within this program. The first one is a classic industrial ecology axis, that is, leveraging opportunities to transform waste produced by a company into resources for another. We develop all facets of industrial ecology such as heat and steam recovery, or any resource that is unusable by a certain business to add value to it.

### **So, is it kind of a circular economy approach?**

Totally, knowing that industrial ecology is one of the components of circular economy.

Then, we work on inter-company cooperation, trying to find how companies can cooperate with one another to reduce some environmental impacts. For example, we can optimize the number of parking spots by regrouping the demand of several companies in parking space. This allows us to reduce land impact. This is the facet of mutualism between companies, for example through the regrouping of deliveries to avoid each delivery vehicle to make individual dispatches. Reducing fleets size is good for mobility but also for the reduction of CO<sub>2</sub> emissions obviously, due to reduced fuel consumption. Those are the cooperation projects. Then, we also work on an infrastructure project that aims to take into account the way we build plants. For instance, we try to encourage the use of wood when it is recyclable and limit the use of concrete whenever possible. We also foster the certification of buildings with low energy impacts and the use of efficient heat sources such as using recycled heat rather than newly-produced one. Here also, it brings positive impacts for the environment.

Finally, we have two other projects under “ÉcoParcs” that are less related to the environmental impacts. One is to bring back proximity governance to favor relationships between companies, and the other is to work on quality of life in industrial parks, which has little impacts on GHG emissions. The goal here is to make services available within those “ÉcoParcs”, and to allow people to stay there without going too far and having to drive to reach them. Those are the five main axes on which we work in the “ÉcoParcs”. We also have a website called “genie.ch” which tells about all these measures.

**Regarding all these tools, how does the process go? Does it come from companies that come to you or does the FTI itself implement such measures on owned land?**

The canton has given us the mission to develop existing industrial parks on the territory and to facilitate life in these areas. In this framework, we act as urban operators. We launch many different tools and promote them via “genie.ch”, notably. We also organize workshops between companies to encourage cooperation, and communicate a lot on how they can launch industrial ecology projects. Another thing we do is, we encourage companies to assemble in associations and help them learn to know each other. For example, we have functional bills of specifications for partnerships, which settle how companies can make use of our sites, as the FTI is an important land owner with a relatively high number of parks. These documents set requirements, for tenant companies, that regulate factors such as density, buildings with low environmental impacts, the mandatory installation of solar panels, the provision of heat or energy rejection for other companies, etc. As the owners, this allows us to foster good practices not only via encouragements, but also through binding criteria for renting. This means that companies that are willing to rent our space are forced to accept such constraints.

**What is the State’s role in ÉcoParcs? If I understand correctly, the canton has given you a mandate to manage industrial parks.**

Indeed. We are an autonomous subsidiary of the State, and we received the mission to deploy this program, which has become our planning philosophy nowadays.

**As part of those tools we have discussed, do you have power over instruments such as taxes, regulations or subsidies that target companies?**

Well, as an autonomous subsidiary of the State, we are not subsidized, meaning that these programs are implemented on our own resources which result from the fact that we are the owners of these industrial parks. We get added value thanks to surface rights, which are granted over periods between 30 to 100 years. Collecting a small rent allows us to cover our costs, and renting this land also allows us to demand specific requirements to our stakeholders, as we have just discussed.

However, we can say that the federal and cantonal framework for companies in Switzerland is relatively demanding. So, we ensure companies are able to comply with these requirements. Now, the most interesting part of our job is to allow companies to work not individually anymore, but to join forces in order to achieve objectives that would not be possible otherwise.

**So, you look for synergies in a sense.**

Totally. All these topics of inter-company objectives and industrial ecology are the same as synergies, in fact.

**Do you work more at the inter-company level than at the individual business level, then?**

In fact, we have 55 industrial parks in Geneva, which are part of the “ÉcoParcs” network. We work at this network scale, organized in areas, and not at the company level indeed.

**Do you help in a way companies to abide to the public plans and regulations?**

Yes. One example is, whenever we invest in building heat networks for companies, we provide energy to a group of companies or buildings. This allows businesses to reuse the heat of a neighboring company. As we provide innovative solutions, we really help companies achieve their contextual objectives.

**You try, then, to foster environmental cooperation of companies with no real binding measures, except for the requirements you set on your own parks, right?**

Indeed. Well, the quantity of regulations there is on companies is quite high. In Switzerland and Geneva nowadays, the legal requirements are rather numerous. If you take the stack of environmental laws that affect companies today, they ensure an environment that is relatively of good quality. Especially compared to other countries.

Regarding our activities, we are currently closing a study that reports the environmental impacts of our industrial parks, with the use of ten different indicators. It will be available in the next few months.

## Appendix 4: Interview of Mr. Alexandre Prina

*Director, Direction générale des transports, Geneva*

*In person on May 17, 2018*

### **What are the different activities overseen by the *Direction Générale des Transports*?**

First of all, the DGT regulates on all traffic and parking matters in the canton of Geneva. It is secondly in charge of the management of intersections with traffic lights. Then it also gives notice to communes in Geneva on the planification of roads, as well as to the *Direction Cantonale du Génie Civil* especially on cantonal roads. Finally, it organizes transport infrastructure to respond to transport demands, it orders public transportation services to the TPG and CFF, and oversees the Fondation des Parkings on parking matters. Those are the main activities.

Then the link that can be found with companies is indirect as it is not part of our main missions. However, we have the mandate to manage a network that is strongly growing, with a skyrocketing demand and limited infrastructure. So our objective is to allow everyone to move on the territory with the most efficient means of transportation, according to the place and time. We also have to forecast the demand in public transportation in order to plan our services.

### **So there is a link between the DGT and the different actors of the canton in order to respond to the demand of everyone?**

Well, we are required to communicate to different actors on the most efficient means of transportation and part of these actors are companies. We promote Mobility Plans which allow businesses to promote in turn the means of transportation that suit best their employees. One of the tools that connects us to companies is the Guide addressed to companies and institutions on Mobility Plans.

### **So how are such Mobility Plans implemented? Are they intended to individual companies?**

It depends. Some plans are inter-organizational, such as the one addressing ZIPLO [*the industrial park of Plan-les-Ouates – ed.*]. The ZIPLO association, together with the commune of Plan-les-Ouates, appointed a design office that is specialized on Mobility Plans in order to develop a whole set of measures that includes car-sharing, shuttles, public transportation passes and parking spaces. The goal is to allow workers to access this industrial park which is experiencing strong growth.

On Mobility Plans, we do not intervene directly in their creation, which is conducted by companies. We have been raising awareness among businesses to make them think about such plans and then we usually redirect them to experts in transportation plans. But one of the goals is to make more coworkers take public transportations instead of using cars. Indeed, such initiatives should come from companies themselves. There are no binding laws as such.

One of our measures is to regulate parking spaces for companies, in order to take into account the road infrastructure, which is limited. And if we want to restrict the number of private vehicles on these roads, we can either put them in buses or increase the number of passengers in one car. This implies either developing the public transportation offer, but we have to ensure buses do not end up in traffic jams. Or we can encourage car-sharing compared to individual car use. So restricting parking spaces especially for companies allows us to reduce journeys at peak time. We can roughly observe that traffic at peak seasons is approximately superior by 10% to traffic during summer vacations. And we see how a variation of just 10% can be crucial and beneficiary to companies, especially for those whose core business is based on movements such as a plumber, or a delivery service for instance. Of course, we seek to optimize such professional movements as well in terms of parking or distances to reduce their environmental impact—a large proportion of these vehicles being powered by diesel fuel. But our objective is also to give them fluidity, knowing that a vehicle that passes through traffic congestion will consume two to three times more fuel than in a fluid traffic.

**Actually, both objectives of fluidity and environmental efficiency are linked, then.**

Exactly. Then obviously, the more people use their bicycle or public transportation, the lower their environmental impact due to not using a car for example.

**According to you, what should be the role of companies in the fight against global warming?**

Every actor has a respective role to play. That is according to the polluter pays principle. However, some companies may reckon that they already pay taxes, and that this is their participation to the allocations to public transportation or traffic management. Generally though, we can see that Mobility Plans begin to be created when a company is experiencing changes in its operations, which will often create questioning about how to manage the transportation of its coworkers. Typically, when a company grows in size, it has more coworkers and sometimes is refused to build additional parking space, which brings uncertainties. It is then required to make an effort to improve the mobility of its coworkers so that they adopt less congesting practices that are also better for the environment. So, the process often happens under such circumstances.

The problem of negative environmental impact today comes from the large proportion of cars in our transportation habits. Improving the traffic flow is consistent with means of transportation that consume less energy. The day we'll have switched to electric cars, we'll have succeeded in the environmental objective, however the objective of fluidity will not be achieved.

Today, car transportation is not an eco-friendly choice. Even taking into account electric cars, someone who is really concerned about the environment should choose other types of transportation that are eco-friendlier.

**What is the policy applicable to Geneva to incentivize the use of electric vehicles?**

There are such measures, but they are under the responsibility of the Department of Environment. There have been attempts to subsidize electric vehicles, notably led by Mr. Barthassat, but they have been rejected by the Grand Council. There was the idea to

exempt electrical vehicles from taxes—currently, the exemption is only carried over three years. There was also the idea to exempt electric cars from public parking fees and of installing charging stations. Another measure that should enter into force is to subsidize the purchase of electric scooters, as it is the case today of electric bicycles which are subsidized by the canton (CHF 250 per bicycle) and some communes. So there has been a reallocation of budgets to this end.

**More generally, does the State of Geneva consider more drastic measures in the sector of transportation? I'm thinking for example of some German cities that ban diesel vehicles or of strong subsidies for electric vehicles in some countries.**

In the area of freight road transportation and professional movements, we are currently formulating an action plan that will include about 15 actions aiming at improving transportation conditions for these sectors.

**Do professional movements represent an important proportion of transportation in Geneva?**

This number is difficult to assess. We consider that there is approximately one delivery per person per week in the canton. That would make approximately 500,000 weekly deliveries out of about 12.5 million movements in total—all modes included. This is not huge, but construction sites deliveries or personal assistance movements are not necessarily included in this number of deliveries. We can approximate an amount of 5-10% in total, including freight road transportation.

**According to you, what sectors of transportation are critical in terms of absolute emissions or potential for reduction?**

A priori, diesel vehicle is a critical part. There are projects that aim at replacing large diesel trucks with hydrogen vehicles for example. Our colleagues at the DGE have been approached by their French counterpart, which are apparently developing a pilot project to build hydrogen plants. This should be accompanied by a vehicle fleet, meaning that technology is probably already available. The issues are now about commercialization and costs.

**Are there additional measures set by the State of Geneva to foster business cooperation against emissions that result from transportation?**

Applying carbon pricing to transportation as well would allow us to consider that companies fully participate in the effort for climate action. Starting with such financial instruments and the creation of funds would clearly allow us to develop public or non-motorized transportation modes.

Again, 80% of the economic activities in Geneva is constituted by small and medium companies in terms of employment, meaning they should be factored in. Those measures are interesting food for thought, but are they politically viable? I'm skeptical about it. You talked about some German cities that banned diesel vehicles in urban centers; Switzerland would not be ready to implement banning measures on diesel vehicles—Geneva has to comply with federal regulations regarding road traffic. But these measures exist in some cities in Italy and other places.

Then, it is important to conduct global life cycle assessments for emissions in order to take into account emissions at all steps of the product life. Some diesel vehicles for instance emit less GHG than gasoline vehicles. Of course, speaking about local air quality, we should rather favor electric, hybrid or gasoline cars.

**Regarding public financing and budgets, are there any plans to progressively increase subsidies or financial incentives for eco-friendly actions?**

Geneva has little room for maneuver to reach budget equilibrium. Consequently, finding additional resources to finance new subsidies seems very hard to accomplish. Raising subsidies today is not foreseeable at the political and accounting levels. Now, the question is, are subsidies necessary? Generally, we can see that people buying electric cars today do not necessarily need subsidies—70%-80% of the market is owned by Tesla with cheapest models at around CHF 70,000.

**So then wouldn't it be interesting to allow consumers who own gasoline cars to turn to electric cars with cheaper models? Could a subsidy help make electric cars more affordable, precisely?**

Well the problem is, such subsidies would need to be huge. Do consumers calculate the costs of operation, as they won't need to buy gas anymore but will consume more electricity? We need to know what the gap is. Today, electric cars are becoming more and more reliable in terms of autonomy for example, that is true. Indirect subsidies such as tax exemptions can be considered as a suitable solution today.

**Some also consider the option to give access to some areas exclusively to electric cars, for example bus lanes or city centers. What is your opinion on that?**

Norway has tried that for a while, but I believe they begin to see their bus lanes being congested, which is not good. Now in Geneva we currently have a very small number of electric cars, maybe around 1,000 which represents less than 0.5% of the total number of cars.

**So, could such measures be implemented as a first step to encourage the electric car market?**

Well, we attempted to make parking free for such vehicles, but it wasn't approved by the political majority in Geneva. Another issue nowadays is fuel tax. It relies on the polluter pays principle, but today drivers consume less and less fuel, which creates a loss of tax income for the State. This can partly explain why authorities would not be well advised to incentivize electric cars too strongly. Today we do not face such issues yet: we are willing to encourage electric cars but with measures that do not cost the State too much.

**Does the State have opportunities to take advantage of the expertise or technology of the private sector?**

Of course. All activities related to the smart canton come from the private sector. Things such as autonomous cars can be foreseen thanks to private actors. The private sector can provide data and knowledge on many subjects. Typically, we're developing the installation of sensors that identify the presence of cars on parking lots. This can potentially help reduce the need to move back and forth in search of a parking spot in

some areas. If people know there is no parking spot in one area, they can directly go to an underground car park. In this case, technology from companies allow such installations. We can also talk about the TOSA test phase for fast-charging buses or the test program we're conducting on autonomous vehicles with the European Commission.

Technological progress in our society allows us to test more and more public-private partnerships. We've been working with Swisscom, solution-oriented businesses, design offices and the EPFL in order to acquire knowledge, technological solutions and data to manage the mobility better. The goal is to provide more adaptive, real time solutions to improve traffic. It has been three to four years now that we decided to work closer with the private sector because the world of mobility is evolving. Digitization can also help us diminish the number of movements, which can be a good solution to avoid developing the infrastructure too much. For example, students can follow part of their courses from home, workers in administration can work from home as well, or we can create coworking spaces. These are all measures that reduce the number of people on the roads, especially during rush hours and in the city center. All these solutions involve private actors.

**By the way, where are we on self-service bicycle stations in Geneva?**

The project to implement a self-service bicycle facility is still in front of the courts.

## Appendix 5: Interview of Mr. Daniel Chambaz

**General director, Direction générale de l'environnement, Geneva**

*By phone on May 23, 2018*

### **What is the role of the industrial ecology concept in the climate action in Geneva?**

There is not a direct, obvious link. It is more like two parallel tracks. On the one hand, you have all the projects that have been conducted as part of industrial ecology, which are not only related to climate. On the other hand, there is the *Cantonal climate plan*, which exclusively focuses on greenhouse gas emissions. Now, of course both topics are related because if we take measures at the companies' level to share resources, indirectly it allows us to avoid some GHG. When we can recycle waste, either directly or via traditional recycling processes, it also reduces GHG. All that we can "mutualize" at the levels of procurement, waste management, or even buildings, for instance, translates to avoided GHG. All the measures that are taken inside companies to optimize their flows and processes or energy consumption also induce less GHG. Generally speaking, I would say that each action undertaken as part of the concept of industrial ecology has an effect that is more or less direct on the climate. By boosting industrial ecology, we also move toward climate protection.

### **So industrial ecology is one of the tools that form climate action.**

Yes, but in terms of climate, it is not the only one.

### **Does it have a link with waste management, industrial flows and circular economy, then?**

Yes, because what falls under the scope of circular economy systematically implies positive impacts on the climate.

### **And how does this link with companies function at the DGE level?**

It mainly goes through the *genie.ch* platform, which comes from the FTI's work. They have developed a concept of industrial ÉcoParcs, which is somehow a very concrete application of industrial ecology on the field. So, we can say it is the FTI that implements industrial ecology within the industrial parks. Secondly, there is the question of energy networks. In fact, industrial ecology, at the beginning, was about direct exchange of resources, which works between big industries and massive flows that are relatively simple. You have the example of Kalundborg, in Denmark which is a model of industrial ecology that dates back from about 20 years ago. Have a look at Erkmann's works on industrial ecology, with these examples cited. So, these models are mainly about big companies that exchange flows. In Geneva, we have tried to explore what we could do, though we don't really have heavy industries, but rather very specialized industries such as watchmaking. In this industry for instance, there is not much to do with regards to industrial ecology: watchmakers do not need us to recollect their specks of gold. So, in terms of materials exchange, I would say there is not much to do in our city.

In terms of mutualization of other resources however, there can be solutions. There is a big investigation movement in the energy sectors, with the "Office cantonal de l'énergie"

that explores solutions such as exchanges of cooling and heating. That is the department, in cooperation with the SIG, that supervises the territorial energy planning (“Planification énergétique territoriale”). This program is precisely the examination of our territory, aiming at finding sources of renewable energy and also discovering where there are needs. Then, we try to match the needs and resources with one another and to install many pipes to organize these temperature exchanges.

**Do you implement such programs both in public and private buildings?**

It is being implemented a lot in industrial parks, but also in all cantonal buildings at the level of private sectors and companies. For example, many actions are being taken that use the heat and the cooling from the lake, which is a program called “GéniLac”. They install pipes all throughout the airport area—comprising the airport building itself—for air conditioning in the summer and heating in the winter. It is a huge area with all the administrative offices around the airport. And at the same time, they also install pipes in the city center, as there are many company offices of all sorts. And this program is not at all in the same logic as material exchanges, but in Geneva, that is what we can do because we have the enthusiasm, know-how and political willingness to do so. Plus, we have the resources, with the geothermal energy, that is under prospection and aims at utilizing all the heat that is lost from industrial companies, the CERN, etc. A whole series of projects is being implemented via the “Service de l’énergie”. That comprises all that has been done, what is underway, and what we are expecting to see in the future.

**You talked about private buildings. How does this process of industrial ecology work with company? Do you approach businesses to optimize their buildings, for instance?**

Indeed, the FTI, the Office cantonal de l’énergie, as well as the SIG—who supply a huge number of customers—do approach actors such as building owners and large companies to explore what measures are feasible. Again, this happens as part of the territorial energy planning and the industrial parks of the canton.

Personally, I had launched the assignment around the industrial ecology concept, but this project has largely gotten out of my scope and is being continued by those entities. They do good work in translating conceptual things into action on the field.

**At the DGE level, do you have relations with companies in the canton? Be it for example through production, consumption or energy matters?**

I personally do not manage concrete actions regarding the resource management of companies, outside waste management. What we really do is ensure companies eliminate their waste through official channels and that they do it correctly. Now, whether they recycle their waste or not is up to them, in the sense that we do not have a law that forces them to recycle. However, we act through awareness, which addresses both companies and individuals, but there is no binding law.

**But businesses now have the obligation to mandate companies in the waste sector for their waste’s elimination, if I understand well.**

Exactly, they have to pay for those services, which are provided by private companies. Those companies largely offer the possibility to recycle waste instead of incinerating a

whole bunch of resources. Nowadays, they systematically head toward recycling methods.

**But there is no regulation that drives them to recycling?**

No, there are no binding regulations. However, there is no professional business in Geneva that does not think about recycling practices.

At our own scale, we have also conducted awareness campaigns on companies' waste for several years.

**How do these campaigns take place?**

In general, we approach economic branches separately: catering waste for instance will be totally different from construction waste. We meet them and look at what sorts of waste they produce. We then try to develop smart practices and design guides for waste management in particular industries, which we distribute to all concerned businesses in each industry. We try to make them aware of eco-friendlier practices they could implement.

There is a regulation that says companies should recycle paper, glass and other wastes. However, concretely it is not monitored as we do not have the ability to watch all businesses of the canton.

**Do you think that applying more binding regulations would be impossible?**

Well, after setting a regulation, we need to be able to control whether people comply, otherwise it is useless. As we do not have the personnel to do so, we prefer working with awareness campaigns. This works relatively well. We would obtain better results with more binding regulations, but it would be at the cost of a gigantic additional work and disputes with companies. We would need an army of civil servants to do so!

**In the canton of Valais, a public motion is being considered to force grocery stores to recollect package waste from their products. Would such a measure be conceivable in Geneva, in order to reduce such waste from our stores?**

I think it would be possible. I'm not fully sure whether we have the competence to do so, but if Valais manages to do it, we may implement such a measure as well.

**I believe this is still at a project phase, in Valais.**

If they execute this, we would definitely observe what happens with great interest. And if it works, there is no reason we wouldn't implement it afterwards in Geneva.

**It may make grocery stores aware of the waste they generate and force them to install the infrastructure needed to recollect it, which transfers part of the costs on them.**

Yes, of course. At the same time, apart from plastic bags that are distributed at the checkout, I am not sure stores have a large room for maneuver. We had examined the question more than a decade ago with Migros, to see whether we could reduce the quantities of packaging. But this packaging is helpful for many things: preserving fresh

products, giving indications on the products—which are mandatory, for that matter—, transporting them, and we cannot eliminate all of the packaging. Looking at what was possible to do did not bring many possibilities.

**How about using packaging that is more recyclable, compared to plastics for instance?**

Well yes, except we then encounter numerous technical constraints. Speaking of paper and cardboard, there is no issue. However, it is plastics that create issues for recycling.

**Right, which I imagine is the predominant material when it comes to packaging.**

Yes, more and more. The problem is, there are widely different types of plastics in terms of composition, colors, etc. We very soon reach downcycling, meaning that with mixed types of plastics we can create objects for applications that are very limited. Recycling plastics would require tremendous waste sorting which today is illusory. It does exist in France, Germany and elsewhere in Europe. However, at the end of the day, not much is truly recycled. High amounts of plastics are then considered as solid substitute waste, which ends up incinerated to create heat. In Geneva on the contrary, we apply the Swiss philosophy which comes from Bern and says: *“We sort out PET bottles which are easy to recognize and separate from other plastics. Those are easy to recycle for the creation of other bottles. As for other types of plastics, we do not try to sort them, but they directly go to incineration for pure calorie creation purposes.”* We believe it makes no sense to sort these materials at the beginning, as in any case, most plastics end up being incinerated. But this topic is very disputed and constantly comes back on the negotiation table. However, it is important to know that waste management only produces *peanuts* in terms of CO<sub>2</sub> emissions. The *Cantonal climate plan* shows that waste management is not much compared to the total of CO<sub>2</sub> emissions we produce. Very often, people consider waste elimination as a terrible source of GHG emissions, but compared to direct emissions of all other petroleum uses, it is almost nothing. This is why I believe waste management in Switzerland is quite well designed. If one day we have machines that efficiently allow us to sort plastics, why not. Today, it would be absurd to engage in such processes.

**Often as well, people may get confused between CO<sub>2</sub> emissions that result from waste, and pollution.**

Those are two totally different things. Then, it is true that pollution is a calamity nowadays. It is important to know that today, most of the pollution comes from developing countries in South-East Asia, Africa, etc. In our countries, we do have small issues of plastics that end up where they should not, but waste is mostly collected. At the end of the day, it is about what we do with the waste that is collected; throwing it in a device that produces heat in Germany or in our incinerator plants here both pollute the air in the same way. To summarize, I believe we have reflected a lot as to the waste management processes here in Switzerland, and I totally adhere to them, personally.

**Speaking more of consumption, there are projects in Europe that aim at directly informing customers about their CO<sub>2</sub> impacts. Notably through energy-labels on products, we may be able to reduce the consumption of products that come from very far. Would that be worth considering here in Geneva or in Switzerland?**

Well, in Switzerland, most likely yes. In Geneva, not really because it would typically depend on the Confederation. If it was developed at the national level, it would definitely be done in Geneva as well. Now, it makes a whole lot of sense to adopt such measures. I am very glad it is being developed in Europe because, at the end, it will come to Switzerland. This country nowadays follows European legislation; we used to anticipate, but today we follow Europe. I think this measure really makes sense: informing people is the least we could do.

**Often, people do not realize the ecological footprint of their choices. Some don't even look at the origin of the products they buy, but this sector creates huge amounts of GHG.**

Right. At our level, what we can do and progressively try to put in place, is informing the population about the huge impacts their food practices have on the environment and the climate in particular. This impact can very easily be reduced by eating half less meat—which also happens to be better for health—, by eating from more local and seasonal sources, and the most organic food possible, meaning with as few chemical ingredients as possible. Through these simple changes in practices, we can easily reduce the GHG emissions that result from our food by 80%, which by the way make up for a huge part of consumption in general. So, these types of awareness campaigns are feasible, and they are conducted. However, imposing the labelling on products themselves is the Confederation's competence.

**Could this not be considered at the local level as a prototype project, through a partnership with distributors such as Migros or Coop?**

Well, yes if they agree on this. But it will considerably complicate their operations. That being said, we do know emissions of what is shipped by air today. And we can easily imagine the level of climate impact for products. For instance, if you take apples in grocery stores, most of them come from Argentina in this intermediary season: we have not had enough Swiss apples during the winter, so we make them come from far away, either by plane or by ship—which probably does not differ much in terms of emissions. At least, it comes from too far for me to want to eat them.

**The problem is, many people do not look at such indicators.**

Yes, that is where we try to bring awareness. But when we see beans, asparagus or strawberries that are sold off-season, it is easy to know they were shipped by air or by sea.

**Are there measures that are taken directly at the distribution level, with grocery stores?**

Well, we had tried to discuss these matters with Migros for instance, at the time. They always tell us that they only follow consumers demand, and that if customers want asparagus in February for example, they sell them. But this logic is completely twisted because the consumers do not want anything in February; they only buy asparagus because they are available. If Migros did not have asparagus in February, customers would not complain about it.

**But isn't it understandable in a sense? Supermarkets would not sell such products off-season if consumers did not buy them.**

Yes, but they buy them only because they are made available to the consumer. I am convinced that customers follow the supply. Initially, it is not the consumer who asked for such off-season products. Of course, not everyone has the ecological reflex to choose local, seasonal products. As a canton, the only thing we can do is to bring awareness, and encourage not to buy strawberries in January, for example.

**About meat consumption, I have not seen awareness campaigns yet that target these products. Is it complicated to tell people to eat less meat?**

Yes, it is sensitive to do so, but it will come. If we do so today, butchers will come and tell us that we are killing their profession and farmers will argue that Swiss meat will be affected, which is not true. If we only ate Swiss meat, we would reduce our consumption by at least two thirds. The majority of the meat we eat here is imported at the cost of deforestation, animal cruelty, and huge amounts of water consumption. In fact, we do eat way too much meat. But as public authorities, we have trouble to explain this and we have to do it very progressively. We often encounter oppositions from livestock farmers and actors from the meat industry. We have nothing against Swiss livestock farmers: Swiss cows and sheep are important to our ecosystems, when they are bred naturally. But again, a huge quantity of the meat is imported for quick consumption.

**We have been indoctrinated for decades to eat meat and drink milk, which is problematic.**

Yes, milk is the same issue, despite the fact that it is not indispensable for our health. But mindsets take time to evolve and our goal is not to antagonize farmers and industries. We have to work together, which is the whole ambiguity of this issue.

**Sets of laws are being adopted throughout the EU that require large companies to report non-financial data, such as CO<sub>2</sub> emissions. Are there such projects at the Swiss or cantonal levels?**

At the cantonal level yes, not regarding emissions but rather energy consumptions. Indeed, large energy consumers are required to declare their consumption, for example by contracting commitments with the administration. This is ruled by the Law on Energy of the canton. There is a whole series of articles called "large consumers", which requires large buildings to become cleaner, for example. The issue of emissions is tackled from a perspective of energy consumption.

**Does your department work with public-private partnerships in some particular areas?**

No. I fail to see what forms they could take. We can rather work with awareness campaigns or through binding measures for companies, but there are not many of them.

**Could more binding measures be put in place?**

Yes, but again I do not think the canton has a lot of room for maneuver here. Many measures depend on Bern. Apart from the topic of energy, which really depends on the canton.

**One last question which is quite sensitive locally: the waste bag tax. Is the objective in Geneva to avoid putting this financial instrument in place?**

Yes, this would be nonsense. In Geneva, our recycling rates are almost equivalent to those of other cantons, if we take into account our particular cantonal structures—we are a canton-city. For twenty years, we have been fostering recycling practices among our citizens, which is done more and more, and better than before. Now that we reach similar recycling rates as other cantons, we would reward the population with a tax? This makes no sense. Spectacular results after the introduction of waste bag taxes, in the cantons of Neuchâtel or Vaud for instance, are also due to new infrastructure that were installed at the same time. If we implemented such a measure here in Geneva, we would not benefit from the same effects, because the recycling potential is almost achieved. So, introducing a tax today would make little sense and it would constitute a very bad way of rewarding people for their progress. As our strategy has been built on awareness and adapted, communal logistics, it works well as it is now. However, if we implemented a tax, for sure it would bring new deviances, against which we would need to act by recruiting new municipal agents, taking control measures against savage behaviors, etc. Politically, the Green party is nowadays the most pro-tax. But until now, they have not intervened very convincingly on the matter. So, the general trend at the political and administrative levels is against this. The population would definitely not appreciate it.

I let myself be surprised however, as we will now have a new environmentalist magistrate, Mr. Hodgers. If suddenly he campaigns for the waste bag tax, I might tell you the contrary in a month. But there is no political consensus in favor of this measure, at least at the moment.

## Appendix 6: Interview of Mr. Yannic Forney & Mr. Olivier Ballissat

*resp.*

**Project Manager & Managerial Secretary**  
(demography, energy, security, social security)  
**Fédération des Entreprises Romandes, Geneva**

**Managerial Secretary**  
(transportation, environment, recycling)  
**Fédération des Entreprises Romandes, Geneva**

*In person on May 24, 2018*

**How do the consultation and dialogue processes work between the FER and companies in terms of climate action?**

**Y.F.** In general, we mainly talk about consultations at the federal level, while only a few of them take place at the cantonal level. Regarding energy, climate or any other subjects indeed, it really comes from the Confederation. At the internal level, different contacts can be found, who specialize in certain topics and to whom the consultation procedures will be assigned, via a whole internal process of validation. Once a stance has been taken by the FER on a particular issue, we sometimes also consult our regional subsidiaries in other cantons for the validation or addition of their potential considerations.

**O.B.** Then, it is important to indicate that on these subjects the FER rather has a progressist approach compared to other economic milieux, which sometimes have more conservative approaches. This is due in part to the metropolitan aspect of Geneva, which is a city-canton and will face other types of concerns than cantons such as Valais for instance. Obviously, we also have regular discussions with our colleagues from the “Chambre de commerce” and sometimes participate to dialogue platforms at the Romandy level. This means, there is a coordination between different business milieux, and each representative organization may have similar or different positions according to each case. Regarding the link with companies, it is maintained in a relatively straightforward way through the professional associations with about 80 offices, which are more or less active. For example, we have contacts with business actors from particular industries such as construction, recycling, transportation, etc. Then our experience allows us, when we need precise information, to contact the right heads of companies to get their vision from the field. Then we need to take a more macro, socio-economic stance that takes into account their view, which is more operational as they face many constraints in their daily life. So, we have favorable relationships with companies. The FER also sometimes organizes short conferences on matters such as sustainable development, for example industrial ecology.

**What are the stances taken by the FER on climate action and have they been evolving over the last few years, in particular with regards to the Paris Agreement?**

**O.B.** The FER closely follows the new project of Law on CO<sub>2</sub>, on which it will also be asked for its stance in the near future. The position I personally defend, as long as it is collectively agreed upon at the FER, is that nowadays we have to examine things at the right scale: Switzerland has only 8 million inhabitants and Geneva about 500,000. Of course, politicians like to position themselves on sustainable development matters as it is quite popular. We are right now located at a crossroads which asks the following question: do we want a climate policy or an energy policy? I personally defend the energy policy because we currently face important challenges in this area. The Federal council has decided, with the popular support, to discontinue our reliance on nuclear energy. Other trends we're experiencing, such as artificial intelligence or the appearance of blockchain technology, also bring tremendous challenges. For instance, just one blockchain transaction requires the same amount of energy as the average weekly energy consumption of one American household! Now, can you imagine, if blockchain technology generalizes, the huge amounts of energy that will be required to generate the computing power for such transactions? These issues bring about huge question marks as to how we can implement the energy strategies we have set at the European and national levels.

Regarding climate change, it has to be managed at a rather large scale, meaning at least at a European level. I believe we all agree on the fact we are experiencing increases in temperatures, but there are true disagreements as to how we can mitigate this issue. In any case, all we can do to make our energy systems more efficient and develop *savoir-faire* is worth doing. Countries such as China for instance, will definitely need smarter solutions in the future and at large scale to have the means to discontinue coal sources of energy for example. They will create huge demand for new technologies in the domain. Then, regarding CO<sub>2</sub>, we should know that fossil fuels will be used in any case. If they are not burnt by us, they will be by emerging countries. Those countries should not follow the same practices upon which we based our economies decades ago, but they should already integrate low-emissions technologies today. And unfortunately, we know this is not the case yet.

I believe people should be aware that climate is something very important for planet Earth and that climate changes have always been accompanied by complex phenomena. Of course, in every phenomenon, there are both risks and opportunities, which should be considered.

**Y.F.** Indeed, we can talk about the energy policy on the one hand and the climate policy on the other hand. We speak in favor of a better coordination between both policies. Politically, the FER has been defending the new Energy Strategy 2050 and conducted this campaign with different organizations. The underlying principle is that we agreed to take part in efforts for better energy practices because the popular willingness went in that direction. Regarding the climate policy itself, we have taken an extensive stance in the consultation procedure 27-2016. We defend an extensive and collective international policy to ensure our country does not go it alone. It is important that Switzerland be not the only country to make important efforts, but those should be endorsed collectively.

**Regarding these efforts, what can one do to ensure the whole international community takes part in the climate action?**

**Y.F.** Well, first Switzerland needs to be fully involved as a country. Then, we need to foster participation of all countries, including the US which are currently withdrawing *[from the Paris Agreement – ed.]*. And it is true that efforts should be carried at the international scale and not only at the scale of a single country, which would not be sufficient to mitigate climate impact. The whole discussion is carried out at different international summits. That is where big stakes are located and where these subjects should be discussed, to make compromises and find consensus. Then, it is important to remember that our country is a direct democracy and the people is largely consulted on different subjects. As the FER, we also respond to democratic processes where the population is consulted.

Regarding businesses, our stance is that target agreements constitute the tool to be favored and developed to ensure companies are free to decide themselves of the measures they should take to reduce their CO<sub>2</sub> emissions. That is an important aspect: not imposing targets but maintaining a certain freedom for businesses to decide whether they are willing to participate to the global efforts. Even though through the Energy Strategy 2050, a link is also made with the global CO<sub>2</sub> emissions in Switzerland which should diminish. And this is the strategy chosen to tackle those emissions.

**O.B.** It is also important to remind politicians that the climate case is very complex and that some decisions can bear heavy consequences. I recently visited an incredibly innovative recycling plant in Germany, which uses waste for valorization into secondary raw materials. This was developed in the Ruhr by Remondis, which is a family business. Next to this recycling plant, I saw the cooling towers of a coal-fired power plant. Those did not exist three or four years ago. Germany invested on solar and wind powers which do not always produce energy whenever we need it. As a result, they are forced to open new fossil fuel power plants where they burn lignite! So, it is good to have a diversified energy mix, but Germany has now completely distorted the European energy market, which also has consequences on our own hydraulic power systems due to a price decrease in the electricity market.

Anyway, if we go talk to companies about energy strategies, for sure they listen to us and we succeed in having them onboard. They are well conscious nowadays that what is valid in one's private capacity, such as embracing Minergie standards, is also valid for the industry. Big companies definitely take part in climate action. Large groups do have the capacities with designed teams, communication, etc.—even though it is sometimes more greenwashing than anything else. However, when we go talk to small and medium companies, they are not even sure if they will survive the next three or four years, so these issues are too abstract for them. Sometimes, it is interesting to have tools that measure CO<sub>2</sub> emissions, though. It allows them to see the year-to-year progression concretely. Likewise, calculating one's environmental footprint is very interesting and concrete. But tackling the economic environment of SME with a climate point-of-view simply does not work.

**Y.F.** To sum up our views on climate policy, we encourage a better cooperation between climate and energy policies. Climate policy should be designed at a global level where

all actors go in the same direction, so that Switzerland does not go it alone. Target agreements should be created mainly with larger or medium companies, while we should come to small businesses with more energy objectives than climate goals.

**Speaking of large companies, there has been a law project in the EU on the extra-financial reporting of businesses. The goal is to ensure larger companies publicly report their CO<sub>2</sub> emissions, among other indicators, in their annual reports. Do you consider such measures as favorable and would they be worth considering in Switzerland?**

**Y.F.** Let's say that there should be no obligations. It should be the company's decision to choose whether or not it wishes to publish such indicators. And if it does not want to, I do not see why we should force it to do so. It should come from the business' willingness to report and reduce GHG emissions.

**O.B.** Well, at the level of large corporations, it can depend. But it also depends a lot on how the figures will be articulated. If we require a multinational to report on non-financial indicators, first it should be the same methods between different groups of the same organization. Then, considering the number of brands the chosen multinational possesses, the company should not pick and choose the emissions it wishes to report. For a small business, it is less complex as we talk about only one site. For larger corporations—not even talking about more opaque holdings—it is much harder to determine. Now it is very good that all these discussions about the climate have happened since Kyoto and more recently Paris, because we realize we only have one planet and that if we continue at this pace, we do not know what type of world you will be leaving for your children or for their own children. This global dialogue goes pretty fast. We are not at the edge of extinction yet, but there are big issues that must be solved. At the regional level of the FER, we try to promote the sanest modes of consumption with local companies, as well as respectful and local production methods. Besides, an important principle we also believe in is the fact that competition is good and should be promoted. But in order for competition to be positive, all actors should play under the same rules. This means we should also combat market distortions such as undeclared work, for example.

**We talked about promoting the consumption of local products. What do you think of projects of energy-labelling that aim at informing the customers directly on products, regarding the environmental impact of their choices in supermarkets for example? Could such measures be considered in Geneva or at the federal level?**

**Y.F.** Well I think it could work. I believe people are more and more aware of their climate impacts, especially since a few years. Then every consumer chooses what he wishes to buy, local or not. I'm not sure an additional label would bear fruit, considering the information that are already printed on products—those are doubts I have, talking as a consumer.

**O.B.** Then, we live in a society that is quite paradoxical. It is true there is currently increasing awareness regarding the ecological impacts of consumption choices. But on the other hand, we find more and more exotic fruits in supermarkets or restaurants, which some consumers buy very frequently.

**Y.F.** Here, it is more an issue that falls on the consumption side, and concerns businesses only to a lesser extent. Maybe this problem will be more defended by the consumers' associations. You can add all information you want with CO<sub>2</sub> labels; some consumers will never even look at those labels. However, it is more about acting on people's conscience and how to change consumer behavior, which becomes a micro-economic issue and one of human behaviors. Of course, there are people who will only buy organic products for instance, but some other consumers only look at the price tag.

**O.B.** Yes, these global warming issues really come down to the consumers' conscience. Some people are very unaware of these, also because we're in a society that goes extremely fast; we sometimes want people to buy more than to think. Passive consumers need to become active, which is not the case for everyone.

**Should one regulate prices then? Are there ways to do so, through taxes for example?**

**O.B.** A liberal institution such as ours is not favorable to taxes, obviously. When we set taxes, people try to avoid them as much as they can.

**Y.F.** And in a canton such as Geneva, levying taxes will just make people go elsewhere to buy their products. I personally think we should act more on the collective conscience side. It is necessary to go that far, in addition to issues such as price we have just talked about. But you can alter the price as much as you want; at the end of the day, if people are not aware of the products' environmental impact, they will not change their behaviors. So, it should also be about additional information. This should come from public actors, supermarkets or other actors as such.

**O.B.** It is also very important to act on making electric or electronic devices that can be repaired. The concept of the iPhone, for instance, is simply outrageous; when its battery is dead, we have to change the whole phone. Then it takes huge amounts of energy to manufacture, use, and recycle them. If we could repair devices such as mobile phones, refrigerators or washing machines, it would be so much better. Setting up repair cycles and creating jobs in these professions is important. It should reflect a true political willingness to weigh diverging interests as well.

**Are changes in the companies' awareness important as well?**

**Y.F.** Honestly, I think some companies are very conscious of the environmental impact they have and to improve the situation try at their own scale. Many take internal measures such as favoring modes of transportation that pollute less, etc. It really depends on the types of companies and of their individual willingness.

**O.B.** Some sectors are also more aware than others. For some industries, it is very difficult to go through this environmental transition. Opportunities are created for some, while other encounter many risks. Businesses in the car body industry for instance are currently undergoing a major crisis. On the other hand, in the Lemman region, we are top notch for the development of drones and their applications. A federation such as ours has to help businesses that are in crisis to evolve, and to facilitate the development of new industries.

**Y.F.** Now with the Energy Strategy 2050, it is obvious that companies and consumers will have to move in the same direction. Companies will necessarily have to make some efforts and their practices in energy consumption will have to evolve. We promote a change that is not too brutal for companies but is accompanied over time.

**According to you, does the State have a role to play to facilitate this transition?**

**Y.F.** The State is globally there to control what happens. Then, it is each company's role to adapt for the best and follow the directions pointed. Companies should be free to evolve without too many constraints or obligations. It should rather be a soft support from the State, which should act as a facilitator.

**O.B.** Indeed, and the problem we encounter with technocratic approach is the overload there can be on businesses, which handicaps them. Managers can become trapped into all sorts of paperwork which prevents them from working correctly, in markets that are more and more competitive. It is important that we do not become societies where we should advise our children to become civil servants rather than managers, because of all the paperwork you face when you manage a business. A country's wealth is precisely made of its enterprising culture and innovation, which should be fostered and facilitated. So, the State should be a facilitator and regulate at a macro level rather than at a micro level. In this transition we were talking about, I believe what is important is to do better with less, which means becoming more efficient. There are new balances to find in our world as things are moving very quickly. We can also come back to practices we used to work with that are saner for the planet. But having indicators of CO<sub>2</sub> emissions for companies can be interesting, as it can always be an incentive to improve their practices.

**Air transportation is also an important issue, especially in Geneva.**

**O.B.** Yes, and in the whole world! The industry is skyrocketing in a phenomenal manner. Here we have to find solutions with economic milieux. Because if we had purely environmental approaches for the development of the Geneva airport, we would just transfer the problem toward the neighboring airport of Lyon.

**And when we see the price of train tickets, it is not surprising that people take the plane instead. There are huge issues of externalities in the transportation industry, as the societal costs are not included in the price of plane tickets which are dramatically low.**

**O.B.** Yes. Now, the very high time constraints that are put on the supply chain of the aviation industry might be beneficial to the train. Indeed, trains are sometimes more reliable, punctual, they bring you directly at the city center, etc. This may encourage people to favor the train in the future, for short intercity trips.

**Should taxes be levied on plane tickets, at least via the VAT or kerosene taxes?**

**O.B.** Air traffic should be regulated at the European level, if not more globally. Again, Switzerland cannot adopt measures on its own. But it is true that Brussels should examine the air traffic issue because we cannot continue in this direction for long. We have now been implementing financial instruments for the road traffic, which the population follows. We should now look at the aviation issue and also make people

aware that flights have environmental impacts, which is an issue many do not realize yet. It looks very much like the same issue we had for cars a few decades ago.

**To finish with, do you think that companies in Geneva benefit from the appropriate framework conditions to fight properly against the global warming phenomenon?**

**O.B.** Generally speaking, we can say there are information exchanges between public, private and civil society actors, which is positive. As mentioned before, we think this is what has the greatest potential in the climate area. What is smart is to present climate measures from the viewpoint of savings potentials managers can make in terms of energy, mainly.

**Y.F.** Indeed, heads of companies are more receptive to energy strategies rather than climate action, which is a word that has lost a bit of its meaning. As mentioned before, the implementation of the Energy Strategy 2050 will definitely have an impact on companies, the efficiency of their buildings, CO<sub>2</sub> emissions, consumers, etc. And this will in turn have local implications at the level of our canton and city. Target agreements should also be pursued in a voluntary way with incentive measures. Finally, all actors have to take part in this fight against climate change.

**O.B.** And one last point is also essential to talk about: what will be the effects of the digitalization of our society on the climate? The internet right now makes up for a significant part of our electricity consumption in Switzerland, and this proportion may very well continue to grow massively in the future.

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