Appendix 2 – European Cities

Lyon, France

Background

In Lyon, much of the climate change preparation and planning is done with a great degree of collaboration with the metropolitan of Grand Lyon. Lyon represents one *arrondissement*--or borough--of Grand Lyon with a population of around 516,000. Grand Lyon itself is composed of the *arrondissement* of Lyon and 59 municipalities with a total population of around 1.4 million with 590,000 housing units and 700,000 jobs (Grand Lyon, 2019b). On December 16, 2020, Grand Lyon Metropolitan Council voted in the *Territorial Climate Air Energy Plan 2020-2030* (Grand Lyon La Métropole, 2020). Three days later Lyon City Council approved their own *Climate-Air-Energy Action Plan 2020-2026* to run in conjunction with the plan of Grand Lyon (Ville de Lyon, 2019). Because of their population size and climate similarities (Table 1.), Lyon is a good comparative city for Toronto.

The *Grand Lyon Territorial Climate Air Energy Plan* sets to achieve three goals: increase renewable energy production by 17% by 2030, decrease CO_2 emissions by 43% compared to 2000 levels, and decrease energy consumption by 30% compared to 2000 levels (Grand Lyon La Métropole, 2020). In French, Grand Lyon's plan is called *le plan climat air energie territorial de la Métropole de Lyon* and abbreviated to PCAET. PCAET has four categories in their plans of action for 2030. Those explored in this document are "sustainable and solidarity design" and "our territory linked to its resources".

In addition to the PCAET, in June of 2015, Grand Lyon launched its *Stratégie Énergétique Métropolitaine: Schéma directeur des énergies 2019-2030* (SDE), which defines the metropolitan's strategy to complete an energy transition by 2030. The SDE also includes 125 actions made in connection with existing public policies, and included deliverables, deadlines, and an estimated budget (Grand Lyon, 2019b). The SDE has four major orientations. buildings, citizens and businesses, network intelligence, and industrial and public investments. The SDE sets the same objectives as the PCAET, with one clarification: they aim to reduce energy consumption by 20% by 2030 compared to 2013 levels, instead of 30% compared to 2000 levels. In 2013 Grand Lyon consumed 33 TWh: 29% residential, 26% industrial, 24% transport, 21% tertiary sector (non residential or industrial buildings).

Heating & Cooling

In Grand Lyon, the strive for sustainable heating and cooling is done in four directions: by *éco-rénover* (eco-renovating) existing buildings, the creation of sustainable new buildings, the proliferation of green space, and through the establishment of *éco-quartiers* (eco-districts). Grand Lyon officials plan to build a low-carbon metropolis and

to mobilize the tools of municipal planners to produce buildings and spaces that allow for sober energy lifestyles.

A great mechanism for promoting eco-renovations is for municipalities to lead by doing. Grand Lyon intends to renovate 200,000 homes, 75% of buildings over 2,000 m^2, and 25% of all buildings under 2,000 m^2 by 2030, which will account for 6% of the 20% energy consumption reduction. In Grand Lyon, metropolis and municipal officials are leading by eco-renovating social housing and tertiary buildings, while also incentivizing eco-renovation in private housing. They aim to eco-renovate 75,000 social housing units in a double-feature to, one the one hand, increase energy efficiency and lower carbon footprint, and on the other, prioritize neglected communities to decrease energy poverty and vulnerability. In the private sector, Grand Lyon aims to eco-renovate 100,000 private condominium units (of the existing 329,000) and 25,000 individuals homes (of 110,000) in the next decade. Eco-renovation will be easier in the tertiary sector where the buildings can be more easily obliged into regulation, but will still require great support and coordination. By 2030, Grand Lyon wants to eco-renovate almost one in three dwellings.

To help deliver such ambitious retrofit goals, Grand Lyon created ECORENO'V, a market intermediary to serve as an advisory and support service for eco-renovations for private housing in the metropolis of Grand Lyon (Grand Lyon, 2019a). Through ECORENO'V, customers have access to financial aid, consultants, and contractors. In the example of a 72 unit apartment complex, Grand Lyon granted 144,000€ to assist in financing a 662,000€ eco renovation that included replacing the ventilation, insulating facades and floors, replacing half of the windows, installing thermostatic valves, and installing humidity sensitive vents for a total decrease in energy consumption of 36%. For private households, grants typically range from 2,000 to 5,000€.

Energy Security

Grand Lyon intends to ensure a clean and sufficient energy supply by increasing the local production of renewable energy and investing in district heating and its energy distribution networks. Investments in renewable energy and recovery technologies are estimated to account for 5% of Grand Lyon's targeted 20% energy consumption reduction.

By 2030, Grand Lyon wants to go from 7% to 17% of its energy needs covered by local production from renewable energy and energy recovery. To do so, they will map the solar potential across the Metropolis, install solar systems on public roofs, and increase solar generation from photovoltaics by 10 times, and solar thermal by five. Additionally, they will be installing biomass boilers on heating networks and increase investments in industrial heat recovery, heat recovery from wastewater, solar thermal energy, renewable gas, and geothermal energy.

This expansion of heat recovery will require investments in the heat network. Grand Lyon will work to increase the densification and extension of current systems while also

creating new networks. This will all require increased monitoring and measure infrastructure, particularly to forecast with changing seasons and climate. Grand Lyon estimates installing 783,000 new electric metres, 349,000 gas metres, and to move from 70,000 to 200,000 dwellings attached to the heating network by 2030. These long term changes are made easier because the metropolis owns the gas networks, electricity, and district heating networks. One of the goals of these investments is also to create a public energy data service that can be used to accelerate the energy transition.

100 Proposals for the Climate

From March through September of 2019, the Metropolis of Lyon hosted nine workshops with more than 500 participants. These workshops focused on nine categories: digital and carbon footprint, energy efficiency and housing, energy efficiency and tertiary buildings, city adaptation to climate change, mobility, renewable energy, consumption and waste, businesses and climate transition, and civic engagement. From this, the Metropolis developed a booklet on *100 propositions pour le climat* (Grand Lyon La Métropole, 2019). For the purposes of this report, we will focus on digital and carbon footprint, energy efficiency, and renewable energy.

Grand Lyon is focusing on digitization because it serves as a powerful vector of an energy transition. Digitization can help optimize transit infrastructure, waste management, and energy distribution networks, and is required for accurate carbon footprint calculations. However, if not implemented properly, digitization can have negative effects as it also requires a significant amount of energy.

Energy efficiency upgrades is one of Grand Lyon's primary strategies for lowering energy demand and emissions. Residential buildings and tertiary buildings make up half of Grand Lyon's energy demand (29% and 21% respectively). Among 17 proposed actions, citizens indicated they want to see a coordination and organization of the supply chain facilitated by the Metropolis, physical offices to access information and experts, third-party financing, and public funding agencies to support the scale of renovations required.

To propel the diffusion of renewable energy and recovery technologies into Grand Lyon, citizens are asking the Metropolis to assist by encouraging and supporting local initiatives and acting as an intermediary to industrial actors. This work will be accomplished through awareness and engagement campaigns, supporting the development of cooperative models for renewable energy production, and by connecting the public with contractors.

Recommendations

- Establish a market intermediary similar to ECORENO'V to assist in the uptake of eco-renovations through financial assistance, contractor recommendations, and expertise.
- Set an ambitious quota for buildings to retrofit by 2030.

- Expand the district heating system.
- Expand geothermal, solar thermal, photovoltaic, and heat recovery systems.

Tables

Table 1. Toronto and Lyon climate data averages 1982-2012 (*Climate Data for Cities Worldwide*, 2020).

Metric	Elevation (m)	Annual Temp. (℃)	Summer average	Summer high	Winter average	Winter low	Annual Precip. (mm)	Precip. high	Precip. low
Toronto	105	8.0	21.5	26.6	-5.3	-8.9	785	81, Aug	51, Feb
Lyon	177	11.6	21.0	27.0	2.6	-0.5	623	80, May	48, Feb

Sources

Climate data for cities worldwide. (2020). Climate-Data.org. https://en.climate-data.org/

Grand Lyon. (2019a). *Guide pratique de l'écorénovation*. Grand Lyon. https://www.grandlyon.com/fileadmin/user_upload/media/pdf/habitat/ecorenov_gp.pdf

Grand Lyon. (2019b). *Stratégie Énergétique Métropolitaine: Schéma directeur des énergies 2019-2030*. Grand Lyon. https://blogs.grandlyon.com/plan-climat/wp-content/blogs.dir/8/files/dlm_uploads/2019/05/2019_Sch%C3%A9ma-directeur-des-%C3%A9nergies.pdf

Grand Lyon La Métropole. (2019). *100 Propositions pour le Climat*. Grand Lyon La Métropole. https://blogs.grandlyon.com/plan-climat/wp-content/blogs.dir/8/files/dlm_uploads/2019/12/04-100propositions.pdf

Grand Lyon La Métropole. (2020). *Plan climat air énergie territorial*. Grand Lyon. https://www.grandlyon.com/projets/plan-climat.html

Ville de Lyon. (2019). *Extrait du registre des deliberations du conseil municipal*. Ville de Lyon. https://www.lyon.fr/blob?op=201912/delib/20195272.pdf