Metropole of Lyon

TRANSFORMATION AGENDA (D.2.2)

Flavia Barone; Béatrice Couturier - Grand Lyon

Sylvain Koch-Mathian, Benjamin Giron, Marine Joss- Hespul

Aurélie Ferrage, Guillaume Roupioz - ERDF

Table of Contents

INTRODUCTION

Located in the Rhône-Alpes region in the northern part of the Rhône Valley, the Lyon Metropolis counts 59 communities within the urban area.
The urban area borders the new Rhône department on the west, south and east, and the Ain department on the north. It is crossed by the Rhône River and its Saône tributary.
Created On January 1, 2015, in the place of the Lyon urban community, it assumes the administrative tasks of the Rhône department, which has been reduced in scope to the non-metropolitan part of the original territory.
With 1.3 million inhabitants, the Lyon metropolis is equivalent to the eleventh most populated department in France. The City of Lyon contains 37% of the metropolitan population.
The Lyon Metropolis is a major employment center, and the main sectors of employment are in the service industries.
Although it is mainly urban, the metropolitan territory includes 40% of natural and agricultural areas.
The Territorial Development Consistency Plan (SCOT) for the Lyon agglomeration includes 74 communities with three Public Establishments for Inter-community Cooperation (EPCI) focusing on the common project of defining the new Lyon urban agglomeration.
Taking into account the major topics of daily life (housing, travel, economy, environment, etc.), the SCOT designates what the Lyon agglomeration will look like in 2030.
The Territorial Development Consistency Plan (SCOT) for the Lyon urban agglomeration envisages a metropolis where a balance is found between economic and demographic growth, respect for the environment, social justice and territorial solidarity.
To carry out its goals, the SCOT develops four major development principles, which are defined for each territory.
First, multi-polarity. Far from being concentrated in the heart of the agglomeration, urban development will be organized around a dozen living areas. This new reference framework, which is meant to limit travel (and in particular the use of cars), includes commercial, educational, sports and health facilities.
Within these living areas, urban centers will supply inhabitants with all the functions for daily living, such as housing, activities, businesses and facilities. This is the concept of multi-functionality, of a "mixed" city, where all urban functions coexist.
This more sustainable type of urban organization is modeled on the "city of short distances", which uses less energy and requires less travel. In exchange, it requires reinforced servicing of the living area by public transportation.
To make room for new inhabitants, the SCOT recommends a denser urban development model. Designed to avoid harming the quality of life for inhabitants, the reinforcement of urban density helps preserve natural areas.
Respecting a 50/50 balance between city and nature is a priority for the SCOT, which promotes the presence of plants within the urban territory and preserves natural,

agricultural and forestry areas. This "green armature" plays a decisive role in the metropolitan quality of life, as well as in its economic wealth and attractiveness.
In parallel, the "blue network" created by the Rhône and Saône rivers is a major component in the new lifestyle setting. It also represents an alternative to transporting merchandise by roadway.
This was the context in which the Territorial Climate-Energy Plan (Metropolitan SEAP) was elaborated, at the crossroads of economic attractiveness, residential attractiveness, resource economy (energy, water and real estate) and a sustainable lifestyle model promoting the well-being of inhabitants.

PART A
THE STORY (STATUS QUO, VISION AND QUANTITATIVE GOALS)

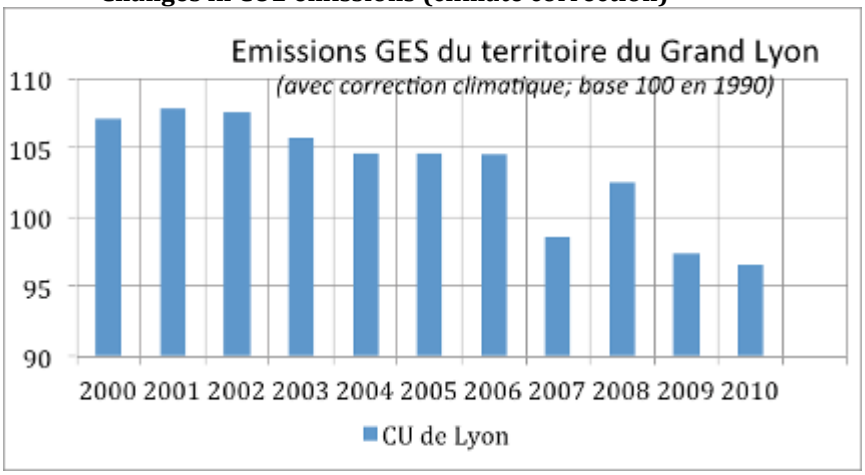
1 Status Quo

Starting in 1990, energy consumption in the metropolitan territory has been subject to increasingly precise and robust estimations that cross statistical data with hypotheses of average consumption.
With respect to greenhouse gases, local work is more recent, with tracking initiated in 2005 of direct annual emissions of carbon dioxide in tons. These are emissions from fossil sources. Indirect emissions tied to the production of goods imported into the agglomeration are not taken into account. Other greenhouse gases are not taken into account (methane and nitrous oxide, mainly from agricultural sources at the national level).

1.1 Energy consumption and CO2 emission

These results are from the model of the Regional Observatory of Greenhouse Gas Emissions (OREGES). They cover the entire regional territory and are consolidated at various infra-regional levels, including that of the territory of Grand Lyon.

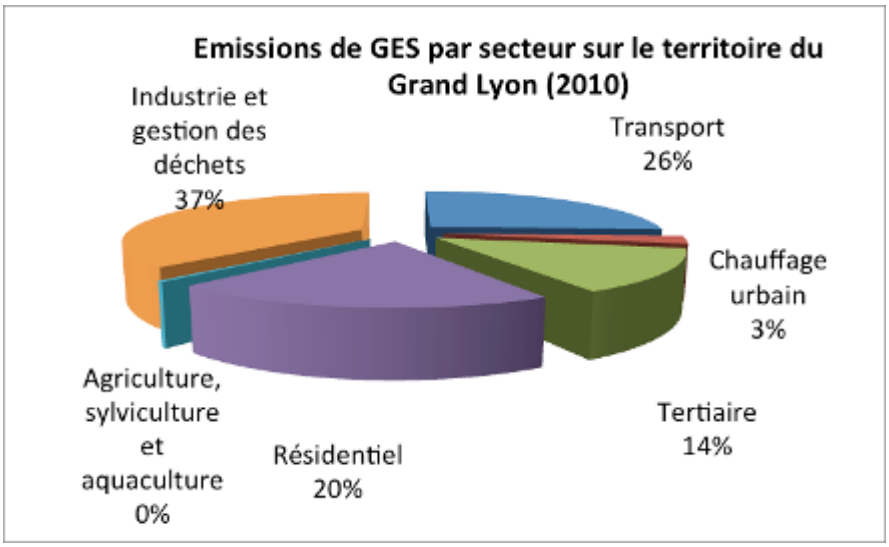
- **Changes in CO2 emissions (climate correction)**



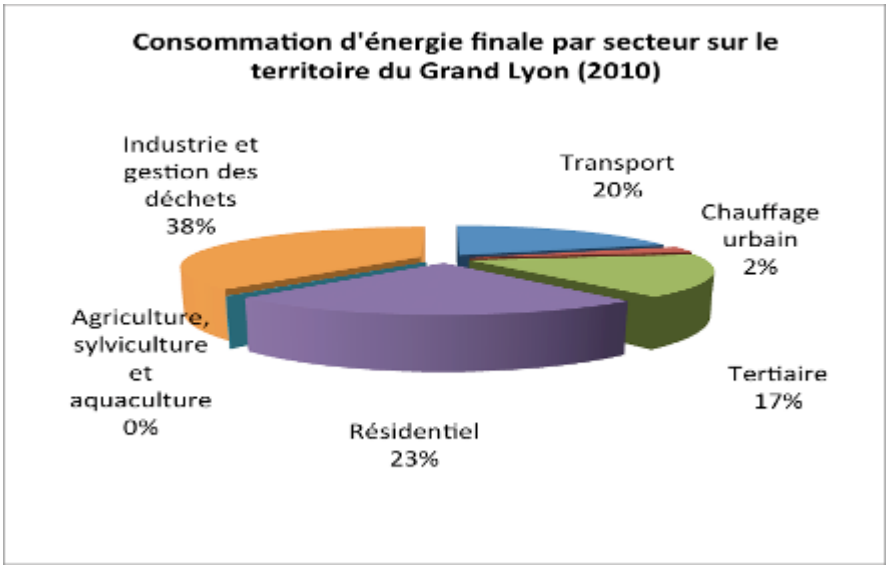
Greenhouse gas emissions in the territory of Grand Lyon
(with climate correction; base of 100 in 1990)
Urban Community of Lyon …

In 2006, greenhouse gas emissions in the Greater Lyon area represented around 7.6 million tons of carbon dioxide from fossil sources, equivalent to six tons per inhabitant, a value that is close to the national average (6.4 tons in 2006).
Because of the urban character of Greater Lyon, this figure, like energy consumption, is less than the regional average of 6.2 tons of CO2 per inhabitant and per year in 2005.

- **Spread of CO2 emissions by sector of activity in the territory of Grand Lyon (2010)**



- **Spread of energy consumption by sector of activity**



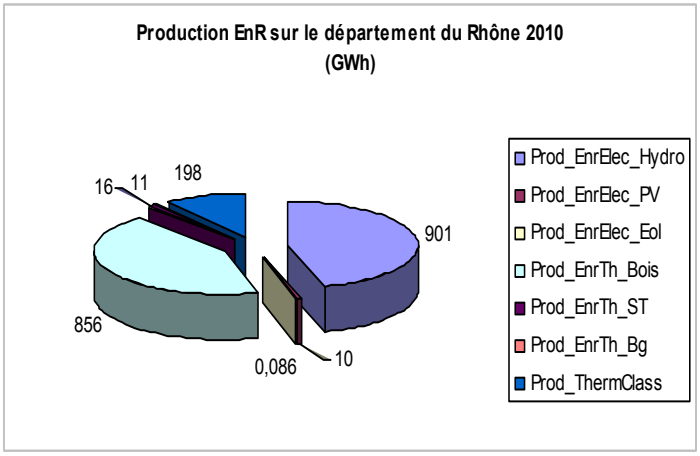
Industry and waste management Transport

Agriculture, forestry and aquaculture Urban heating

Residential Tertiary

From 1990 to 2000, energy consumption in the urban agglomeration increased very strongly, on the order of 39%, and reached nearly 3.31 million toe (ton of oil equivalent), at a much faster pace than population growth (2.7% from 1990 to 2000).
From 2000 to 2006, the increase continued to 3.41 million toe, but at a slower pace: there was a 3% increase from 2000 to 2006, while the population increased by 5% during the same period.

- **Renewable energy production in the Rhône department, 2010**



Hydro-electric (electric renewable energy production)
Photovoltaique (electric renewable energy production)
Wind power(electric renewable energy production)
Biomass (thermal renewable energy production)
Solar heating systems (thermal renewable energy) production
Biogas (thermal renewable energy production)
Class. thermal production

1.2 Energy transition Regulatory Framework

(see Annex 0)

1.3 Energy transition Financial /fiscal Framework

(see Annex 0)

1.4 Player mapping and related competencies (governance)

(see Annex 0)

2 Vision and quantitative goals

2.1 Overview of the Grand Lyon's climate and energy plan (PCET)

The Territorial Climate and Energy Plan (PCET) is a territorial sustainable development project, the main purpose of which is to combat climate change. Instituted by the National Climate Plan and subsequently enshrined in the Grenelle I and Grenelle II laws,

it is a framework of commitment for the territory. **It is an equivalent to the Sustainable energy action (SEAP) of the European commission.**

Grand Lyon's PCET is based on a partnership approach involving, in 2013, 74 public and private partners (businesses, public establishments, research institutes etc.).
Grand Lyon's PCET has two objectives in its sights:

- Mitigation of / reduction in Greenhouse Gas emissions. The aim is to restrict the territory's impact on the climate by reducing greenhouse gas emissions;
- Adaptation to climate change. The aim is to reduce the territory's vulnerability to the impact of climate change which cannot be entirely avoided.

A PCET is characterised by target figures for the reduction of greenhouse gas emissions and by the definition of an adaptation strategy for the territory.

2.1.1 Implementation stages

Grand Lyon has asserted its commitment with regard to Energy and Climate since 2005, via its Agenda 21.
In 2007, Grand Lyon initiated the implementation of a Climate and Energy Plan in its territory. Today, the urban community is recognised at national level for its partnership approach in drawing up its Climate and Energy Plan.
The plan was produced in three stages and has already given rise to 2 Climate and Energy Conferences bringing together all the partners.

- **17/05/2005:** Publication of Grand Lyon's first **Agenda 21** (2005-2007). The fight against the greenhouse effect is one of the 5 orientations and focuses on the areas of sustainable mobility, energy management and sustainable development. Action 39 puts in place a Climate and Energy Plan.
- **28/11/2007:** Grand Lyon's deliberation, recognising the **European 3 x 20 objectives** by 2020 and factor 4 with a horizon of 2050.
- **2009:** 1st stage of the Climate and Energy Plan - **Diagnosis**: publication of an initial study of greenhouse gas emissions, of energy consumption in the territory by sector of activity and of the main challenges associated with adaptation to climate change.
- **06/05/2010:** 1st Energy and Climate conference: putting in place the partnership process.
- **2010/2011:** 2nd stage of the Climate and Energy Plan - **Vision 2020**: in conjunction with close to 200 partners in the territory, production of scenarios allowing a 20% reduction in greenhouse emissions to be achieved by the horizon of 2020.
- **28/11/2011:** 3rd stage of the Climate and Energy Plan - The **Partnership Action Plan**: signed by 60 partners, on the occasion of the 2nd Energy and Climate Conference.

- **2012:** 1 framework deliberation and 9 deliberations on the implementation of the sections of the Climate and Energy Plan
- **2013:** The partners of the Climate and Energy Plan met at the 3rd Energy and Climate Conference to share an initial progress report on the actions undertaken (28 October).

2.1.2 Quantified objectives

The territory's greenhouse gas emissions were evaluated by Air Rhône-Alpes at 7.6 million tonnes of CO2 / year in 2000. This is the reference point from which Grand Lyon and 60 partners in the territory have committed to a 20% reduction, which corresponds to **1.5 million tonnes CO2 / year**. The 26 actions identified in the 5 sections of the partners' Action Plan should allow these objectives to be achieved by 2020.

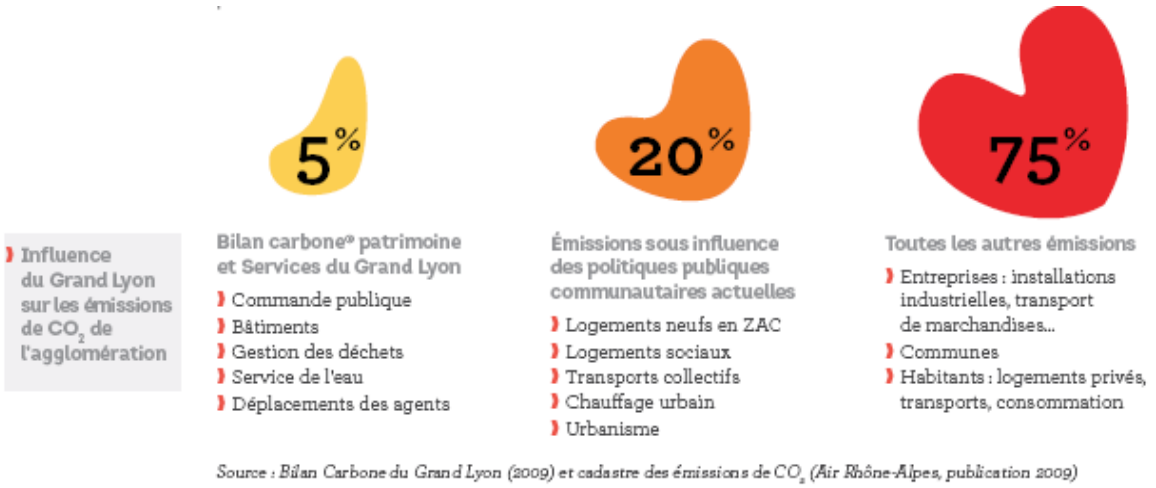
In the diagnosis carried out in 2009, the "emissions survey" of Grand Lyon's territory indicates that the CO2 emissions come principally from industry (including energy production and waste management), transport, and the residential and tertiary sectors.

Répartition des émissions de CO_2 sur le territoire du Grand Lyon, par secteur

Source : Air Rhône-Alpes (publication 2009, données 2006)

Spread of CO2 emissions in the territory of Grand Lyon by sector		Industries without CO2 quotas Industries without quotas Heating networks Habitat	Tertiary Transport Agriculture Total CO2 emissions 7.6 million tonnes

Moreover, the diagnosis also showed that Grand Lyon could only act directly on 5% of CO2 emissions in the territory via its public utilities and could influence 20% of emissions via its local policies (residential, transport, urban planning, environment). This shows the real value of the partnership action.



Source : Bilan Carbone du Grand Lyon (2009) et cadastre des émissions de CO_2 (Air Rhône-Alpes, publication 2009)

Grand Lyon's influence on CO2 emissions in the agglomeration	Heritage carbon balance and services of Grand Lyon Public order Buildings Waste management Water utility Employee travel	Emissions under the influence of current community public policies New homes in urban development zones Social housing Public transport Urban heating Urban development	All other emissions Businesses: industrial installations, goods transport etc. Municipalities Residents: private homes, transport, consumption
Source: Bilan Carbone du Grand Lyon (2009) and Cadastre des émissions de CO2 (Air Rhône-Alpes, published in 2009)			

To reach 3 X 20 and Factor 4 goals by 2050, Greater Lyon has proposed 26 major actions in areas concerning companies, transport, housing, energy, urban planning, institutional exemplarity and lifestyles.
Greater Lyon invited the Energy Climate conference partners to commit along with it to carrying out concrete work in each of these major areas.
The complete list of the 26 actions is found in Annex 4.

Since the start of 2012, the Climate and Energy Plan has been in its operational phase and a number of actions are starting to bear fruit. Thus, from a quantitative viewpoint, the actions of the Climate and Energy Plan undertaken to date have allowed **a CO2 reduction evaluated at 100,000 tonnes CO2 / year**.

These reductions represent a 1% to 2% drop in emissions in the territory. These figures will be refined by the quality processes of the Climate and Energy Plan. Thus, the Cit'ergie® (2013-2014) certification process will allow more in-depth monitoring of the actions and the putting in place of indicators.

Moreover, initial information from the survey inventory of greenhouse gas emissions in the territory shows that, during the period 2000-2010, greenhouse gas emissions in the territory fell by 10%.

2.1.3 Means for tracking goals:

The PCET approach features a dual system for measuring and tracking the evolution of greenhouse gas emissions in the territory.

The measurement system:

Each year, OREGES publishes a cadastral inventory of greenhouse gas emissions in the territory. These emissions are listed by sector and type of energy used.

From 2013 to 2014, work was done to improve this inventory and bring it in line with the MRV (monitoring, reporting, verification) concept stemming from the U.N. approach.

This work enabled enhancing the cadastre with real data and was finished with an external audit by CITEPA, an official body in charge of tracking emissions in France within the framework of the Kyoto protocol.

The tracking system:

Greater Lyon wanted to federate all territorial players within a partnership approach to begin its energy transition and to combat greenhouse gas emissions.

This approach was concretised by the implementation of an innovative system of governance: the Climate Energy Conference (CEC).The CEC brings together the key players in the following areas: industry/energy producers, buildings, transports, civil society, institutions and public and private research laboratories.The objectives of the CEC are to share the strategies and goals of the urban area's Territorial Climate Energy Plan, check the coherence of actions and verify the results obtained. An in-depth assessment is made every two years.

In parallel, Greater Lyon is committed to Cit'energie certification, which is based on a French label derived from the European Energy Award (EEA).

The certification process is currently being developed with the pertinent services from Greater Lyon. The tentative score is 62%.

2.2 Major orientations of public policies related to energy

A notable aspect of Grand Lyon's climate and energy plan approach is the fact of having prompted or reinforced consideration of energy in each of Grand Lyon's public policies. Henceforth, each major department of Grand Lyon knows that it can play an important role in the achievement of the 3 x 20 objectives even if the public policy which it implements seems a priori very remote from the topic of energy.

The smart and sustainable city strategy

The idea of the smart city is built around 4 main ideas:

- the taking into account of the environmental challenges and energy constraints;
- the main actors functioning as a network - local authorities, citizens and businesses;
- the movement away from ownership to usage - participation of users in the design of products and services;
- the inclusion of new technologies (information and communication, robotics, intelligent transport systems etc.) to facilitate working as a network, encourage changes in energy use, support and encourage behavioural change and usage patterns.

As concerns energy, the smart city strategy is present in the territory though a large number of smart grid experiments that aim to test all facets of the smart grid, from optimal management of the electrical network to approaches for managing energy demand.

Waste strategy:

The administration of Greater Lyon is the second leading producer of renewable energies in the territory through the recycling of waste as electricity (86 GWh) and heat (355 GWh). Heat production is ensured by the incineration plants at Lyon Sud and Rillieux la Pape, which processed 364 tonnes of waste in 2012.

The key issue in defining the waste strategy will be to evaluate the place of waste in energy production in the broad sense; the strategy will obviously cover heat and electricity but should also cover the opportunity represented by biogas production through the methanisation process.

Water strategy:

Since 2005, numerous efforts have been made in the area of sewerage to respond to the various sustainable development aims.

Of the actions undertaken, the search for energy production potential in connection with the recycling of waste from waste-treatment stations can be cited. Thus, the recovery and recycling of the heat from the incineration of by-products from the treatment stations at Pierre Bénite and Saint Fons results in a reduction in CO2 emissions of 11,919 tonnes per year for 51,117 tonnes of non-inert waste incinerated.

Moreover, a slurry recycling system for the production of biogas has been put in place in the purification station at La Feyssine.

An additional step could be taken with the prospect of studying, in the context of the production of the energy master plan, the potential for heat recovery from the new wastewater mains pipes.

Strategy for buildings

The building sector accounts for around 17% of greenhouse gas emissions in the territory (not including emissions associated with the urban heating network).

The orientations decided on to achieve the 3 x 20 objectives are threefold:

- the urban densification and the prioritisation of urban renewal in rebuilding the city as it stands,
- the massive renovation of 16,000 homes per year (12,000 private and 4,000 social housing) with high energy performance levels (known as BBC renovation),
- the medium-term and long-term need to incorporate the best technologies in terms of heating, to use renewable energy and to develop heating networks for the majority,
- support in achieving neutrality for all stakeholders (occupants of offices and homes).

Moreover, the partners in the climate plan are currently considering the establishment of a "one-stop shop" which would help to simplify the process of rehabilitation work undertaken by households.

Mobility / transport strategy

Grand Lyon's mobility / transport strategy is described in the urban transport plan, a reference document on this subject.

The reference scenario selected in the context of the climate and energy plan with regard to personal mobility requires action on all fronts: sustainable modes, public transport, car-sharing, regulation of the place of the car in the city, urban densification.

The expected changes in modal shares are as follows:

- a very strong increase in bicycle use,
- an increase in walking, including in outlying areas,
- a major increase in use of public transport, in particular in outlying areas.

In terms of direct and indirect emissions of greenhouse gases, there is a big drop allowing the following objectives to be achieved: at 580k t CO2, the drop from the 2000 emissions is more than 21%.

This scenario does not include electric car usage which would allow a further saving in the order of 3 to 4%. At this propose Grand Lyon is definig a stragegy on electic charge infrastructure developpement for 2020.

2.3 Towards an energy strategy and a future master plan for energy

To put in place an energy strategy for the entire territory, Grand Lyon plans to draw up an energy master plan.

The purpose of this tool is to provide a **forward-looking vision of the energy planning to be put in place in the territory of Grand Lyon to clarify the consequences of public policies in terms of energy and to guide and enrich the establishment of a local energy policy.**

In this context, it offers an optimum vision of the **organisation and development of the energy system (production, grids and networks, consumption) in the territory, in response to the challenges of sustainable development and the smart city** and which takes into account:

- the current situation in the territory;
- the challenges of energy transition;

- the territory's resources, assets and constraints;
- the public policies of the territory and the projects arising from them (development, transport, habitat, waste etc.).

An energy master plan to prepare Grand Lyon for new responsibilities with regard to energy and to build an energy policy at territory level:

The energy master plan provides a basis from which an energy policy can be established.

The territorialisation of energy resulting from the energy master plan (SDE) allows **orientations to be given** to territorialise energy transition and to put in place a local energy policy built on the following levers:

1. the implementation of measures aiming to reduce consumption in coordination and coherence with the sustainable development strategy, the PCET (renovation, replacing fuel oil with gas or wood etc.), the smart city strategy and the regional energy policy;
2. the rational development of energy networks (heat / cold, gas and electric);
3. the development of renewable energies;
4. guaranteeing social and territorial cohesion by ensuring access for all to energy.

An energy master plan to integrate energy in the setting of objectives for public policies and in the design of projects arising from them:

Public policies and local development do not systematically take optimum account of energy in their implementation. Yet, they have a direct influence on the development and design of energy distribution networks (gas, electricity and heating), in the development of renewable energy projects and in energy consumption.

Moreover, the structuring of all energy networks plays a driving role in energy management and the development of renewable energy.

The SDE is an energy planning tool which aims to clarify the taking into account of energy issues in the orientation of public policies (transport, housing, environment etc.), urban services and their operational implementation.

The objective is:

- for projects at study stage: to integrate energy sufficiently upstream in the design of projects so as to optimise the use of the energy networks, to promote the development of renewable energy sources, and to reduce consumption.
- for future projects and policies: to incorporate the vision of energy organisation given by the SDE when establishing urban policies and when deciding on the territory's local development, for example: development of a heating network close to a mixed development zone, knowing the impact of public transport or of the electric vehicle on the energy network, identification of zones in the local urban development plan (PLU) for renewable energy projects etc.).

For this approach, the Transform project contribution consists in:

1) Carrying out a first analysis of:

- the way energy strategies can be included in urban planning, since the goal is to have an energy strategy that is as close as possible to territorial reality and that is implemented more easily because it is included in existing public policy;
- player identification and the data necessary for implementing the energy transition process.

2) Working on the strategic topics that the community needs to invest more heavily in; these are the topics that contribute to reaching local energy goals (planning of smart energy grids, crowd funding, spatial energy master plan).

Part B - Evaluation of the city's energy strategy SEAP and transformation process

The process of creating the Lyon Transformation Agenda is based on the "generic" method elaborated by the leaders of Work Package 2, which is described in the Generic Handbook.

1 City concept assessment

The Generic Handbook describes the different steps in building a transformation process that results in a smart city.

After a first step (Part A) dedicated to describing the situation that exists in the current framework document for the city concerned, Chapter B suggests how to procede to a comparative analysis of the ideal transformation process and the process being carried out in the city according to the implementation of its framework document.

To do this, the main characteristics of an ideal transformation process were defined by the WP2 leaders and are presented as a table.

Each partner city is asked to fill in the table below and describe the differences observed between the ideal vision and the actual situation.

	City assessement	Ideal vision	Gap between city assessement and ideal vision	Srategic issues to be adressed locally (within the TA)
Vision/Objectives Definition of objective(s): How is the (main) objective/aim of the city plan defined?	Grand Lyon Territorial energy & Climate Action Plan (PCET= equivalent to SEAP) is defining both quantitative and qualitative objectives. General objectives of the plan are well defined and correspond to the European target 202020 for 2020. Amongst the 26 actions that have been selected by the PCET, most of them have clear quantitative objectives in terms of CO2 reduction. But for some actions (ex. Smart grids) it has been difficult to set clear quantative objectives in terms of CO2 reduction, energy savings or RES. Qualitative objectives have been set such cases.	Objective: Define components of the city plan (e.g. CO2-reduction, energy demand reduction, increase of renewable energy production or energy efficiency), using a clear quantitative and qualitative set of categories	8/10	Enrich the current SEAP with respect to questions about approaches from a territorial angle (through a future master plan). Improve the coordination and planning of electrical, gas and heating networks.
Governance: Involvement of other city policies in the plan Stakeholders involvement in the plan coordinated action within the administration	**Participative elements** A wide offer of options for participation, priority of action planning and experimental approaches. Local and regional stakeholders have been implied in the definition of the PCET objectives and action plan. Key players have defined together with the Grand Lyon the action they will implement.	Objective: to integrate other city policies (multilevel governance) Objective: Systematically, continuous participation in developing and implementation of the city concept	8/10	- Implement governance by internal and external players in Greater Lyon in the context of a future energy master plan. - Reinforce the involvement of Greater Lyon services that play a role in energy.

	Role of stakeholders Even if the participation of local and regional stakeholders has been significant and most of them are committed toward the objectives the PCET, their actions remain quite isolate with no sounds cooperation between stakeholders. **Coordination in administration** At city level, there is a good coordination about the SEAP action plan between Grand Lyon and its 58 municipalities A coordination with the regional level has been stetted up	Comprehensive tasks explicitly named and considered in the organizational processes		- Reinforce coordination at the regional level, in particular as concerns the supply industries. - Affirm the presence of Greater Lyon in the areas of national political decision-making tied to energy.
Integrated approach What is the underlying "philosophy" of the plan ?: Holistic and integrative approach or Segregated, additive approach.	We are in a partial integrative approach (integration of production and heat grids), but this approach must be expanded integrating relations between grids, consumption, local policies. a) integrated two levels of governance (Grand Lyon and municipalities)	Objective : to have an holistic and integrative approach considering the interrelations between different components of the transformation agenda (e.g. the energy chain with respect to production, distribution	6/10	Reinforce the interplay of urban planning policies and energy policies in the context of the future master plan.

Spatial approach level of differentiation with an integrative view on different city scales	City considered as homogeneous space, there is a distinction of the action depending of the district or municipality of the grand Lyon. Spatial approach is mostly considered in the urban projects where specific energy performance requirements are defined.	Objective: differentiation in terms of city scales (eg. building-, quarter-, district- or area-scale)	5/10	Develop the approaches from a territorial angle.
Timeline : horizons 2020/2030/2050 Does the plan provide a specific timeline?	Just one time line, which is 2020	Objective: defined milestones for short-term, mid-term and long-term targets as well as for the implementation of measures.	6/10	Elaborate a scenario covering the period from now to 2050, with a possible intermediate step in 2030
Monitoring: Is the achievement of objectives monitored?	A system of monitoring is in place which observes the transformation process and provides regular progress reports – with possible adjustments	Objective: system of monitoring which observes the transformation process and provides regular progress reports – with possible adjustments	6/10	Develop a spatial approach to monitoring (monitoring by territory).

Changing agents: taking into account social and technical innovation Ability of the system to be resilient	Grand Lyon PCET integrates the innovation within the action plan but does not quantify the impact. A larger scope of innovation could be also introduced (ex: question of open data)	Objective: take into consideration technical and social innovation (e.g. new energy producing technologies, changing consumer behaviour) as an accelerator/catalyst for the city concept? Objective: be able to propose a resilient system	7/10	Continue studies on sources of heat that could be mobilised (unavoidable energy).
Investment: medium-term budget plans	1. All the measures that are directly under the influence of GL are examined with regard to their financial dimensions and designed accordingly. Dedicated budget have been secured by the GL. 2. For the measures that implies a strong participation of national, regional and local stakeholders, part of the budget have been secured but there is still an important share of open financing depending on recurring negotiations.	Objective: all measures are examined with regard to their financial dimensions and designed accordingly	7/10	Build financial partnerships with SEAP and future energy master plan players; clearly indicate the investments provided by each and the planning schedule.

This comparative analysis allowed identifying the elements of the strategic approach where a major difference was noted with respect to the ideal transformation process.

This analysis gave rise to a principal axis of federation centred on an integrated approach.

It was clear that the Transformation Agenda needs to focus on an improved integration of energy vectors, on the one hand, and the public policies implemented by Greater Lyon, on the other, especially as concerns energy, urban planning, housing, mobility, water and waste.

Two correlated topics were identified with respect to this main axis:

- the governance of a future Transformation Agenda, with the main objective of associating the energy network managers and the various Greater Lyon services in shared discussions;
- a spatial approach that would aim toward a territorial and spatial adaptation of the Transformation Agenda. The idea would be to closely coordinate the future Transformation Agenda with the framework documents as concerns urban planning; these documents are the Territorial Coherence Plan (SCOT) and the Local Urban Planning and Housing Plan (PLUH). The services in charge of urban planning would actively participate in the elaboration of the future Transformation Agenda.

2 The intake workshops

After this first step (city concept assessment), which consisted in analysing the gap between an ideal Transformation Agenda and the current strategic approach with respect to the Lyon urban area, the Generic Handbook, presents a second step that consists in identifying the key themes the energy transformation process could focus on as a basis for improvement.

2.1 Step 1 – selection of 10 themes

The objective of this first step is to lead to a short list of 10 themes starting from the 26 actions of its 2020 Energy and Climat Action Plan (SEAP) plus two new priorities of the energy department that had not been clearly identified as such in the sustainable climate energy action plan. First step consisted to check compatibility of these themes with:

- the smart City strategy of the Grand Lyon,
- the new Energy Strategy of the Grand Lyon,
- and TRANSFORM objectives and key elements

Each of the 28 actions has then been graded on a scale of 0 to 5 on the following criteria:

1. **Internal development of the action in Grand Lyon**: the action was graded 5 if the municipality has deployed all the levers that it can to achieve the objectives.
2. **Progress compared to the 2020 objectives**: the action was graded 5 if the objectives are fully reached.

One other criteria was taken into account to down select a few themes, that is the **potential impact of the measure on CO_2 emissions reduction**. As an illustration, the action "*Ensure the thermal refurbishment of the existing social housing stock*" is rated 5 on the means deployed by the municipality since all the work has been done to schedule and design the refurbishment of the existing social housing stock in Grand Lyon. However the action is rated only 2 on the progress towards 2020 objectives because refurbishment is progressive and operations are spread over the 10 years (SEAP covers the period 2010-2020).

The three criteria were used to present graphically the 28 actions shown in the diagram of Figures 3 and 4. As an example, the measure "*Develop the refurbishment of the existing private housing building stock*" weighs more (labelled as "*4.5 Rehab privé"* on the diagram) than "*Ensure high energy performance of new housing buildings"* (labelled as "*4.2Privé neuf BBC*") since the volume of new buildings is very low in comparison with the existing building stock.

The diagram reveals three identifiable zones:

- Zone 1 on the right hand side: these are actions having both good progress compared to 2020 objectives (rated 4-5 on 5) and a good or average deployment of means within Grand Lyon for their realisation. These actions have also the particularity to have relatively low impact on CO_2 emission reduction.

- Zone 2 in the left top corner: these are actions that are not well advanced (rated 0-3 over 5) but that are mobilising a lot of effort from municipal services (rated 4-5 on 5).

- Zone 3 in the bottom left corner: these are actions that are not well advanced and characterized by a low level of resources being invested in them by the Grand Lyon.

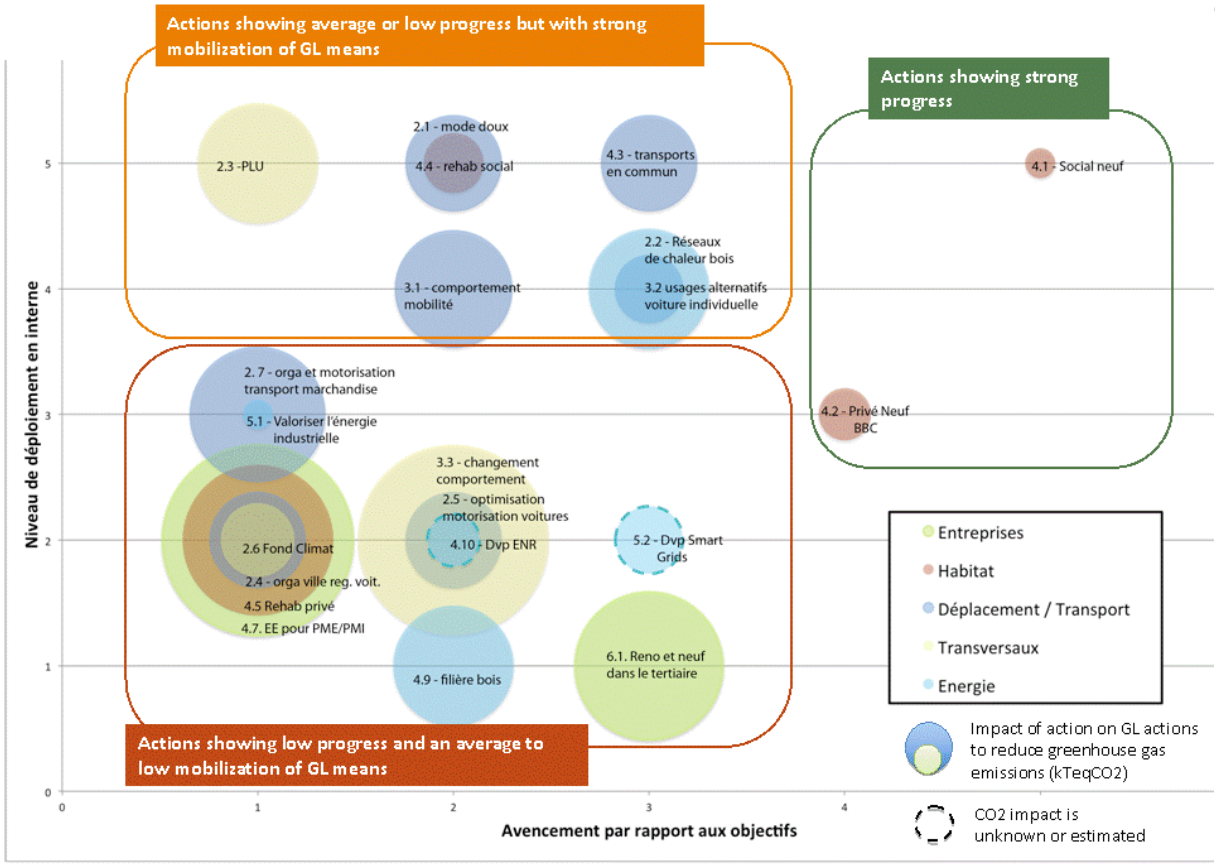


Figure 3. Diagram of the 28 actions plotted in terms of the progress towards 2020 objectives (x-axis) and the internal development of the action in Grand Lyon (y-axis).

Zone 3 will be the focus the Transformation Agenda since the objectives is to identify barriers and solutions to inject momentum in these measures by reinforcing efforts currently deployed by Grand Lyon. This down selection work has led to a selection of 8 themes by merging related sub-themes. These are shown in the table 2 below.

Table 2. Selection of 8 themes for TRANSFORM.

Category	Measure
Transport	Prepare the diversification of the energy mix of road transportation by encouraging the development of alternative energies
Housing	Develop the refurbishment of the existing private housing building stock
Enterprises	Favour the construction and refurbishment of tertiary buildings to reach high energy performance
Cross-cutting themes	Elaborate the future Grand Lyon Energy Master Plan
Energy	Develop smart grids
	Value waste industrial heat
	Structure and develop the renewable energy sector
	Citizen investment and participation in renewable energy projects

2.2 Step 2. Detailed analysis of the 8 themes and priority setting with the Grand Lyon departments

The 8 themes have been analysed by local TRANSFORM partners in detail using the following criteria:

- impact in terms of CO2 reduction
- progress with regards to the objectives and key actions that have been led
- compatibility with the policies of the different departments inside the municipality
- levers that the municipality has to have a real impact
- possible synergies amongst different departments
- interactions with other stakeholders
- examples of actions that could be led in TRANSFORM to take this theme forward.

The intake workshop reports details these elements as well as the analysis of each theme.

This has been done with two workshops to ensure the participation of all the departments of Grand Lyon concerned by the themes: Energy, Urban development, Water and Sanitation, Waste, Housing & urban social development, Mobility, Cityzen participation & public dialogue, Economic and International Development, etc.

Table 3 below summarizes the output of the workshop with Grand Lyon departments.

		Prepare the diversification of the energy mix for road transport	Develop the rehabilitation of the private pool	Promote the building and renovation of exemplary office buildings	Elaboration of the future energy master plan	Develop smart grids	Promote energy derived from waste incineration	Structure and develop renewable energies	Citizen commitment to EnR over the territory
		1	2	3	4	5	6	7	8
1	Objective with respect to the 3X20 goal (CO2, energy, etc.)	3	5	5	2	2	2	3	1
2	Qualitative analysis of project status	2	1	0	0	3	1	2	0
6	Delivery by GL services	1	4	0	5	4	2	1	1
7	Capability of the community to implement	2	2	2	4	2	3	3	2
	Results of workshops with the services								
4	Priority given to Greater Lyon services	2	1	3	5	5	2	3	4
8	Synergy between GL services	3	2	1	5	4	3	3	2
9	Synergy between local players	4	4	4	5	5	3	2	4
	TOTAL	12	13	10	24	20	13	12	13

As a conclusion, the three themes have clearly been identified as priorities:

- Theme 4. Prefiguration of the energy Master Plan
- Theme 5. A new function of “flexibility facilitator” in the development of smart grids
- Theme 8: Citizen Investment and participation in renewable energy projects.

One theme has been removed: Theme 3: Construction and refurbishment of tertiary buildings to reach high energy performance .This theme will be addressed at the Smart urban Lab level (WP4).

Other themes received very similar marks (12 or 13):

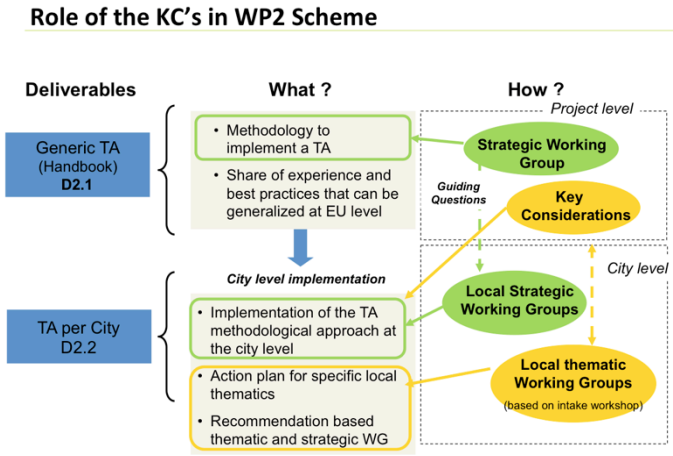
- Theme 6: Value waste industrial heating thermal grids will be an important point addressed by the WP4 and is therefore not selected here.
- Theme 2: Refurbishment of the existing private housing building stock is already heavily addressed by the housing department of grand Lyon and is removed of the list.

3 Key considerations outcomes on strategic issues to feed local strategy

In this chapter the city should describe if and how key consideration discussions at EU level can feed, or be integrated in the local theme analysis. Put in evidence the benefits of these discussions, the limits, barriers, the evolution needed to make things change.

Key Consideration Working Groups (KC WG) have been created following themes selection made during cities' Intake Workshop meeting (WP1). Each city had to choose 3/5 themes for their Transition Agenda (D.2.2) and their Smart Urban Labs (D.4.2).

KC WG were set-up on to gather industrial/knowledge partners and cities experts to work on the barriers faced regarding those KC and to exchange good practices that can benefit to other cities.



6 KC WG were created, but only 4 were active:

- KC3 - Smart Grids, leaded by ErDF
- KC4 – Integrated Planning, leaded by the University of Genoa
- KC5 – District Heating & Cooling, leaded by Amsterdam
- KC6 – Low carbon mobility, leaded by Accenture

Grand Lyon has participated to the KC 3 - Smart Grids & KC 4 - Integrated Planning
Both items were selected during the Intake Workshop session (see §2.2).

3.1 KC3 WG main recommendations

They are of 3 kinds :

a) DSOs could support the city's energy transition

- DSOs and cities can collaborate in order to support the city's energy transition by providing energy consumption diagnostic of the city
- Input & output datas are essential to build the diagnostic :
  - Input datas (geographical area, existing buildings)
  - Output datas (energy consumption, production of an area, fuel poverty indicator)

b) But there are some barriers to this collaboration

This energy diagnostic requires the DSO to share energy consumption data with the city municipality. Yet there are some important barriers the DSO needs to overcome :

- **Institutional** – Caused by the internal organisation.
- **Economic** – Related to the economic consequences of making data open. Such as the loss of income and cost of the data collection and processing.

- **Legislation** – Caused by country legislations preventing data publication such as data confidentiality regulation.
- **Information quality** – Caused by the quality of the data (lack of certain data or the data is not structured enough).
- **Technical** – such as lack of standards, the lack of proper software or hardware.

c) The importance of the early study phase to enable the Smart grids

But cooperation between cities and DSOs during upstream phases of urban developments project needs to be reinforced to help both City and DSO getting a shared vision of the future energetic situation of an area. It will help to improve network planning and assess the most interesting evolution scenarios for the area integrating smart grids solutions.

3.2 KC4 WG main recommendations

They are of 3 kinds:

a) Clarify the Open data issue

- The discussions showed the lacking or partial application of EU indications in fact of open data (COM(2011) 882) and the treatment of energy data and their public.
- The Efficiency Directive 27/2012 is somewhere confusing about the aims the information can be delivered for. This fact causes misunderstanding and mistaking interpretations at the local level that do not assure the right application of the Directive in itself and do not permit the realization of the expected results.

⇨ *KC4 WG purposes a better clarifications of uses and targets of the treatment and the availability of the energy data*

b) Strengthen link between Energy & Urban policies

- Generally speaking, local entities claim a more stringent connection between energy and urban policies.
- The absence of a "territorialisation" (or "territorial-action") of the SEAP and its energy targets comes up as a crucial gap

⇨ *KC4 WG purposes to develop a territorial approach of the energy strategy in the urban policies, as the Energy Master Plan*

c) Need of a monitoring tool

- Most cities underlined the need of a technical tool for gathering information with an adequate level of sophistication and functionalities apt to an energy dashboard, able to revise the current stage but also the drawn out forecasts.

- The most important thing is that what was established in a territorial perspective (e.g. photovoltaic initiatives on the whole city) can be studied also in its foreseen impact at a more detailed level.
- Data use should offer the possibility to bring in end-users for the generation of data and the use in practical applications and the use of analytics to search for better economies in scenario's are an innovative step towards smart city planning.

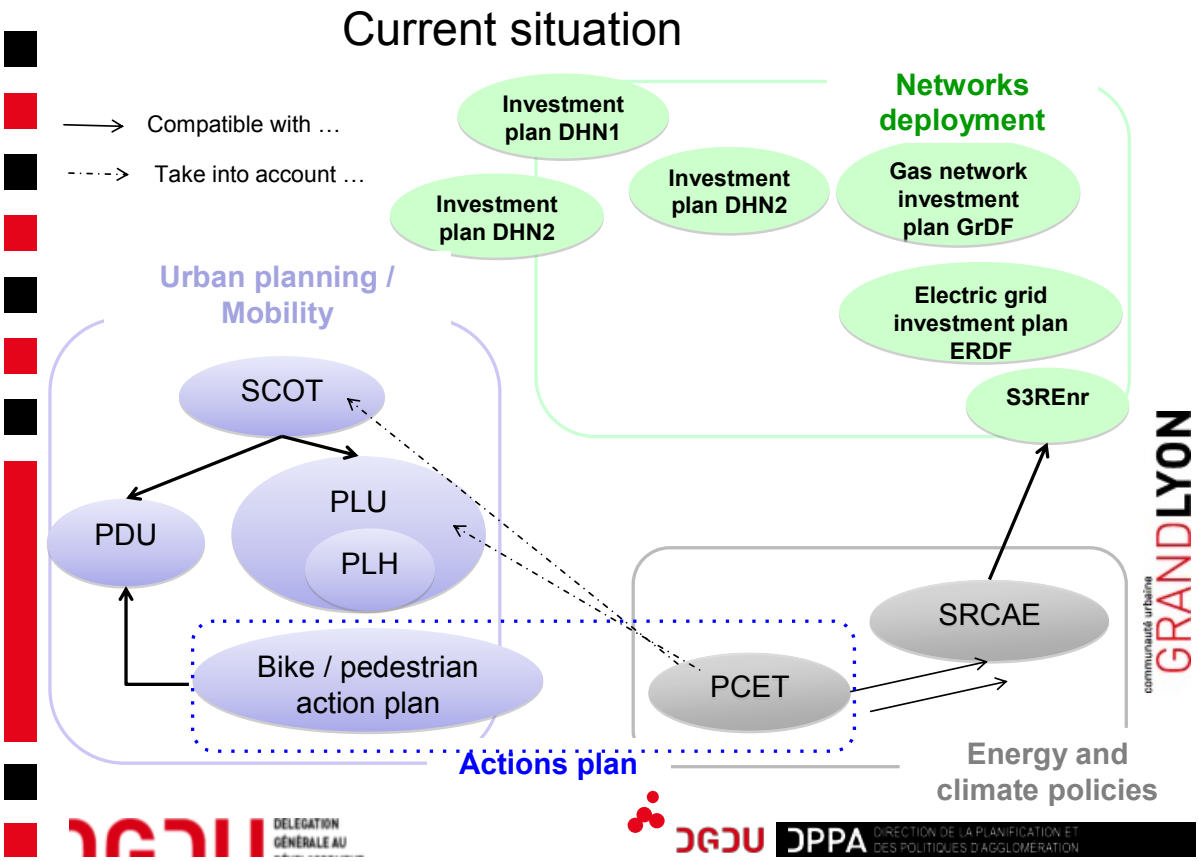
⇨ *KC4 WG purposes to develop a monitoring tool with an appropriate methodology to set up smart city analytics (based on the one developed in Transform).*

Part C
Improving the ability to implement: strategic city working groups and selected themes

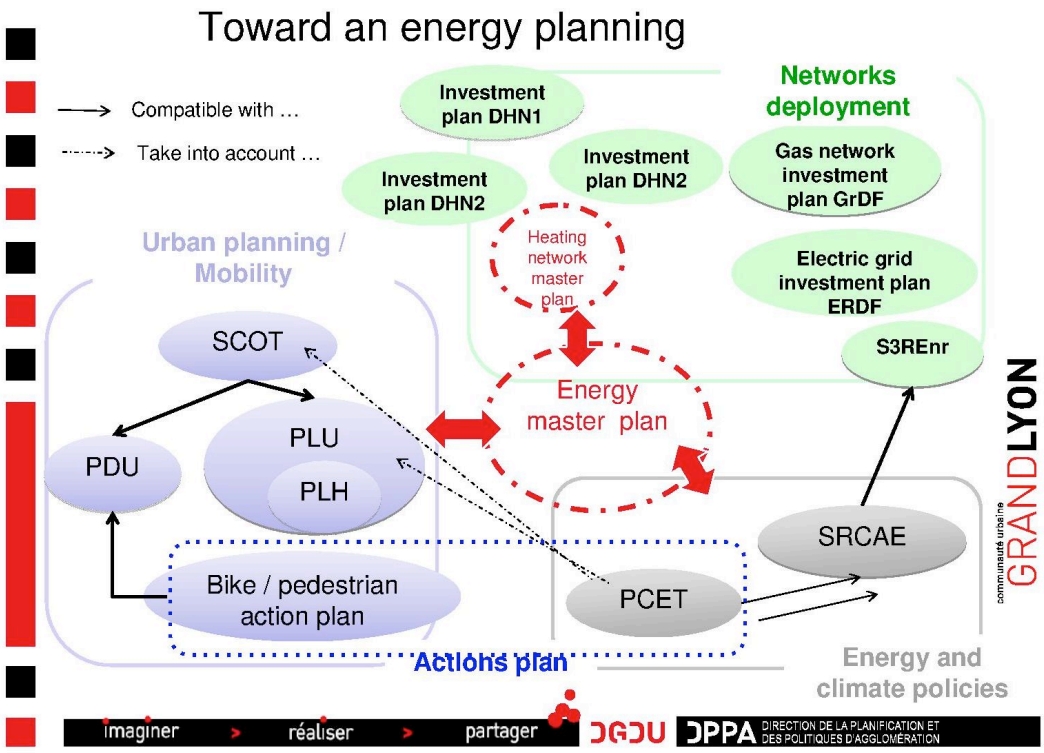
1 Strategic city working groups

1.1 Objectives of the local strategic working group

Energy planning at the urban area level means implementing an optimal energy organisation that is in line with energy transition goals and coherent with local policies (housing, employment, resources, economy, communication, etc.).
One of the conditions for a successful energy transition on the territorial scale is to include energy goals in the urban planning documents (PLUH, PDU, SCOT), as well as in operational projects.
The main objective of the local strategic working group was to improve the integrated approach of the Grand Lyon energy policies by introducing more synergies and complementarity between the land use plan (PLU and SCOT), the Grand Lyon policies (mobility, housing, ect.) and the sustainable energy action plan (PCET, SRCAE), as well as with the master plan and investment plan of the distribution energy network operators (ERDF, GRDF, heating & cooling networks.)

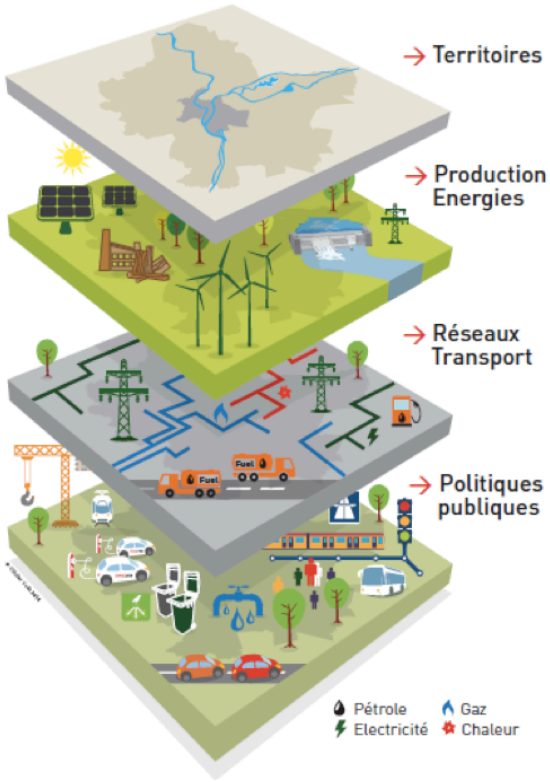


DHN: District Heating network
SCOT: Territorial Coherence Plan
PLU: Local Urban Plan
PLH: Local Housing Plan
PCET: Local Energy and Climat Plan(equiv. to SEAP)
SRCAE: Climate, Air & Energy Regional Scheme
*S3RENR: Regional Scheme for the intergration of RES to the electric grid*Plan modes doux



Secondary objectives of this working group were to reinforce the governance within the administration and with the local authorities and distribution energy networks operators.

Last but not least, this work was the opportunity to prefigure the Energy master plan of Grand Lyon that will improve the spatial differentiation of energy and climate objectives while ensuring a better efficiency of the measures and complementarity between energy network developments in line with the urban development strategy.



The expectation is to find the relevant scale to model the energy system enabling Grand Lyon to:

- Orientate energy measures,
- Monitoring them,
- Take into account changing agent impact on energy system

1.2 Working procedure

A first stage in reinforcing the links between urban policies and the energy industries was the Grand Lyon's creation of a platform of stakeholders in urban planning and energy.

Review of the working group of energy and planning stakeholders

Launched in the context of the response to the call for European Smart Cities projects, the strategic energy planning workshops aim to bring together all the stakeholders in the areas of urban planning and energy.

More precisely, they are intended to allow the following:

- a common culture to be established in relation to energy planning issues,
- the framework to be prepared for the production and the organisation by the partners of a future energy master plan,

- contributions to be made to and participation in the research and development work to be carried out in the context of the European TRANSFORM project, in particular with regard to the construction of an energy diagnosis at demonstration district level (in this case, the Part Dieu district), which can then be produced at the level of the agglomeration.

This group of representatives thus constitutes the hard core of forward-looking reflection on energy at the level of the agglomeration and is a driving force in terms of innovation and strategy at local level.

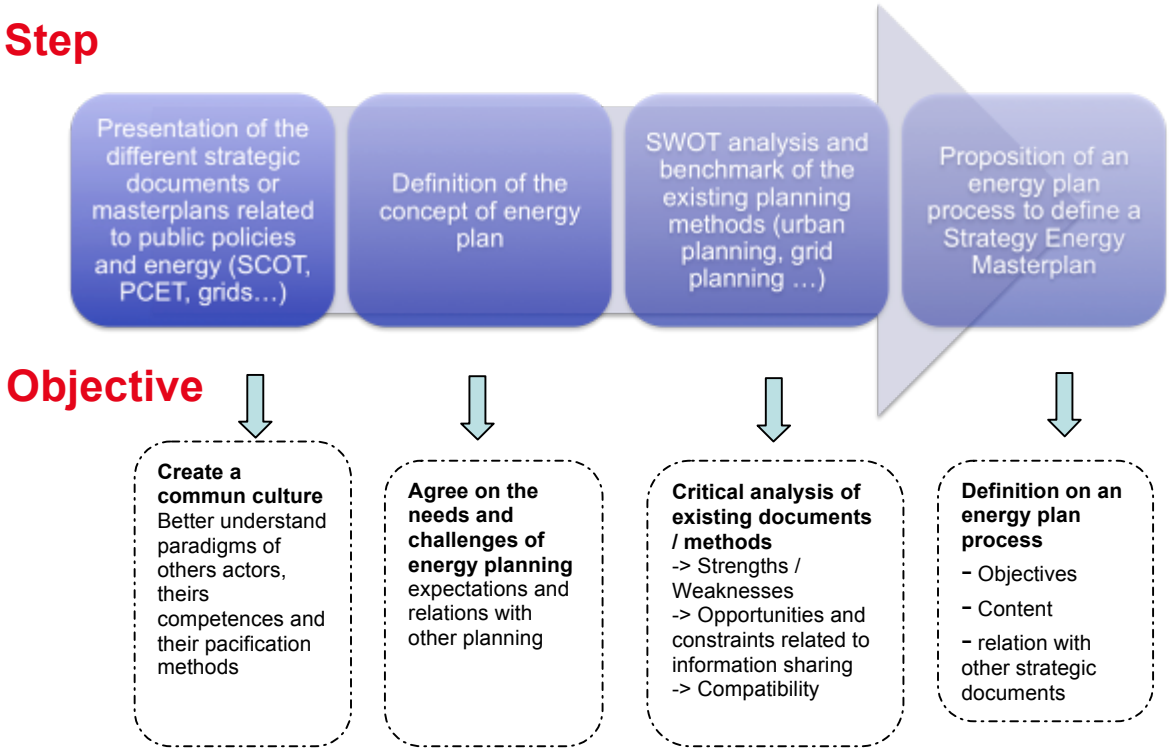
Working group members:

- Greater Lyon (Energy Mission, DPPA, mobility, urban planning, etc.)
- City of Lyon
- SEPAL (in charge of the elaboration of the SCOT)
- ERDF
- GRDF
- Urban Planning Agency
- Local Energy Agency
- Hespul

and RTE, Rhône-Alpes Region, when necessary.

Working group agenda

These workshops fit within the following work steps:



This working group has adopted the following roadmap:

a. **Analysis of framework documents for urban planning and energy**

- Description of the energy documents and action plans (SRCAE, PCET):
  - Document objectives and steps in drawing up these documents
  - Their approach to energy and their impact
  - Identification of the link between energy and public policies on waste, water, transport, housing, environment and economic development

- Description of urban planning framework documents (SCOT, PLU, PDU):
  - Document objectives and steps in drawing up these documents
  - Their approach to energy and their impact

- Description of planning procedures for energy networks (to ensure that they are included far enough upstream in planning documents) and franchise arrangements:
  - Steps in network planning
  - Factors that trigger the choice of investment
  - Available tools
  - The impact of urban planning framework documents on network planning

b. **Assessment of current planning processes and definition of energy planning objectives**

This step first presents an analysis of the urban planning system and the energy framework documents and action plans. The analysis should:

- Highlight the strengths and weaknesses of current urban planning;
- Identify outside obstacles (which are not under the control of local authorities);
- Identify opportunities to improve taking energy into account in these documents.

The idea is to use this analysis to point out the first legal and contractual drivers and the first recommendations for governance, as well as to define energy planning goals.

c. **Proposal for an energy planning procedure: method for drawing up an energy master plan for energy development in the territory**

This step aims to:

- List the legal, regulatory and contractual means provided by the future energy transition law.

- Describe the method for drawing up an energy master plan, identify the key players and how they interact in implementing energy planning and make proposals concerning the future development of the platform for these energy planning players (What role do they play in drawing up the master plan?).

- Identify the modelling tools needed to build various scenarios and track the implementation of the energy master plan.

1.3 Results of the local strategic working groups

Following the workshops, a summary document was written presenting the results of the SWOT analysis of current urban planning.

Swot analysis of existing planning urban approaches

	Strengths	Weaknesses / Risks	Opportunities
Vision	• Energy vision coherent with urban and energy strategies	• Energy strategies on the regional level not relayed locally • No means for communities to have a shared vision	• Integration of societal strategies and supply tied to energy in compliance with SCOT and new MAPTAM responsibilities
Governance	• Creation of bodies bringing together the various territorial levels tied to the need for regulatory coherence and coherence between planning documents	• Energy providers little or non-involved in drawing up documents • Energy providers little involved in urban projects upstream • No formal body guaranteeing an operation link between PCET and SRCAE • Access to energy data by communities	• Implementation of an energy governance in the context of new responsibilities • Implementation of an energy master plan inspired by the SRCAE S3ERE model • Draft law on energy transition positions the region as the head entity • Experimental areas for more flexible energy planning
Regulation of Urban Planning	• Environmental and social energy strategies present in SCOT, PLU, PDU • Accounting for energy in the OAPs • GL housing references	• Energy could be better integrated within the PLU-H ➔ Strategy of finding the proper balance • No regulatory decrees on the possibilities offered by the Grenelle law	• Adding of energy strategies and the vision of energy over the territory in the PLU-H presentation report • Communicate on the energy strategy of mobility in the context of the PDU revision • Involvement of the network administrators in MDE actions through the concession agreement or specific charters • Aligning of territorial data (same hypotheses, one database, etc.) • Convergence of time scales • SD DSIT coordination
Time Scales	• SCOT, PLU-H and PDU scheduled over the same time period	• No alignment between the visions in urban planning documents and energy strategy visions	
	• Capitalization on the approaches to travel and PCET modeling • Presence of energy modeling tools in the community fabric	• Difficulty of accessing data; no territorial adaptation of PCET goals • No integrated, dynamic model of the energy system • No sharing of initial hypotheses	

The results of this working group allowed to feed the current reflection within the framework of the revision of the PLUH.

In the context of the PLUH revision, a "Factor 4" city workshop was implemented to identify the possibilities of including rules or orientations in the PLUH that would aim to:

- allow taking the bioclimate of buildings more fully into account;
- promote the development of renewable energy on building roofs;
- avoid urban heat islands through the planting of more vegetation (on the ground and on building facades).

Along the same lines, to encourage connection to the city's various heating networks, a map of the current deployment of the District heating & cooling networks will be annexed to the PLUH.

The new PLUH will be approved in 2017.

Similar work will be launched on the Urban Mobility Plan (PDU); a revision was begun on this plan in 2014.

The new Urban Mobility Plan should produce a detailed assessment of the contribution of transport to CO2 emissions and to energy consumption in the territory.

It should also quantify the impact of the proposed scenarios with respect to climate and energy goals and show that it participates fully in the strategy for reducing greenhouse gas emissions in the territory.

2 Improving the city's ability to implement the themes

2.1 Theme 1 - Implementation of an energy master plan

2.1.1 Identify the interfaces between Greater Lyon services and the energy master plan

This consists in identifying the activities of the Greater Lyon departments and services that are tied to energy and, more specifically, tied to the system for establishing the energy master plan.

The thinking and discussions of the departments on energy has also been noted.

The goal of this work is to **propose an organisational structure for establishing an energy master plan** that includes all interested parties in Greater Lyon. This organisation should be complementary to and coherent with existing bodies. The idea is not to create more working groups but to benefit from existing working groups that could contribute to the establishment of an energy master plan and consolidate this work for dedicated technical committees. Specific working groups will be created only if a particular topic is not already handled by existing entities.

Analysis of functional interfaces for drawing up an energy master plan

Summary of interface organisation:

Subjects of interface	Committed work or ongoing reflection?	Leader department and other involved departments	Kind of stakeholders governance	Timeline
Reflection on the implementation of traffic lights fed by autonomous photovoltaic panels (not linked with the network)				

2.1.2 SWOT analysis and set of measures for the theme

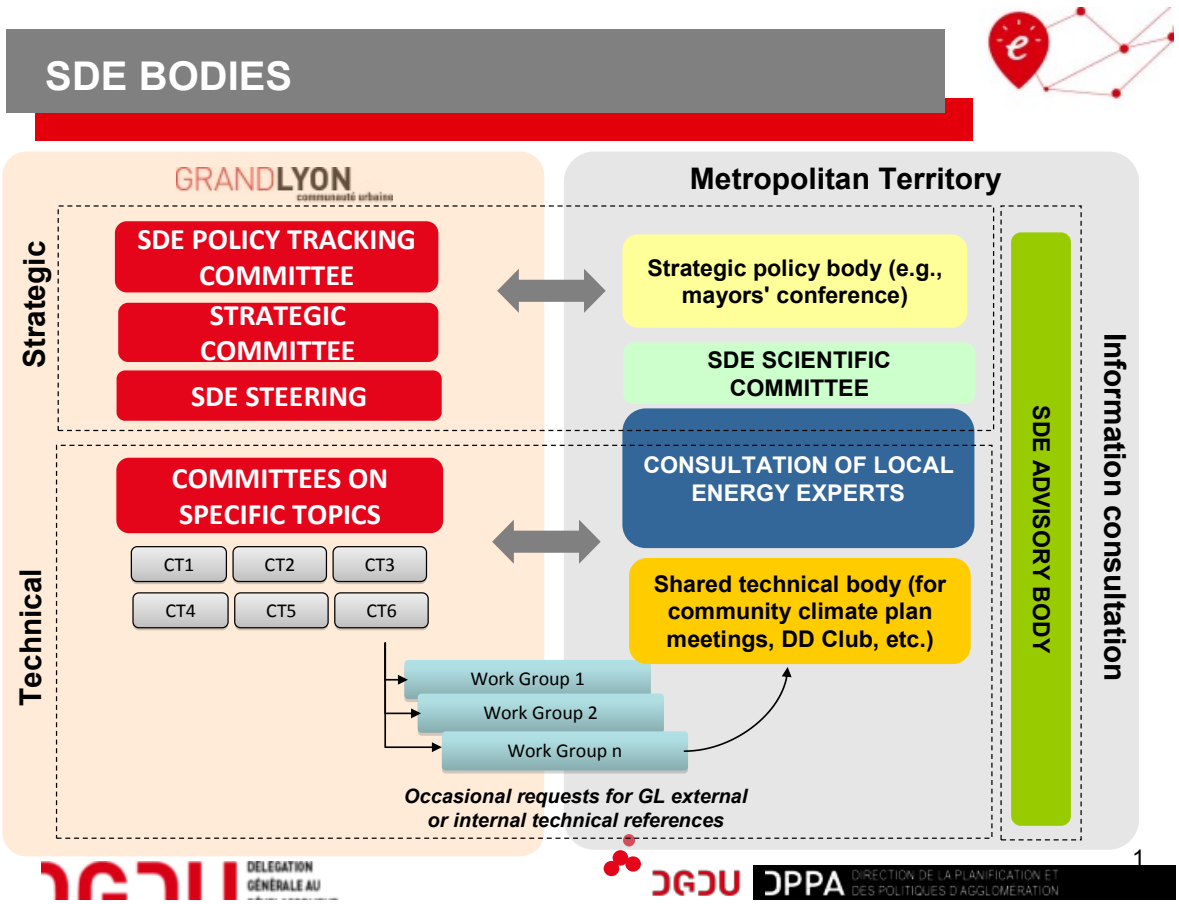
Cf Annex 3

2.1.3 Action plan

Building of governance with partners around the energy master plan

The workshop for energy and urban planning stakeholders launched at the start of the TRANSFORM project (see Part C - 1 - 1.1) has successively allowed:

- Creating an interface with the various Greater Lyon services;
- Identifying projects under the responsibility of the services tied to energy;
- Expanding discussions by the Greater Lyon Energy Mission on the way to organise the elaboration process for the future energy master plan;
- Proposing the following internal governance schema for working on the elaboration of the energy master plan:



The Energy Mission has also established the planning schedule and steps for drawing up the future energy master plan:

- **Proposed work method**

Elaboration of the energy master plan would be spread over four years, starting in late 2014. The main periods in this elaboration are described in the diagram below:

- **2015 Period**: dedicated to an assessment of the energy sites of the various players and the financial mechanisms tied to the energy transition; the evaluation of development potential for renewable energies; and the evaluation of the impact of public policy on the energy system by 2020, 2030 and 2050.

- **2016-2017 Period**: dedicated to the elaboration, quantification and choice of organisation scenarios for the energy system with the help of an energy modelling and mapping tool developed during this period.

- **2017-2018 Period**: identification of an energy strategy, as well as creation of an action plan and the tools needed for its implementation.

1 **Assessment**

- Energy assessment
- Assessment of public policies tied to energy

2 **Energy impact of public policies**

- Evaluation of the impact of public policies (travel, housing, developments, waste, environment, economic development) on production, networks and consumption

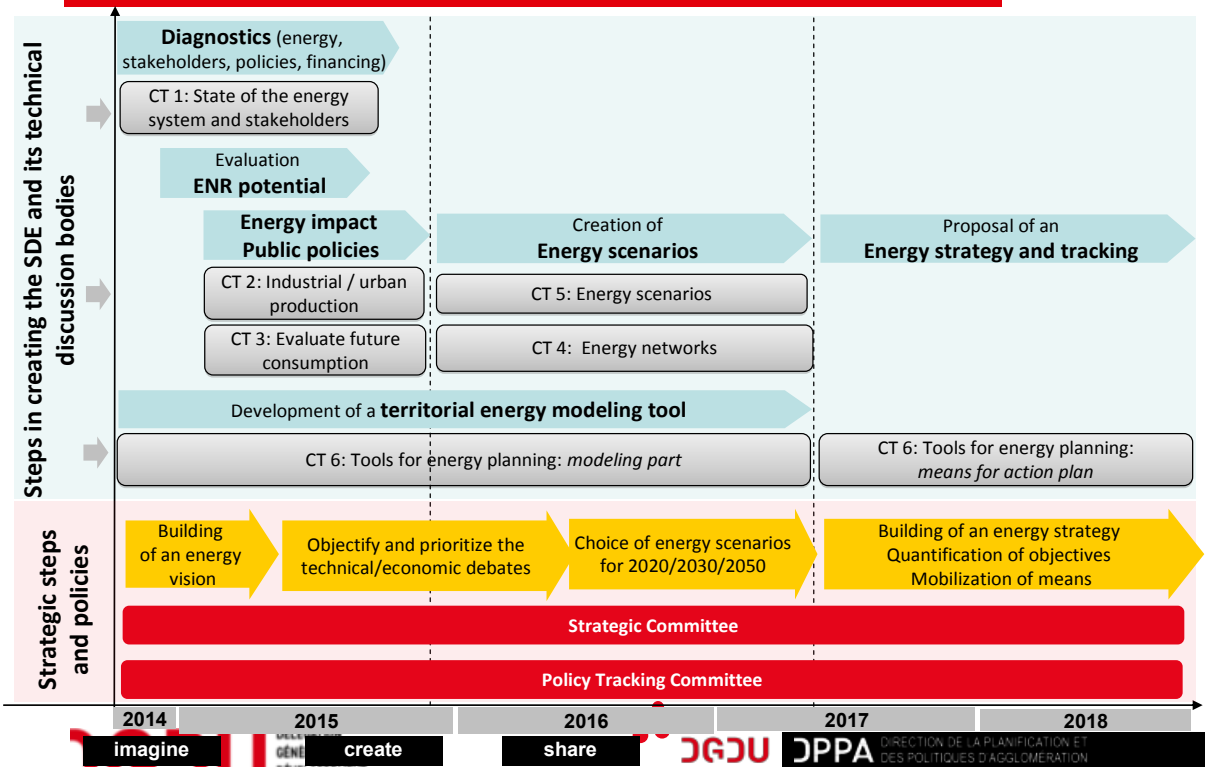
3 **Elaboration of energy organization scenarios over the territory**
Selection of a territorial energy organization scenario => SDE

- Scenarios that take into account the impact of public policies, their evolution, the energy transition strategy and PCET actions
- This scenario is designed to be dynamic and will follow a continuous improvement plan according to changes in context

4 **Identification of an SDE deployment strategy**

- Identification of regulatory vectors for SDE deployment Second-generation PLUH, PDU and SRCAE, PCET
- Identification of supporting tools (financial, contents of concession agreements, operational entity)
- Assistance for defining an energy policy
- Identification of the organization of key players in deploying and steering SDE

Interaction of Bodies at Different Project Steps



Thus, by 2018, metropolitan Lyon will have an energy master plan that is closely aligned with the Territorial Climate Energy Plan currently being used as the SEAP for Greater Lyon.

2.2 Theme 2 - Development of Smart Grids

Brief description :

The development of Smart Grid technologies helps cities to improve their local energy planning.

- Firstly, it allows identifying the flexibility potentials in production and consumption over a specific area
- Secondly, it interacts with the actors responsible for their implementation and activation (building constructors, land developers, retailers, producers, large consumers, etc.).
- Thirdly, Smart Grids technologies will enable new data services that will feed local government energy policy-making processes.

Then coordination between the cities and the Energy Actors (DSO's, Urban planner & designer, developer…), will allow the use of new tools able to assess the energy policies impact on the distribution grid.

This working group explored concretely these processes by identifying different flexibilities for the Part-Dieu district, to assess the local energy transition scenario affordable, the innovative grids needed and the financial impact.

2.2.1 Context

Smart grids are technologies that enable confronting the evolution of an electric system in the context of an energy transition.

Changes in European and national regulations during the past fifteen years have caused national energy policy to evolve toward a liberalised market, with the increasingly clear goals of managing energy demand and developing renewable energies.

Locally, this is evidenced by the massive arrival of renewable energies in the past ten years. The boom in intermittent renewable energy and the new uses of electricity (specific electricity, electric vehicles, heat pumps, etc.) has increasingly complicated management of the distribution network. In particular, managing unbalance in the distribution network between electrical production and consumption has become more difficult.

In addition, new phenomena such as voltage peaks and imbalances or rapid variations in power can, under certain circumstances, disturb users and generate costs due to having to reinforce the low-voltage network.

Local governments are also playing a more active role that they used to. They now design local energy policies which needs to be consider in grid planning. Finally, national centralized Demand Response markets are emerging and operate directly on distribution grids.

In consequence, the electrical Distribution System Operator (DSO) is under heavy pressure to handle greater complexity in real time and to support dynamic evolution in a local context. ERDF has anticipated these issues by carrying out an ambitious program to develop smart grids.

The smart grid principle consists in relying on new technologies to:

- Have a better idea of the current status of equipment in the distribution network and of low-voltage network flow, in particular through the use of an infrastructure based on communicating meters;
- Provide better integration of local demand and production profiles in order to improve the rules for connecting and planning networks;
- Better anticipate network electrical status, which enables more precise use by taking into account flexibility on the production or consumption side;
- Better integrate local energy scenarios into network planning by specifying their impact on investment programs and smart network deployment and by examining the opportunities provided by certain local resources (on either the production or consumption side), which can be considered as infrastructure alternatives or reinforcements.
- Provide new services for consumers by giving them access to their real time consumption and helping them to manage their electricity usages.

In circumstances like these, smart grid technologies can meet the new challenges and can, especially in certain cases, limit the need for reinforcements and contribute to limiting costs for the local community.

This response will be all the more effective if network needs can be anticipated as precisely as possible, thereby allowing the network to be used optimally for the benefit of the community.

The ability to forecast the overall evolution of energy needs is a major factor in achieving smart grid efficiency. This requires examining the community's role in coordination with the DSO.

In this context, the community's role, and especially the role of Greater Lyon, needs to be examined as a driver in the optimal deployment of smart grids.

In light of the conclusions on the energy transition debate, Greater Lyon would seem to be the pertinent level for carrying out the transition and leading a local energy policy. Greater Lyon has the key competencies to act on demand and on the local development of the energy offer, in particular regarding urban planning, housing, economic development and transport, but also as concerns the means of implementing long-term strategies to optimise management of local resources.

More specifically, the future Lyon Metropolis, which would be competent on energy networks and in charge of the PLUH, would be a legitimate choice for implementing a **territorial energy planning schedule.** This schedule would provide an overview of energy system evolution (production, energy networks, consumption) throughout the territory at different points in time and in collaboration with energy distributors.

In particular, this planning schedule should include smart grid technologies in the evolution of the energy system over the short, mid and long term.

In any case, **coordination between the electrical DSO and local authorities would contribute to the implementation of optimal energy planning** that would be based on the energy transition strategy while guaranteeing continuity in the quality of distribution network service, as well as viable technical and economic conditions.

2.2.2 Description and objectives of the selected theme

The working group carried out an initial examination of the evolution of electrical network planning practices by having a look at the respective roles and expectations of local authorities and the network manager.

Reinforced coordination between local communities and the electrical network distribution manager would enable building concerted local energy scenarios that are more robust and in line with a vision shared by the community and the manager.

These scenarios would enable the electrical network distribution manager to grasp the variation in demand over time and space at the territorial level in order to anticipate needs and precisely evaluate the necessary mid- and long-term investments by identifying projects subject to uncertainty and requiring work that is more difficult to carry out (costs/deadlines).

The DSO would thus be able to forecast the technical and economic effects of the urban development on network constraints, supply quality and security and losses. This would allow him to evaluate the value of network reinforcement alternatives using flexible sources and local decisions.

Managing the electrical demand of the area can be done using two types of solutions: permanent (static) solutions (building renewal, reliance on an energy vector other than electricity for thermal use, adjustment of installation size, etc.) or dynamic flexibility solutions (distributed load shedding, piloting of demand in the services sector, etc).Part of the work carried out by this working group consisted in describing the processes shared between local authorities and the DSO and in listing data exchanged.

This working group aimed to identify various flexible sources and work on upstream mobilisation of flexibility through “smart network planning”.

2.2.3 Analysis SWOT

Cf. Annex 3

2.2.4 General approach of the working group

As described above, the aim of the flexibility study is to define if and in which conditions could demand response and demand side management allow for optimising distribution

grid planning and grid building works (whether it be extension, renewal or reinforcement of the grid). The approach therefore does not consider the market applications of flexibility use and furthermore it considers wider types of flexibility than real time control or use of dynamic tariffs.

The general methodology of the work is presented graphically in figure 1. The methodology is based first on two parallel actions. The first one, done by HESPUL consisted in identifying all possible sources of flexibility based on the characteristics of the demand in the area of focus (metropolitan area or Part-Dieu district). The second action, done by ERDF consisted in leading two studies in parallel : deriving a projected load curve of the Part-Dieu district and sizing the network based on state of the art methods, both studies being done using a description of four possible futures for the area evolution to 2030.

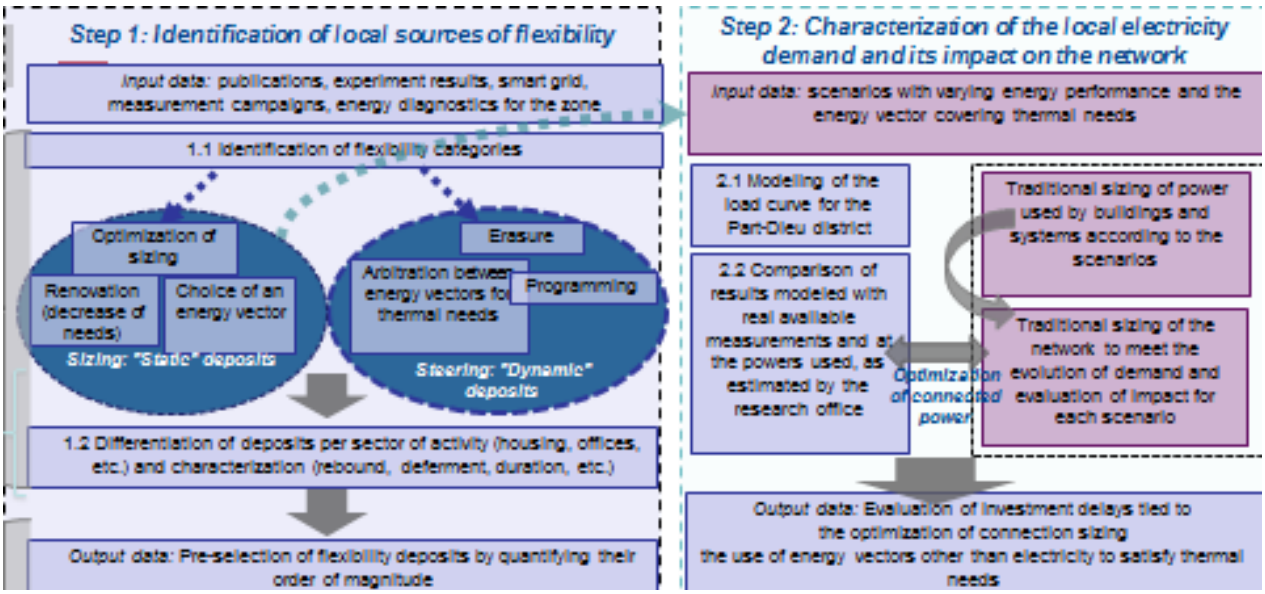


Figure 1. General approach to the study of fleibility use in distribution network planning

Step 1 : Identification of local flexibility sources (done by HESPUL)
National and international publications on demand response, demand side management and flexibility, results from smart grid experimentations, results from monitoring campaigns in France are reviewed to browse all possible flexibility sources. These sources are divided early on in two macro categories: **static sources** encompassing, for example, refurbishment works, high performance construction, selection of an energy source other than electricity for supplying building thermal needs such as district heating, gas, or waste heat recovery, and **dynamic sources** encompassing, for example, dynamic control and curtailment. These sources differ for each activity sector as offices, hotels, dwellings do not have the same demand characteristics nor control capacities. Based on a diagnosis of the demand of the area of focus (energy networks in place, activity sectors present, etc.), sources may be classified by order of magnitude of power avoided in peak (units may be in W/m2) as well as other characteristics (reliability, duration, rebound effect in the case of dynamic sources, etc.).

Step 2 : Characterizing local demand and the impact of static flexibility sources on distribution network sizing (done by ERDF)

The distribution network operator, ERDF, is simulating the future load curve of the Part-Dieu district using an internal modelling tool, MOSAIC. At the same time, ERDF is doing a study of the network evolutions. These two actions use as input four evolution scenarios of the future of the area.

These four scenarios were made by Grand Lyon and Hespul and are described in the following tables :

Scenarios		Scenario 1 Conservative case		Scenario 2 Energy Efficient		Scenario 3&4 Highly energy Efficient	
uilding delivery date		2014-2020	2020-2030	2014-2020	2025-2030	2014-2020	2020-2030
Energy efficiency level	New buildings	RT2012	RT2012 -20%	RT2012	RT2012 -40%	RT2012 -20%	RT2012 -40%
	Refurbished building	Standard retrofitting	BBC Effinergie	BBC Effinergie	BBC Effinergie -20%	BBC Effinergie	BBC Effinergie -20%

Table 1 :Description of building performance.

		Scenario 1&2 Business as usual		Scenario 3 Highly Energy efficient – District heating and cooling		Scenario 4 Highly Energy efficient – electricity	
Building delivery date		2014-2020	2020-2030	2014-2020	2020-2030	2014-2020	2020-2030
Energy supply Scenarios	Housing : Heating & DWH	Gas	90% of buildings: Gas / 10% of buildings: District heating network	Gas	District heating network	Gas	Electricity
	Offices : Heating	Electricity	70% of buildings: Electricity / 30% of buildings: District heating network	Electricity	District heating network	Electricity	Electricity
	Offices: Cooling	Electricity	70% of buildings: Electricity / 30% of buildings: District heating network	Electricity	District cooling network	Electricity	Electricity

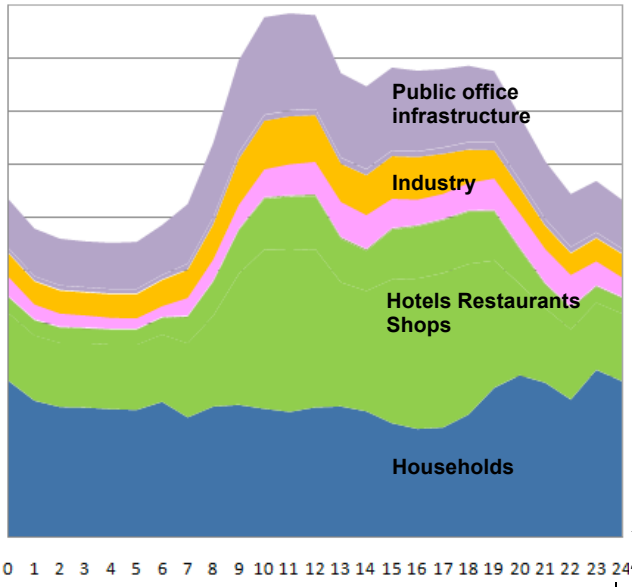
Table 2 : *Description of the energy carriers used to supply energy demand for heating, DHW and cooling.*

These two steps are further detailed in the following paragraphs.

- **Step 1 : Identification of flexibility sources**

Here flexibility potentials are assessed. The focus is on sources that can be planed, anticipated, forecasted in order to constitute reliable assets. The flexibility activation process will have to be precisely defined in a contractual document. As examples of unreliable flexibility sources, we may cite adapting the lighting load to human presence (mouvement sensor) or installing power plugs with a switch to eliminate standby power. In contrast, reliable sources are all measures that can be made automatic, can be integrated by design in equipment programming, rather than being dependent upon the will of individual users. Static flexibility sources are reliable by definition, except if they generate a rebound effect on other electricity uses (e.g. using more electricity for electronic devices in high performance buildings). Correct setting of ventilation systems (flow rates) to avoid motors' overcharge is a great example of a reliable flexibility source.

The estimated load curve of the Part Dieu area provided by ERDF (see figure 2) help to identify the type of flexibility sources to be analysed for this area. Dwellings, small shops and offices (subscribed power less than 36kW) and large offices (greater than 36kW) represent almost three quarters of the peak demand.



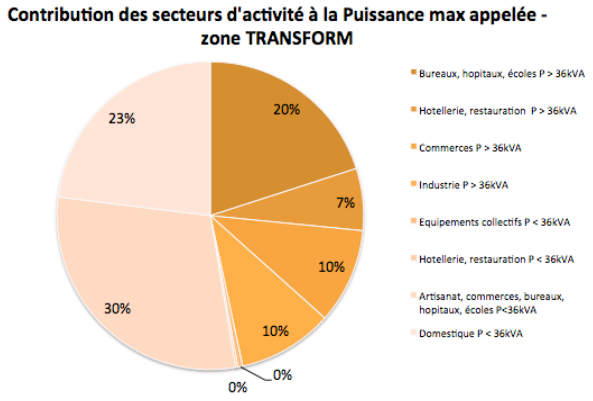


Figure 3. Participation of each activity sector to the peak demand for the Part-Dieu district on a winter day (source ERDF)

Figure 2 : estimated local curve of Part – dieu district

Flexibility in the industrial sector has not been looked into since this sector is a rather small contributor to peak demand. Moreover, the major equipment classified in industry is the boiler and the refrigeration machines that fuel the district heating and cooling network of the sector. While optimisation of motors, pumps and other electrical equipment associated with the boiler has not been analysed, flexibility sources of the district cooling network, currently fuelled by several air compressors, have been analysed in terms of technology and fuel switch (heat pumps uisng the Rhone river as cooling source or the air output of underground parking lots) – static sources – and in terms of load shifting using large ice storage tanks to delay the charge within a day – dynamic sources (see figure 4). Feasibility studies have been realised on

the static flexibility sources. Additionnal study would be needed to assess the feasibility of load shifting using large storage tanks.

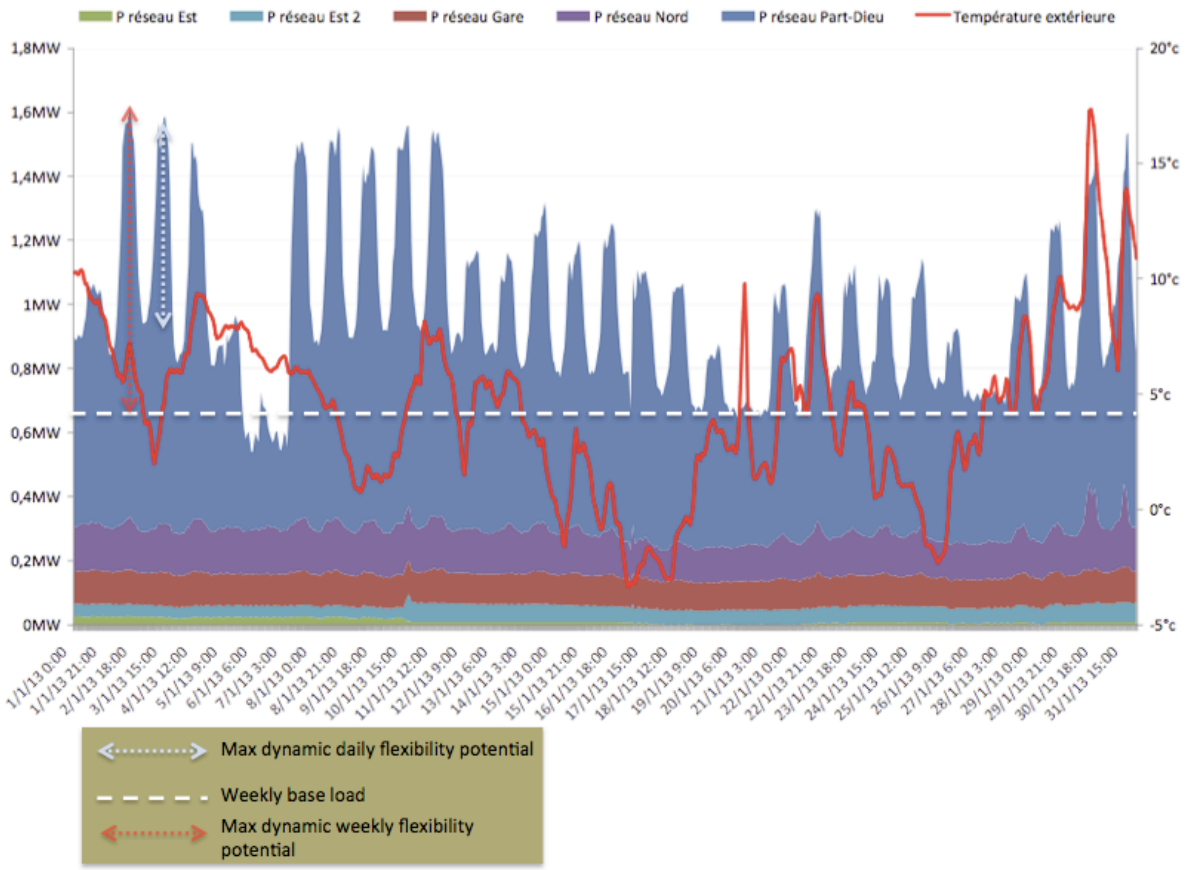


Figure 4. Load curve of air compressors fueling the distric cooling network on a winter day showing various flexibility potentials.

Tables 3 and 4 list most flexibility potentials that have been analysed in terms of unitary impact (W/m2 or percentage of maximum load) and other characteristics (reliability, duration, rebound effect in the case of dynamic sources, necessary equipment to harness the flexibility potential, etc.) for the purpose of building flexibility potentials to be tested on the Part-Dieu load curve. Ultimately, the actual potential depends on the surface and performance of the building in question.

Activity sector	Electrical equipment concerned	Technical measure
STATIC FLEXIBILITY SOURCES		
Residential/ Offices sector	Centralised ventilation	1. Avoid oversizing equipments
		2. Implement very good air tightness (see PassivHaus certification)
	Individual Domestic Hot Water (DHW) Device	1. Avoid oversizing equipments
		2. Change energy carrier (district heating, gas, wood, etc.)
	Pumps used for centralised DHW production with energy carrier other than electricity	1. Avoid oversizing equipments
		2. Variable speed pumps
	Individual Electrical heating devices	1. Increase the efficiency of equipment (e.g. heat pump with high performance factor)
		2. Change energy carrier (district heating, gas, wood, etc.)
		3. Improving significatively the enveloppe performance (better
	Pumps used for centralised heating with gas ou wood (i.e. energy carrier other then electricity)	1. Avoid oversizing equipments
		2. Variable speed pumps
	Common parts Lighting (corridors, stairs, outside lighting, parking, etc.)	1. Reduce installed power by using more efficient lighting and adapting to the actual needs of users (low level of lux in corridors and parking, using natural lighting, etc.)
	Stand-by power	1. Favoring equipment with almost null standby power
	Flotte de véhicules électriques privée	1. Installing slow charging stations
	Air conditionning	1. Avoid oversizing equipments
Additional elements in Shops/ Restaurants	Cold Storage	1. Avoid oversizing equipments
		2. Change energy carrier (district heating, gas, wood, etc.)
	Cooking	1. Use very efficient devices
		2. Change energy carrier (gas, biogas, etc.)

Table 3 List of static flexibility sources (non-exhaustive).

Activity sector	Electrical equipment concerned	Technical measure
DYNAMIC FLEXIBILITY SOURCES		
Residential sector	Centralised ventilation	1. Correct setting of flow rates
		2. Regular filter cleaning to avoid overchange
		3. Anticipating the charge by overventilating common spaces followed by curtailment
		4. Adapting the load to human presence (carbon dioxide sensor)
	Individual Domestic Hot Water (DHW) Device	1. Starting the DHW device in night hours
		2. Regulating the charge as a function of the injection of power by renewable energy systems
		3. Anticipating or postponing the charge
	Pumps used for centralised DHW production with energy carrier other than electricity	1. Adding storage units to displace the load
		2. Regulate based on actual demand in real time
	Individual Electrical heating devices	1. Anticipating or postponing the charge
		2. Combining heating equipment using different energy carriers and switching based on network signals
	Pumps used for centralised heating with gas ou wood (i.e. energy carrier other then electricity)	1. Adding storage units to displace the load
		2. Regulate based on actual demand in real time
	Common parts Lighting (corridors, stairs, outside lighting, parking, etc.)	1. Diminish power demand when building power demand approaches a certain value
		2. Adapting the load to human presence (mouvement sensor)
	Stand-by power	1. Use of power plugs with a switch
Additional elements specific to the offices sector	Centralised ventilation / Lighting in Offices	1. Stop during inoccupation hours
		2. Reducing the load during the last two hours of occupation when less workers are present
	Climatisation	1. Anticipating or postponing the charge
Additional element in Shops/ Restaurants	Cold Storage	1. Displacing the charge to night hours

Table 4. List of dynamic flexibility sources (non-exhaustive).

- **Accessing relevant data for quantification of flexibility sources in the metropolitan area**

Evaluating the flexibility potential at a macro-scale (city-scale, territory-scale, etc.) for all sectors with the aim of reducing peak load on the distribution network requires a great deal of data on energy and power demand. Ideally, one would need an aggregated load curve at the scale of a transformer station (low/medium voltage, or medium/high voltage) and an extensive description of activity sectors and of main energy usages, to be able to provide an analysis of the flexibility potential at a macro-scale. However, such data is scarcely available and of good quality in France. In this section, we describe what types of data could be gathered and treated on Grand Lyon's territory so as to gain insight into flexibility potentials. This would allow the local authority to detect where it should focus its attention.

N°	Data	Description of data characteristics	Use in computation of flexibility potential	Potential Sources of information
1	Floor area	Actual floor area with distinction by activity sector, building construction age, thermal uses of electricity	Allow mutltiplication of the flexibility potential in W/m2 by a floor area	*Urban planning agency *Departmental territory directorate (DDT) ...
3		Future floor area with distinction by activity sector, building construction age, thermal uses of electricity		
4	Subscribed power	By building or by equipment with distinction by activity sector, building construction age, thermal uses of electricity N.B. Data can be aggregated if needed - aggregation should be coherent (by activity sector for example)	Allow mutltiplication of the flexibility potential in W/VA by the total subscribed power in kVA Allows for deduction of uses of electricity by crossing with other data on the buildings	*DSO: ERDF (per building: requires consent from clients for communication of this data to a third party)
5	Description of uses of electricity	Identification of usages of electricity	Build a load curve based on this knowledge as well as the age of the building (hypothesis on the performance of the building enveloppe) Allow mutltiplication of the flexibility potential in W/VA of specific equipment	*Inquiries of operation and maintenance employees
6	Estimation of uses of electricity	In absence of real data, deduction based on other characteristics: subscribed power, activity sector, floor area	Allow mutltiplication of the flexibility potential in W/VA of specific equipment	*Energy data based on different operators (gas, electricity, district heating and cooling) *Government statistics (INSEE) *Knowledge of engineering consultants
7	Installed power per main equipment	Evaluation of installed power for main equipment: ventilation, air conditionning, heating, lighting, etc.	Building a load curve based on this knowledge as well as the age of the building (hypothesis on the performance of the building enveloppe) Allow mutltiplication of the flexibility potential in W/VA of specific equipment	*Knowledge of engineering consultants *Results from monitoring campaign *Inquiries of operation and maintenance employees
8	Modelled load curve per MV/LV transformer stations	Load curves by activity sector on a typical day of summer and a typical day of winter shows already lots of information : types of uses of electricity (crossing with temperature can allow a first estimation of installed power for heating), level of base load, etc.	Deduce main uses of electricity and their magnitude for each activity sector (if posssible using also floor area and outside temperature) Can validate at least in order of magnitude the load curve obtained by modelling uses of electricity	*DSO: ERDF
9	Real load curve of building	By monitoring campaign or smart meter	Can validate at least in order of magnitude the load curve obtained by modelling uses of electricity	*DSO: ERDF (per building: requires consent from clients for communication of this data to a third party) * Operation and maintenance company
10	Real load curve measured on a line from the HV/MV substation	Load curves on a typical day of summer and a typical day of winter and knowledge of the buildings supplied by this line show already lots of information : types of uses of electricity (crossing with temperature can allow a first estimation of installed power for heating), level of base load, etc.	Can validate at least in order of magnitude the load curve obtained by modelling uses of electricity	*DSO: ERDF
11	List of entreprises with number of employees	This information is relevant especially for offices to deduce installed power for specific uses of electricity	Allow for deducing installed power based on national statistics	* Local Chamber of Commerce and Industry (CCI)
12	Mapping of heat pumps using groundwater for heating/cooling	Location and subscribed power of heat pumps allows for identification of buildings using electricity for heating	Precise hypothesis on thermal uses of electricity Allow for evaluating the performance of heat pumps	*Regional directorate of environment, planning and housing (DREAL)

Table 5 Relevant data for evaluating the order of magnitude of the flexibility potential at a macro-scale.

An approach integrating flexibility sources into smart planning of the distribution network, requires to assess their technical and economical impacts on the electrical grid. These impacts can be estimated using tools considering the current state of the grid and evolution scenarios.

In addition, the flexibility potentials cannot be added to obtain one number at the metropolitan scale since flexibility potential should be understood as a couple (power, time) to have an electrical pertinence.

The Transform experience showed that there can be important differences in the estimation of power for new buildings or areas depending on who made these estimations (engineering consultanting companies, DSO, …). This is caused by the lack of common hypothesis and processes for power estimations studies. Having a share vision of the future buildings between the city, the DSO and the engineering consultanting companies could therefore improve the power estimation both at the building and district level.

Step 2 : Improving network planning methods

Electrical distribution network development is a process that is exposed to high uncertainties and must provide the best balance between quality and security of supply, and infrastructures cost.

The current process of distribution network development is based on exogenous data that describes the local economic context and the evolution of power injection or withdrawal over the mid and long term.

This process operates in a closed circuit through a readjustment of operating hypotheses: measurements taken on the networks and the diagnosis of past events enable adjusting the models and making investment decisions. The processes of supply and operation are therefore inseparable from development. These links are further reinforced by the development of new uses for electricity that are difficult to forecast and that make network management more complex.

Work by the local TRANSFORM group aims to minimise uncertainties through an upstream collaboration on the urban development decisions to be made by Greater Lyon and ERDF. The process described above, which previously operated as a closed circuit, will now try to more precisely include the city's various urban development hypotheses.

This new ways of working and cooperating between the network operator and the municipal authorities will benefit both parties:

- Since the network operator would have greater visibility on the evolution of future network consumption, he would be able to technically and economically optimise developments on the distribution network.
- Since the municipality would have greater visibility on the impact of public policy **on** the energy system, it could better orient public policy **for** the energy system (and make it more goal-oriented) and improve the piloting of territorial energy policy.

Through this project, to analyse the impact on the electrical grid of the various city energy policies, ERDF uses a new tool that simulates the load curve of the area according to different hypotheses. This tool is therefore useful to identify differences in the electrical behaviour of the area depending on the evolutions scenarios. It's a good way to get a first vision on potential problems for the grid if one scenario generates consumption peaks. ERDF is also assessing the impact of the development scenarios through a network sizing study that will

consider global indicators like network constraints, supply quality and security, and investment cost.

- **Simulated load curve of the Part Dieu district**

The TRANSFORM project was a perfect place to experiment new planning tools. One of these tools, named MOSAIC, aims to simulate the electrical load curve of an area. It uses as input data the description of future building and hypothesis on their energy efficiency level and their energy vector for heating and cooling.

Using this tool for the Part Dieu area was only possible thanks to the supply of the following data by the municipality with the support of Hespul :

- Programming data related to the Part Dieu urban project:
  - Building characteristics (year of construction, useful surface, ground surface, building height, inertia level)
  - Activities (housing, offices, food stores, non-food stores, hotels, cafés, restaurants, lessons learned)
  - Mobility (number of normal or quick recharging outlets)
- Evolution scenarios for energy needs in the district .These scenarios are described in page 49
- Proportion of the thermal energy needs of the buildings that use electricity as energy vector. These data have been estimated by the city and Hespul thanks to the analysis of the annual consumption history by building and by energy vector (electricity, gas, district heating and cooling). See more in the WP4 report.

The electricity demand can be seen as the sum of microscopic contributions, with different physical consumption devices. But it can also be influenced by statistical parameters such as economic growth, national mean temperature etc. MOSAIC uses a hybrid approach that is a compromise between complete and complex physical models, and fast simplified statistical models to simulate the electricity consumption. The contribution of each usage is added to create the electrical load curve. This tool is particularly flexible as it's possible to modify the model of each equipment (if the technology and energy efficiency evolve) and to add new equipment if necessary.

When the project began, MOSAIC was still a research and development tool that had never been used for a neighbourhood as complex as Part Dieu. Therefore lots of works were necessary to make MOSAIC able to use the data given by the municipality. Furthermore, the quality of the load curve forecast had to be assessed by comparing simulated and real load curves for different types of building. This work has first been done for a simple residential building (see the following figure 5)

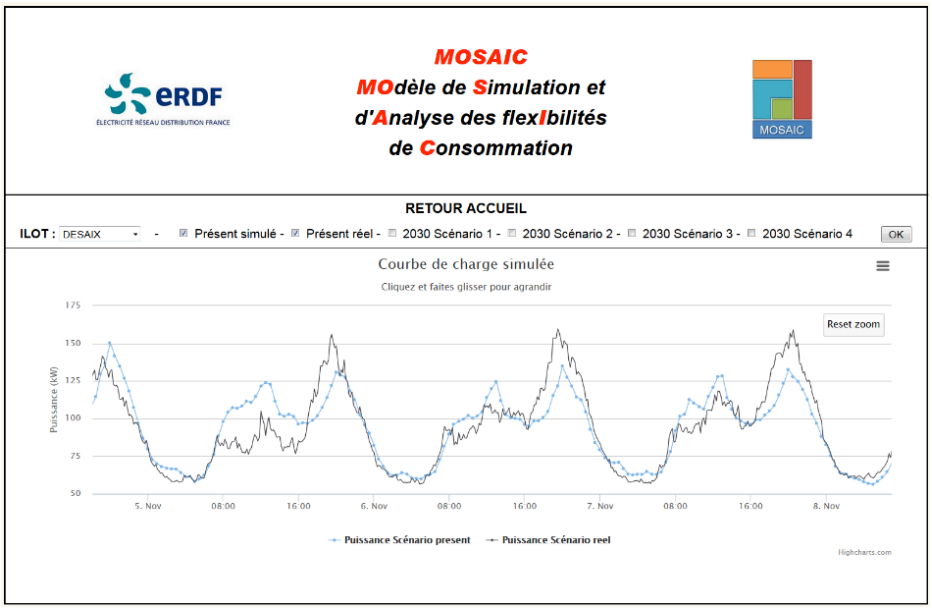


Figure 5 – Calibration of MOSAIC for DESAIX building

The assessment of the simulation quality will be a long run process. The first result of MOSAIC's simulations for the Part Dieu district will be available in the next few weeks.

- **Evaluation of the development scenarios' electrical impacts**

In complement of the MOSAIC work, ERDF is doing a technical and economic analysis of the city's development scenario. This study aims at assessing the scenarios' impact on the MV grid using the following key performance indicators:

- electrical constraints
- quality and security of supply
- cost of the infrastructure

This MV level study will provide a good image of the necessary grid development work of the area. Once the real characteristic of the new building are better know, this study will improve and will include the LV level.

One of the objectives of this study is also to investigate how ERDF can take into consideration, in the way network are sized, the efforts of the city to promote efficient building. The Part Dieu project is very unusual. As a major business district, Part Dieu must have the best level of quality and security of supply. Any supply problem could have dramatic economical impact for the entire region.

2.2.5 Next steps for the working group

The work done by the TRANSFORM Smart Grids working group has been very promising as it plants the seeds of a long term collaboration between Grand Lyon and ERDF.
Both parties now believe that the development of flexibility on the electrical grid can only be done through early collaboration between the urban planner and the DSO.

Yet there is a lot of work to do before this process can be industrial. This work will need to focus on the following points:

- Identification / qualification and certification of the static and dynamic flexibility sources (continuing the work done in Transform).
- Identification of the actors playing a role in the activation of each flexibility source and definition of their responsibilities.
- Creation of the necessary governing body able to identify, locate, and asses the need for flexibility and the potential flexibility sources to activate.
- Contractual negotiation of the flexibility activation and monitoring.
- Integration of these flexibilities in everyday management of the distribution grid.

2.3 Theme 3 - Citizen Commitment to renewable energy over the territory

2.3.1 Description of the selected theme: Context and objectives

Brief description:

Citizen investment in local renewable energy projects is a way to boost the development of renewable energy projects on the territory, improve acceptance of these technologies and support local economy. So far, several structures have supported this activity in France. Although the national regulation have a rather large impact of the feasibility of these projects (low feed-in-tariff, high connection costs, etc), the municipality can have a role in facilitating citizen investment and participation in local renewable energy projects through such actions as creating a fund to finance feasibility studies, providing access to public buildings' roof, interacting with the different actors, etc.

This group aims to shed light on and obtain answers to the following points:

- How can the part of local ENR production be promoted and developed based on citizen investment?
- What social impact or program adherence would be produced by a citizen investment project (educational actions, raising awareness, etc.)?
- What is the best positioning for Greater Lyon on this type of project: contracting authority, facilitator (funding provider, guarantees, etc.), project partner, financial backer?

Based on these questions, the proposed work method consists in:

a) Analysing the main characteristics of the two major types of citizen investment projects currently being used in France:

- "ethical" projects;
- participatory projects that are based on either public or private initiative.

This analysis will be carried out using criteria previously identified by the working group. These criteria correspond to the contracting authority, the target building, the power range and the way in which citizens are involved.

Categories of photovoltaic projets

	Citizen investment in the photovoltaic solar enrgy	Participative investment in the photovoltaic solar energy	
Project owner	Group of citizens	Municipality	Private operator
Target buildings	Unifier (school, associative place, co-ownership)	Municipalitiy buildings	Private buildings (tertiary, warehouses) or public equipments
Range of power	P < 36 kVA Simplified connecting, attractive price list 9 kWc, investment < 100 k€)	P < 250 kWc (Important financial risk	According to capacities (technical, financial) of the operator
Modalities of citizens involvement	Governance Direct (parts of capital) and indirect (via EPI, investors' clubs, crowdfunding) investment	Indirect favored investment (via EPI, investors' clubs, crowdfunding)	Indirect favored investment (via EPI, investors' clubs, crowdfunding)

b) Proposing a positioning for Greater Lyon for each project family identified, with the goal of improving the project completion rate.

2.3.2 SWOT analysis and set of measures for the theme

See Annex 3

2.3.3 Action plan

The working group dedicated to the topic of citizen investment was launched in October 2014. It is currently in operation and will continue throughout 2015.

The deliverable is a roadmap that concerns the following points:

- Assessment of the analysis of various types of legal, technical and financial arrangements used to carry out citizen investment projects;
- Current obstacles to implementing citizen investment projects in the Greater Lyon area;

- Positioning to be adoped by Greater Lyon to promote the development of this type of project. Which financial, real estate and fiscal levers should be activated?

Finally, this deliverable will propose an action plan listing the main measures to be implemented by Greater Lyon to reach the goals mentioned above and giving an estimation of the number of projects that could be undertaken from now to 2020.

On the date of submission of the final report on WP 2, the results (incomplete) of the analysis made have enabled establishing different ways to work as concerns the possible position of Greater Lyon:

A positioning as contracting owner for projects supported by the Metropolis

In this case and in order to collect the capital of interested investors, the Metropolis should carry out the creation of a legal structure of the semi-public company type that will enable gathering public and private capital for a given projects.
As the contracting owner, the Metropolis will carry out project feasibility studies, choose suppliers and carry out installations.
This type of arrangement requires additional investigations, in particular as concerns legal and financial matters that were unable to be carried out for the TRANSFORM project, but that should be done during the next half.

A positioning as supplier of roofs: availability of existing metropolitan constructions

In this case, the Metropolis will no longer develop projects but will be a facilitator for projects developed by private partners.
This positioning requires identifying potential usable roofs on metropolitan buildings.
The goal will be to focus on roofs that allow incorporating photovoltaic panels to obtain a preferential rate, but projects concerning power plants on the ground will also be studied.
Benchmarking carried out in the workshop has enabled arriving at two types of possible solutions for the implementation of projects.

First solution: Residents, who would be grouped according to a structure to be defined (association or commercial company), would purchase panels themselves and would rent them to the Metropolis using a long-term leasing-type loan (over 15 years, for example). After this period, the community would become the owner of the equipment. The implementation and maintenance of panels would be done by community agents. Electricity produced would be consumed by the building where the roof is located.

Strengths:

In the case of self-consumption, this system has the advantage of simplicity. It requires only one agreement between residents and the community and enables avoiding the signature of a contract with ERDF (subject to notifying ERDF of the presence of a self-consumption system).

Obstacles:

From a legal point of view and taking into account the current regulatory framework for communities (mandatory competition for all public orders), the issue of a competition between residents to select the panel "supplier" remains to be resolved. How can the notion of resident investment be qualified in the definition of competition criteria for the choice of a producer?

From a financial point of view, this model, which was developed using the city of Lorient, France, is justified as long as:
- purchase rates at Enercoop, the original renewable energy supplier, are above those of EDF;
- technical services have the necessary skills for mounting and operating the panels.
This is more difficult in the context of Lyon, where investors must make a profit and the Metropolis must not rent panels at an annual rate that is above the purchase rate for electricity for a purchased quantity equivalent to panel production.

Current average rates (TRV on all sites) - source: Greater Lyon Logistics and Buildings Department

Amounts in € Cents	kWh Only, Excl. Tax	kWh Incl. Tax (including transport and special taxes)
Green rate	4.5	11.2
Yellow rate	6.8	18.2
Blue rate	9	27
Market offer >250 kVA	4.9	11.31

From an operational standpoint, the search for usable roofs must focus on buildings that are occupied during the summer in order to be able to consume the electrical production of the photovoltaic panels. This therefore excludes schools, which are potentially a major source of energy.

Second solution: the Metropolis accepts making roofs available free of charge or through a rental fee. These projects would concern only tiled roofs in order to obtain an integrated rate (pre-schools, school groups).

The Metropolis could guarantee the loans taken out.
From a legal point of view, investor partners should put together an appropriate structure, of the SCIC or SAS type. From a financial point of view, investor partners should finance and carry out feasibility studies of the roof structures that would hold photovoltaic panels. From a technical point of view, if the electricity is not self-consumed, the Metropolis maintains its existing rates and contracts.
Strengths:

This arrangement does not require investment by the Metropolis.

Financial support positioning
Financial support by the Metropolis of Lyon could be provided for:

- Paying for upstream studies. Work group members feel it is preferable to target financing studies that assess the roof structures of community real estate, rather than feasibility studies, which should be left to the project leaders.

- Financing of project participants, either through acquiring shares in the project companies or through subsidies.

- Loan guarantee (to be studied further).

All these topics must be examined in greater detail in the coming "resident investment in renewable energies" workshop group meetings.

Communication/media relay

The final stance that involvement by the Metropolis of Lyon could take with the goal of promoting the implementation of resident investment projects in renewable energies is tied to the visibility and promotion/highlighting of experiments carried out in the territory.

As for preceding topics, the work group has so far only taken a quick look at the possibilities offered to the Metropolis in this area. A detailed action plan for the communication/promotion approach remains to be established.

Conclusion: Impact of the TRANSFORMATION agenda on the city energy strategy and related policies

Transform fed and initiated the process of building an Energy Masterplan for Grand Lyon:

- By the creation of an Energy stakeholder platform **addressing energy strategic considerations**
- The intake workshops were the opportunity **to rise energy issues and mobilize the others public politics** to energy issue
- The local working groups on priority themes will give the **impulsion and initiate the work of construction** of TA
- The Key consideration working group at the TRANSFORM project level are an opportunity to **address and share specific technical issues with others cities**

The energy master plan that Greater Lyon would like to adopt will be a tool for planning the energy transition over the entire territory. The objectives of this tool will be to give a prospective vision of the energy plan to be implemented over the Greater Lyon territory, shed light on the energy consequences of public policies and enrich the implementation of a local energy policy.

In this context, the energy master plan should offer a prospective vision of the **organisation of the energy system** (production, networks, consumption) **over the territory in agreement with territorial resources and constraints**. It should take into account:
- The current status of the territory and its resources;
- The territory's economic, political, regulatory, social, technical and environmental context;
- The energy transition strategy;
- Public policy in the territory and the projects resulting from it (development, travel, housing, waste, water, new information and communication technologies, etc.).

- **The purpose of an energy master plan**

To prepare Greater Lyon for new energy competencies and build a territorial energy policy:

The energy master plan provides a base for implementing an energy policy.

Means listed in the energy master plan allow **establishing guidelines** for territorialising the energy transition and implementing a local energy policy based on the following essential elements:

1. Implementation of measures aiming to reduce consumption, in coordination and coherence with the sustainable development strategy, the PCET (renovation, replacement of fuel oil by gas or wood, etc.), the smart city strategy and the regional energy policy;
2. Rational development of energy networks (heating/cooling, gas and electricity);
3. Development of renewable energies;

4. Guarantee of social and territorial cohesion by ensuring access to energy for everyone.

To include energy when setting public policy goals and in the design of projects stemming from these policies:

Public policy and local development do not take energy into account in an optimal way in their implementation. Nonetheless, they have a direct influence on the development and sizing of energy distribution networks (gas, electricity, heating), in the development of ENR projects and in energy consumption.

In addition, the way the set of energy networks is structured plays a major role in managing energy and developing renewal energies.

The energy master plan is a tool for energy planning that aims to ensure that energy questions are taken into account in the orientation of public policy (transport, housing, environment, etc.), as well as in urban services and their operational implementation.

The goal is to:

- For projects under study: include energy well enough upstream in project design so that energy network use is optimised, the development of renewable energies in encouraged and consumption is reduced, without forgetting specific project constraints and goals.
- For future projects and policies: include the vision of energy organisation laid out in the energy master plan when implementing urban policies and in the choice of local territorial development (examples include the development of a heating network near a concerted development zone, awareness of the impact of public transportation or electric vehicles on the energy network and the identification of PLU areas dedicated to ENR projects).

- **How the energy master plan relates to other existing documents**

The energy master plan aims to provide a link between the framework documents on energy and climate (SRCAE[1], PCET), the framework documents on urban planning (PLU, PDU, SCOT) and the other major strategies implemented by Greater Lyon (waste, water).

Therefore, from the viewpoint of climate and energy documents, the energy master plan aims to orient SRCAE and PCET actions at the territorial level by including the development perspectives for energy networks (electricity, gas, heating) through the investment plans of network operators and the evolution of energy production.

With respect to the urban planning and major strategy documents implemented by Greater Lyon, the energy master plan aims to supply a vision of energy organisation over the territory (supply, distribution and consumption) in agreement with the goals of the climate

8 avril 2015 | Page 63 of 92

energy documents and energy market evolution perspectives (production, energy networks and consumption). The goal is for the vision of energy organisation over the territory found in the energy master plan to become a structuring element for the PLU-H and PDU urban planning documents, as well as for the strategic orientations implemented by the urban community (sanitation, waste, smart city).

Annexes

Annex 0 - Energy transition Regulatory Framework

1.2 Energy transition Regulatory Framework

1.2.1 National level

The Ministries for the Ecology, Sustainable Development, Energy, Transport and Housing

The Ministry for Ecology, Sustainable Development, Energy, Transport and Housing defines and implements policy regarding energy and its uses.

The major objectives of French energy policy are enshrined in the so-called POPE programme law of 13 July 2005. These objectives were also incorporated in the Energy Code created by order no. 2011-504 of 9 May 2011:

- to ensure security of supply;
- to maintain a competitive price for energy;
- to preserve human health and the environment, in particular by fighting against the worsening of the greenhouse effect;
- to guarantee social and territorial cohesion by ensuring access for all to energy by the continuity of the public utility.

Achieving these objectives is the responsibility of the DGEC (General Energy and Climate Directorate). In this context, four major axes have been defined:

- managing the energy demand;
- diversifying the energy mix;
- developing research and innovation in the energy sector;
- providing transport and storage means in line with needs.

With regard to the organisation and functioning of the energy system, the DGEC:

- defines the framework for the development of energy infrastructures in France for the horizon of 2020 by means of two systems:
    - the multi-year programming of investment in electricity and heat production (PPI). It is in this context that calls for tenders are issued for production (allowing security of supply and the development of renewable energies to be ensured);
    - the multi-year outline investment plan (PIP) in the area of gas;

- approves the development plan for the public electricity transmission grid.

- with the Minister responsible for the Economy, it sets the regulated electricity sales tariffs;

- defines with EDF, in the context of the public utility contract, the conditions for implementing the public utility obligations and the additional commitments entered into by the company.

- draws up the general regulations for the electricity sector and ensures the protection of interests such as the environment and the safety of property and people.

The objectives and the roadmap for France to meet the challenges of global warming are defined in the Environmental Grenelle and are reflected by the production of :

- Territorial Climate and Energy Plan (PCET, equivalent to the SEAP): it provides in particular for the generalisation of low-consumption buildings with a horizon of 2012 and energy-positive buildings with a horizon of 2020, and the reduction in energy consumption in existing buildings by at least 38% by 2020;
- Plan for the development of renewable energy with a high environmental quality: launched on 17 November 2008, its objective is to increase to at least 23% the renewable energy share of energy consumption with a horizon of 2020;
- Particle Plan aiming to reduce emissions of particles and NOx.
- Climate, Air and Energy Regional Scheme (SRCAE): roll-out of the Environmental Grenelle at regional level.

- **Law on energy transition:**

In 2013, the French President requested a national debate on the energy transition. This debate aimed at confronting the current energy model with the strategic goals and issues our society is encountering (increasing scarcity of resources and climate change, a secure energy supply and continually increasing energy consumption).

The conclusions of this debate on the energy transition have oriented the proposed bill (which will be voted on late in 2014) toward:
- an energy transition by and for everyone;
- the promotion of efficient energy for competitiveness and employment;
- a diversified, balanced and secure energy offer that is based on the technological development of tomorrow's energy system and appropriate means of governance.

Articles 64 of "the draft *law on energy transition for green growth* " makes provision for a series of measures aimed at greater sobriety and better energy efficiency, as well as the promotion of renewable fields.
The law mainly concerns the construction sector, which alone accounts for nearly half of the energy consumption in France. The roadmap makes provision for the thermal renovation of 500,000 houses per year, a goal stated since 2012, but still a long way from being achieved. Furthermore, the entire housing stock should be renovated according to "low energy buildings" standards by 2050

New public buildings must be *"Energy exemplary"* and "*energy positive whenever possible"*. Efficient energy use will henceforth be part of the decency criteria of houses. A *"digital housing health record"* will be set up for all new constructions as from 2017, in order to help households in their renovation approach. The poorest households will also receive an "energy-cheque" to pay suppliers or carry out work.

One of the key drivers for ensuring a successful transition is the strengthening of territorial competencies to promote a decentralised implementation. The role of local communities is reinforced within the energy system organisation, from production to distribution and consumption. For the transition to be resilient and long-lasting, the territories must have a long-term vision that is in line with the changes in their environment and with social wellbeing, in particular by developing local activities that are a source of income and employment.

In a similar manner, the MAPTAM (Modernization of Public Territorial Action and Metropolitan Affirmation) Law, adopted on December 19, 2013, gave rise to the creation of the Lyon Metropolis on January 1, 2015, over the geographical perimeter of Greater Lyon (see Point 1.2.3. Local Level).

The Higher Energy Council

The Higher Energy Council (CSE) is an organisation put in place by the Ministry for Energy with the principal objective of advising it on national energy policy. It is consulted about all the State's regulatory acts relating to this policy and about the decisions relating to the electricity and gas markets.

The CSE is also responsible for evaluating the progression of renewable energy in the final energy consumption in relation to France's commitments entered into in the context of the European Energy and Climate package.

At the request of the Energy Ministry, the Higher Energy Council may issue opinions about other topics. These opinions issued by the CSE are consultative and have no legal value.

The CSE is made up of representatives from various organisations including 5 local authority representatives.

The Energy Regulation Commission

The Energy Regulation Commission (CRE) is an independent administrative authority, created on the occasion of the opening up of energy markets to competition by the law of 10 February 2000 concerning the modernisation and development of the public electricity utility, now codified in the Energy Code.

The CRE contributes to the smooth operation of the electricity and natural gas markets for the benefit of end consumers and in compliance with the objectives of the energy policy.

Its missions are to regulate the electricity and gas grids and markets. It does this by:

1. Guaranteeing the right of access to the electricity and gas grids. In this context, it:

- Sets the tariffs for use of the public electricity and gas grids.
- Is the recipient of contracts concluded between the managers or operators of the grids and the users, and notifications of refusals to conclude contracts or protocols for access to the grids.
- Settles disputes between the users and managers of the grids concerning access to the grids.

2. Ensuring that the grids are working correctly and are being developed. In this context, it approves the annual investment programmes of the natural gas and electricity transmission grid managers and ensures that the necessary investment for the proper development of the grids is made.
3. Guaranteeing the independence of the grid managers.
4. Contributing to the construction of the European internal electricity and gas market.
5. Monitoring the transactions made on the electricity, natural gas and CO2 markets.
6. Ensuring that the retail markets are working correctly. In this context, it gives opinions to the ministers responsible for the economy and energy with regard to regulated electricity and gas sales tariffs and with regard to social tariffs for vulnerable people.
7. Helping with the implementation of the means for supporting the production of electricity and the supply of electricity and gas. In this context, it:
   - issues an opinion on the tariff orders setting the purchasing conditions for the energy produced by the installations, recycling household waste and using renewable energy (article L. 314-4 of the Energy Code);
   - proposes to the Energy Minister the conditions at which the sale of controlled access to historic nuclear energy (ARENH) takes place;
   - annually proposes to the Minister responsible for Energy, the amount of the contribution to the public utility charges for electricity (CSPE) and the contribution to the social solidarity tariff (CTSS) (articles L. 212-9 and L. 121-38 of the Energy Code).
8. Informing all consumers.

The Environment and Energy Management Agency

The Environment and Energy Management Agency (ADEME) is a public establishment of an industrial and commercial nature, created in 1990, placed under the joint oversight of the Ministries for Ecology, Sustainable Development and Energy and for Further Education and Research.

ADEME is involved in the implementation of public policies in the areas of the environment, energy and sustainable development. The agency makes available to businesses, local authorities, public authorities and the general public:
- its capacities in terms of expertise and advice;
- its assistance in the implementation and the funding of projects and research.

It is also involved in the formation and coordination of observation systems to get a better knowledge how different sectors are developing.

1.2.2 Regional level

In application of the Grenelle II law, the regions are responsible for producing:

- Climate, Air and Energy Regional Scheme (SRCAE): this scheme defines the orientations to mitigate and adapt to the effects of climate change at regional level by using the potential of renewable energy, by developing energy efficiency and by preserving air quality. It may incorporate the territorial climate and energy plan.
- the Regional Wind-Power Plan (SRE): this plan allows the establishment of Wind-Power development zones to be organised.

The S3R ENR (Regional Plan for Connection of Renewable Energy to the Grid) must be drawn up by the the electricity transmission grid operator (RTE) in collaboration with the distribution grid operators (ERDF and local DSO). The S3R ENR must be in accordance with SRCAE orientations and should be designed to facilitate the development of green, clean, reliable and renewable energy (solar and wind power in particular).

The S3R ENR aims to define the **network developments** needed to include renewable energies and allow sharing some of the cost among producers.
The S3R ENR defines:

- *the **initial status** of ENR productions and of the network at the moment of SRCAE validation*
- *the **reception capacity** reserved for ENRs for ten years for each post*
- *the **infrastructures to be created or reinforced** to meet SRCAE goals*
- *the **estimated cost** of establishing new reception capacities*
- *the **extent of sharing** among ENR producers in the same administrative region.*

In the Greater Lyon area, the majority of ENR development projects are located on the low-voltage network. Because of heavy consumption over the territory, the connection to ENR production must not lead to reinforcing the transformers. ENR installations with a power above 36kVA will nonetheless be subject to a reservation of capacity and will pay for the share.

When an SRCAE has been approved, the S3R ENR must be drawn up, consulted and sent in within six months by the RTE manager. Next, the plan is subject to an environmental evaluation. The S3R ENR is approved by the regional prefect after an opinion by the environmental authority. Therefore, it takes about one more year for prefectoral approval of the SRCAE and the S3R ENR.

In addition, the regions have their own energy and environment agencies. In the Rhône-Alpes region, Rhônalpes **Energie**-Environnement is an association created in 1978 to advise local authorities and businesses in the public utilities sector on economising energy, promoting renewable energy, protecting the environment and implementing sustainable development.

1.2.3 Local level (Départements / Municipalities / Public Establishment for Inter-Municipality Cooperation)

The Grenelle II law called upon the Departments, urban communities, agglomeration communities and municipalities and communities of municipalities with more than 50,000 residents:
- to adopt a territorial Climate and Energy Plan by 31 December 2012. Where the local authority has committed to a territorial sustainable development project or local Agenda 21 project, the climate and energy plan constitutes the climate aspect of it;
- to produce a sustainable development report prior to the adoption of their budget.

In the area of energy, the municipalities have the following competences:
- the putting in place of actions to manage the energy demand (MDE). The EPCI's can also intervene in support of these actions;
- mission of overseeing the public utility of energy distribution (electricity, gas and heat) in their territory. This mission of oversight can be delegated to inter-municipality energy syndicates (for example: SYDER, SIGERLY etc.).

- **MAPAM law:**

The law of 27 January 2014 on the modernisation of territorial public action and affirmation of metropolises, called "MAPAM law" or "MAPTAM law" aims to clarify the competences of local authorities, by particularly reorganising the legal system of the most integrated French inter-municipal communities, the metropolises.
The MAPAM law provides for a metropolitan status adapted to the local characteristics of major French urban areas.
The text makes provision, in Lyon, of a special scheme with the creation of a new local community: the Lyon metropolis, to go effective as from 1 January 2015.

The following are amongst the new tasks assigned to the Lyon metropolis:

- construction and maintenance of the heating and cooling networks
- construction and maintenance of high speed broadband networks,
- concession of electricity and gas distribution networks,

The new Lyon Metropolis will therefore have a wider energy mandate, which will enable it to build a forward-looking vision, translated in the form of an energy master plan, and directly manage investment policies and operational action programmes.

1.3 Energy transition Financial /fiscal Framework

The national energy regulatory environment has witnessed many changes over the past five years. Additional changes are still to come with the future law on energy transition, currently being discussed in parliament.
The most important measures are presented here below.

1.3.1 Financial schemes for energy savings in the buildings sector

- **Interest-free eco loan :**

An important measure on the financial aspects of subsidies for the rehabilitation of existing housing stock was adopted in the 2009 finance law; the interest-free eco loan. This approach comes to complement the range of already existing incentive-based financial instruments for thermal renovations in buildings, such as the "sustainable development" tax credit or the sustainable development passbook account.

New measures to be included in the energy transition bill:

- ✓ Tax concession of up to 30% for energy renewal work
- ✓ Energy cheque as a complement to the ANAH "Live Better" programme
- ✓ Implementation of third-party regional financing companies for work by private individuals
- ✓ Implementation of "energy transition and green growth" loans by the Caisse des Dépôts (a public bank)
- ✓ Call for projects on positive energy territories and for smart grid development projects

1.3.2 Financial mechanisms for developing clean transport

- ✓ Reduction of the TIC (internal consumption tax) for biofuels from certified units
- ✓ TGAP – general tax on pollution-generating activities

New measures foreseen in the energy transition bill:

- ✓ Bonus for the purchase of an electric vehicle (in the amount of €10,000)
- ✓ 30% tax reduction for the installation of outlet terminals by private individuals
- ✓ Access by communities to the **dedicated allowance for projects related to the energy transition** (5 G€) for financing clean transport
- ✓ Possibility for the municipality to authorise electric vehicle travel in bus lanes + free parking
- ✓ **Implementation of a "Vehicle of the Future" programme** supported within the context of future investments (950 M€)

1.3.3 Financial mechanisms for developing renewable energies:

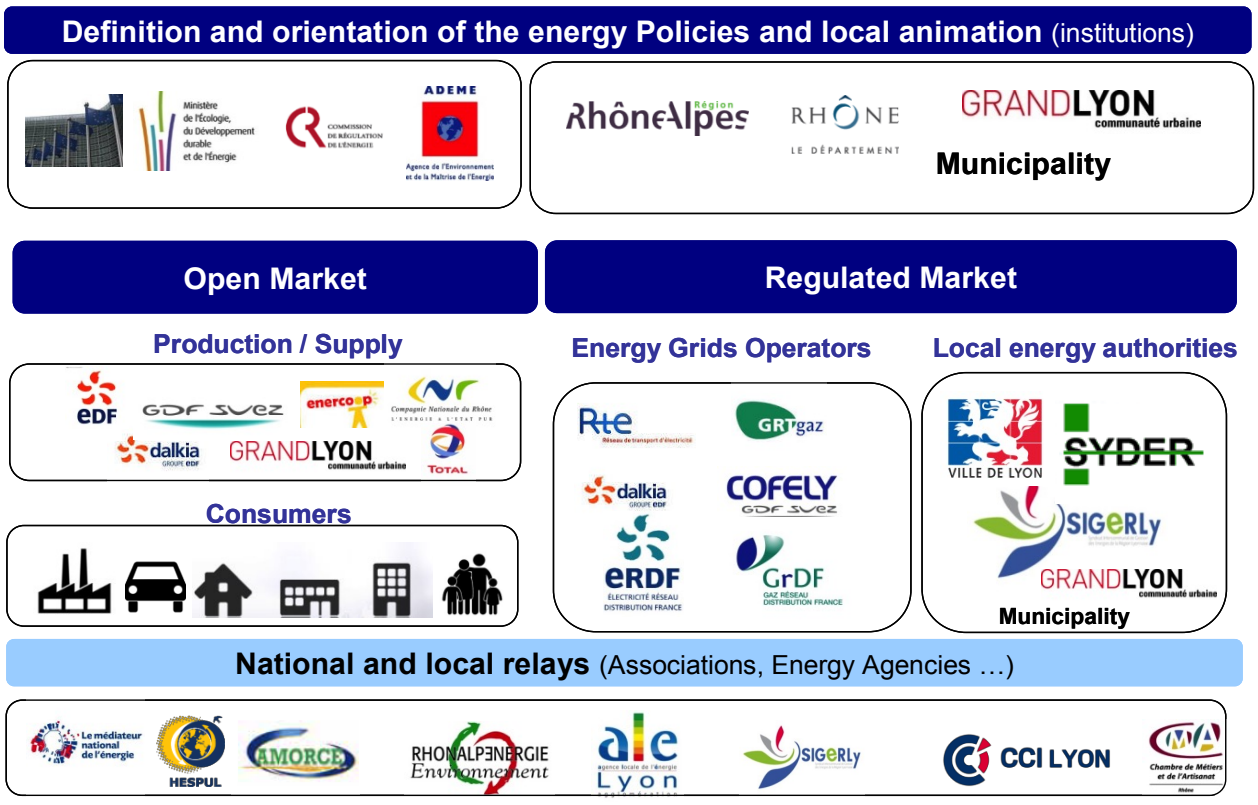
- ✓ Sustainable development tax credit: targets the best-performing equipment in energy use and equipment using ENRs. End of validity scheduled for 2015.
- ✓ Energy saving certificates: promotion of actions that allow saving energy
- ✓ Aid for the development of renewable energy sectors through governmental implementation of purchasing rates that encourage producers (photovoltaic, on-land and offshore wind farms, methanisation, etc.)
- ✓ Presence of a heating fund: financing of projects in the collective housing, service and industry sectors in the amout of 5.5 Mtep by 2020.

New measures to be included in the energy transition bill:

- ✓ **Doubling of the heating fund** (400 M€ mobilised by 2017): financing of projects in the collective housing, service and industry sectors
- ✓ Aid for the development of mature renewable energies (purchase price / market premium)
- ✓ **Extension of the call for projects system** to emerging industries (offshore wind, biomass and photovoltaic power stations on the ground, as well as photovoltaic installations on buildings with high energy consumption)
- ✓ **Ecological bond loans** for smaller companies over a period of 20-30 years with advantageous rates
- ✓ Implementation of a government **call for manifestation of interest** in support of innovative projects

1.4 Player mapping and related competencies (governance)

The diagram below illustrates the institutional landscape in France with respect to energy. It shows the players who are in charge of defining the strategy and those who are responsible for its operational implementation as concerns production, transport, distribution and management/operation.



1.4.1 The government and government agencies

The French government defines and implements policy related to energy and energy use. The government sets the energy goals concerning local energy production, meeting the energy demand, energy precariousness and the reduction of greenhouse gases. These goals are then defined at the regional level and for communities with over 50,000 inhabitants through the

Territorial Climate Energy Plans. The government also determines the financial arrangements for the energy transition.

The government has a public establishment, known as ADEME (Environment and Energy Management Agency), which participates in the implementation of public policy in the areas of environment, energy and sustainable development. ADEME makes its expertise available to local communities, authorities and the public at large and provides assistance in the implementation and financing of projects and research.

1.4.2 The energy regulator

The Commission for Energy Regulation (CRE) is an independent administrative authority that was created in 2000 when the energy markets were opened to competition. The Commission contributes to the proper functionoing of the electricity and natural gas markets for the benefit of end consumers and according to energy policy goals.

Its main mission is to regulate access to the electricity and gas transportation and distribution networks. This is done primarily by setting the rates for accessing these networks.

We have also discussed ADEME and CRE above.

1.4.3 The municipality (Grand Lyon)

Municipalities in France are generally organised into inter-municipality groups (conurbanisation) in order to share a certain number of jurisdictions and services.

In addition to its operational responsibilities in particular in terms of urban design, development, roads, waste management and water management, Grand Lyon acquired in late 2011 responsibility for supporting the management of the energy demand and for supporting renewable energy development. Grand Lyon is also in charge of the administration of the Lyon-Bron-Villeurbanne heating network under the terms of a concession contract entered into with an operator for a 25-year period from 2013. The other heating networks present in the territory are either private networks or public networks administered by the municipalities or the energy syndicates.

Upon the creation of the metropolis on 1 January 2015, Grand Lyon will also become the organising authority of the electricity and gas distribution networks, a responsibility which is today in the hands of the municipalities, who have in turn delegated it for the most part to the syndicates.

Since the launch of the climate plan process (SEAP), we have seen the 3 x 20 challenges being taken into account in the various relevant public policies (water, refuse, transport) implemented in the territory of Grand Lyon (Cf 2.2 “the major orientations of public policies related to energy).

The challenge over the next few years lies in the field of urban planning (limitation of urban sprawl, coordination of urban projects / energy production, etc.).

1.4.4 Electricity and gas grid operators

The transmission grids

Transmission grids are the large infrastructures which distribute energy over the entire territory. For electricity, the transmission grid operator is RTE for the entire national territory.

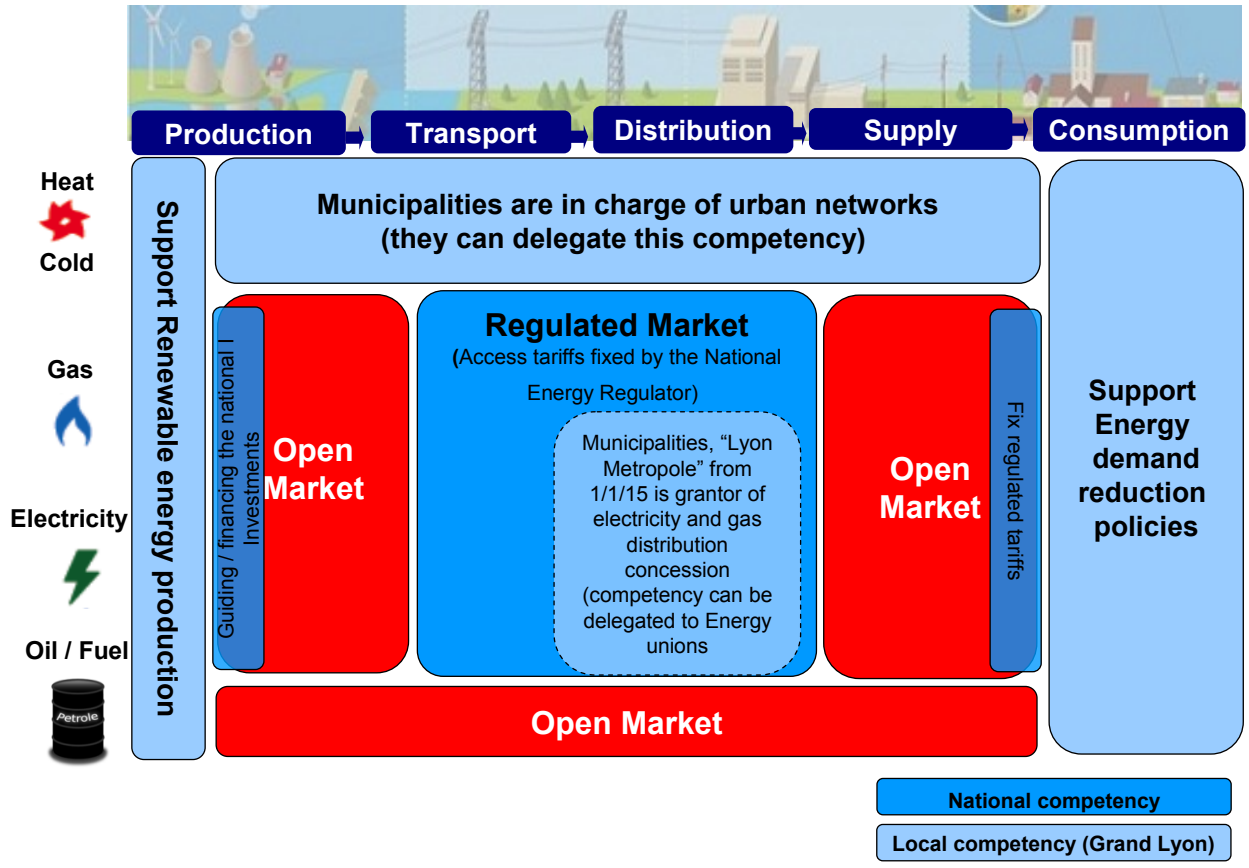
For gas, the transmission grid manager is TIGF in the southwest of France and GRTgaz for the rest of the national territory.

The transmission grids operators are the owners of the grids they operate.

The distribution networks

In France, the distribution networks belong to the municipalities but are operated by Distribution System Operator (DSO) companies. These DSO have a public service duty. ERDF, the electricity DSO, is fully owned by the EDF Group which is 84% owned by France. GRDF, the gas DSO is fully owned by GDF Suez which is 33% owned by France.
The administration of electricity and gas distribution networks for the territory of Grand Lyon is in the hands of SYDER (230 municipalities, including 9 in Grand Lyon), SIGERLY (56 municipalities including 51 in Grand Lyon) and the City of Lyon.
SIGERLY also carries out the administration of heating networks in 10 municipalities of Grand Lyon. The other municipalities manage their heating networks directly.

1.4.5 Energy value chain and related competencies



1.4.6 Stakeholders mapping for the Grand Lyon SEAP and for the future energy master plan.

In the context of the Transform project, work was carried out under the ageis of AIT to identify:
1) the players involved and their role in the implementation of the Territorial Climate and Energy Plan (PCET) for Greater Lyon;
2) the players to be mobilised in the context of the future energy master plan by identifying the most important ones from a decision-making and financial point of view.

This document is attached to this report (Annex 2)

Annex 1- Details on the financial framework

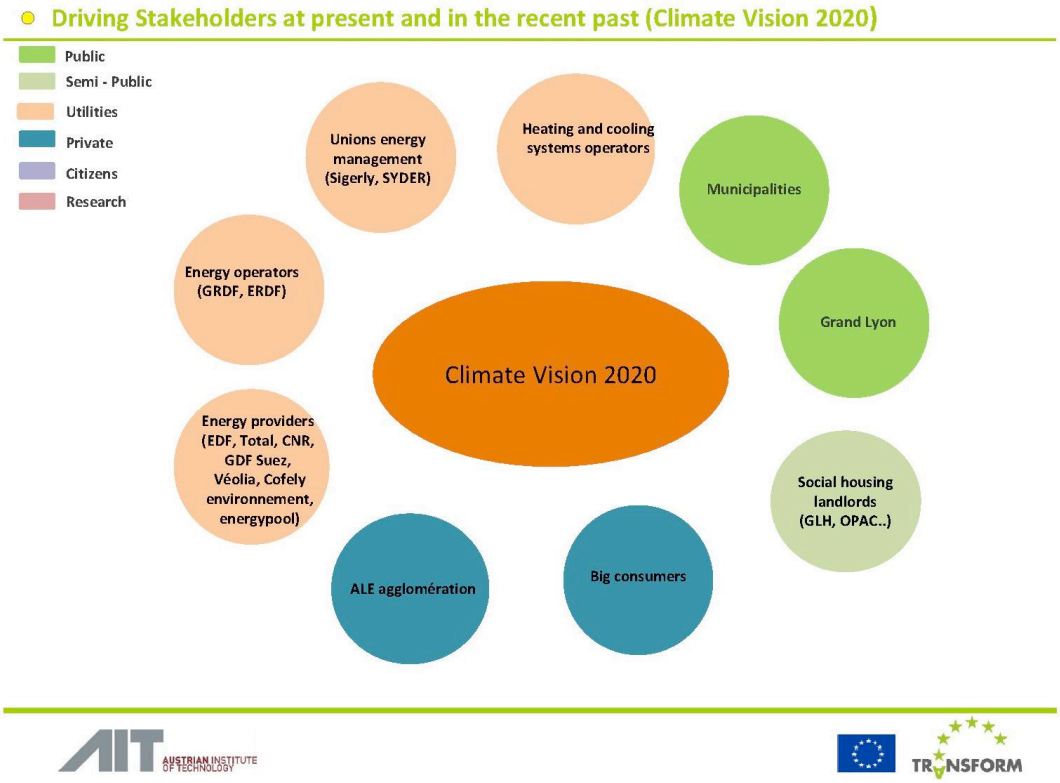
Eco-loan

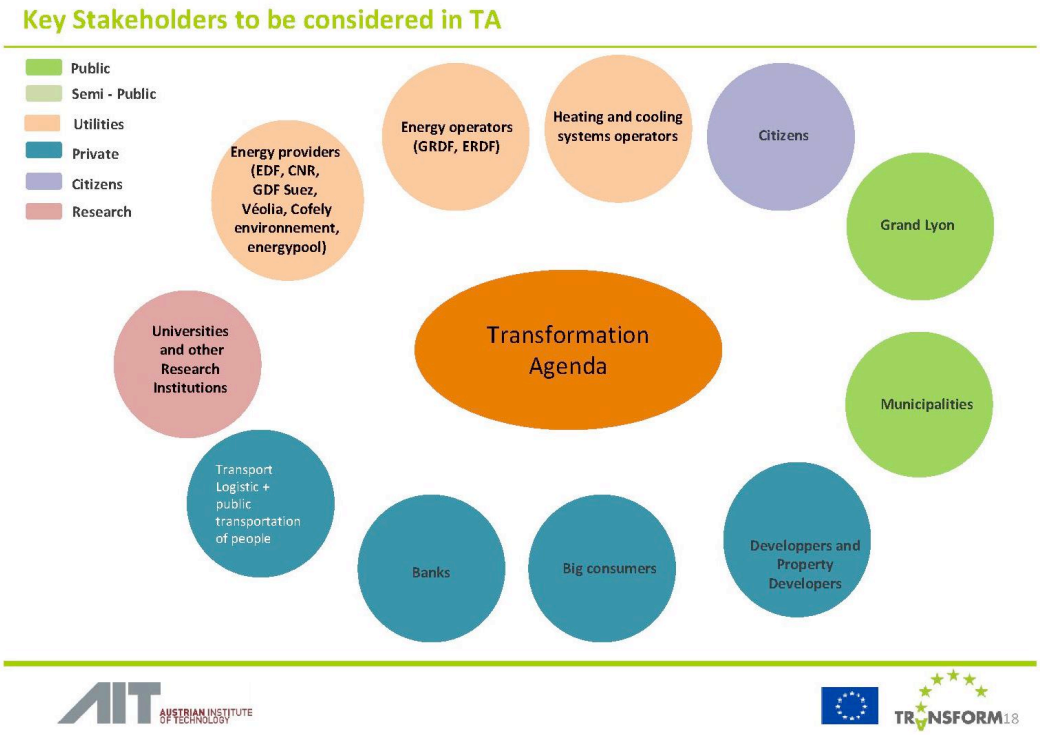
The eco-loan provides financing for energy saving initiatives and potential costs resulting from these initiatives in order to make the house more energy-efficient, more comfortable and emitting less green house gases.
To qualify for the interest-free eco-loan, you must:
- either implement a "work package"
- or attain a minimum housing "overall energy performance"
- or rehabilitate a private sanitation system using an energy-saving device.

A "work package" is a set of consistent works whose simultaneous implementation considerably improves the energy efficiency of the house. The works, carried out by professionals “Certified as Environmentally-Friendly" as from 1 September 2014 (as from 1 October 2015 in the overseas departments) must be selected from at least two of the following categories:
- Efficient roof insulation,
- Efficient insulation of external walls
- Efficient insulation of external windows and doors,
- Installation or replacement of a heating system or production of domestic hot water,
- Installation of a heating system using renewable energies
- Installation of a domestic hot water production device using renewable energies.

Equipment and materials used must meet minimum technical specifications.

Annex 2 - Stakeholders mapping for the Grand Lyon





Annex 3- Description of the selected theme: Context and objectives

1 Theme 1- Implementation of an Energy Master Plan

1.1 Description and objectives

Theme 1 - Implementation of an Energy Master Plan	
Theme description	The Community Council deliberation no. 2012-2754 dated February 13, 2012, which approves the Lyon Urban Community energy-climate plan, provides for the implementation of an Energy Master Plan as one of the tools for carrying out its action plan. The Energy Master Plan envisaged by Greater Lyon is a tool for the regional planning of an energy transition. This tool aims to give a prospective vision of energy planning to be implemented over the Grand Lyon area in order to better understand the energy consequences of public policies and to guide and enrich the implementation of a local energy policy. In this context, it proposes an optimal vision of the organization and development of the energy system (production, networks, consumption) over the territory which will meet the goals of sustainable development and the smart city and which takes into account: the area's current state; energy transition goals; the area's resources, advantages and constraints; territorial public policies and their consequent projects (development, travel, housing, waste, etc.).
Objective with respect to the 3X20 goal (CO2, energy, etc.)	There is no cost target for 3X20. However, energy system planning will be done with the goal of reducing CO2 and increasing EnR production.
Qualitative analysis of project status	This action is not a separate action PCET action; rather, it provides a tool for PCET territorializing. Its implementation has been planned for in energy mission work. At this stage, an analysis has been made of the methodology implemented with the identification of participants and necessary tools. The Transform project could accompany the energy mission in carrying out the initial work.
Costing of theme actions	A first budgetary allocation has been committed to by Greater Lyon through the organization of an energy mission and the launch of an AMO.
Sub-theme proposition	Work on the key factors for implementing an urban planning and energy approach from the viewpoint of regulatory and legal aspects and computer tools. – work on infrastructures → link with the energy-planning workshops - already in operation Tool core definition (input and output data, type of results) Describe the points of interface between the Energy Master Plan and the master plans of other departments (water, streets and roads, etc.) + prioritizing (according to critical points) Identify services with an impact on energy
Associated Greater Lyon services	Energy mission, PLU, travel, urban area strategy (DD urban planning, PCET), water, sanitation, GDEID
Key players	Organizing authority for electricity and gas networks, communities, network operators (heating/cooling, electricity and gas), ALE, SEPAL (SCOT), region (SRCAE), etc.
Link with the policies of different GL services	This theme is a priority of the main service concerned and falls within PCET objectives.
Capability of the community to implement	Other energy departments (water, sanitation, etc) don't have enough time. For example, network operators are heavily solicited to recover heat from waste water. The water department is not suited to leading the participants because it is an interested party → role of TRANSFORM and the energy mission Include the evaluation of fatal energy If we focus only on the implementation of the sub-theme, the community has the necessary competence to federate the interested parties around the theme of planning.

	Regulatory obstacles could limit the scope of action by the community and its access to energy data. The goal of this work is also to highlight these blocking points.
Synergy between GL services	Synergy targets: - The energy mission: steers implementation of the Energy Master Plan - PLU-H services: can set energy and climate goals within the PLU-H regulations (existing approach) - Travel, water and sanitation services: present strategies and master plans which must be taken into account in energy planning - Urban area strategy: responsible for sustainable development strategy implementation and therefore linked to sustainable urban planning - The PCET: is involved in reaching PCET goals
Synergy between local players	- Region: backs the strategic SRCAE document which gives rives to the regional outline for connecting EnRs. Energy planning must be SRCAE compliant. - SCOT: Energy planning must be SCOT compliant. - Communities: validate planning choices for their area. - ALE: is the Greater Lyon relay for energy and provides expertise on energy-related themes. - Producers: initiate the energy project in the territory.
Territorializing of the implementation strategy	Within the TRANSFORM framework, the territorializing of energy strategies adds value -> This theme is considered at the territorial level.
Examples of actions	- Work on the implementation of a method for building an energy master plan by following these steps: o Identify the interested parties o Analyze urban planning and network methods o Analyze framework documents on urban planning and energy (contracts, regulations, strategic documents) o Analyze existing IT resources and the functionalities required o Identify how these planning approaches interact with legal and contractual levers in order to achieve energy planning which responds more closely to the goals of energy transition o Define the contents of an Energy Master Plan

1.2 SWOT analysis

Theme1 - *Implementation of a Spatial Energy Master plan for Grand Lyon*					
	Leading question	**Strength**	**Weakness**	**Opportunity**	**Threat**
Political	*Is the intervention political supported?*	- Political implication of Grand Lyon affirmed by his skills on supporting energy saving and renewable energy development. - An energy department has specifically been created in Grand Lyon administration to address this topic	- Local politics which have a strong impact with energy needs to be more involved in this process.	- To further involve others politics in energy issues	- Some politics are drove by others factors not systematically consistent with the energy and environmental policy (ex. Economical and organisational factors)
Economical	*Is the intervention economically feasible? (is there a business case)?*	- The Grand Lyon has a dedicated budget for the implementation of the spatial energy master plan.	- Few local financial and fiscal incentives to support energy policy (ex. Local energy tax can be used to enhance energy policy implementation)	- If legal framework evolves by giving more energy competences to the town it can be an opportunity for Grand Lyon to redefine a local energy incentives acting on the following leverages: taxation, circular economy, financials aids…	- The actual economical crisis is an unfavourable context to finance the energy transition. Founds may be addressed to others priority topics (unemployment reduction, economy development …)
Social	*Will the intervention be socially accepted?*	- There is no particular issue on the social acceptance of this initiative. The positive aspect are the optimization of the energy management on the town which has direct repercussions on the citizen and the economy development			
Technical	*Is the intervention technically feasible?*	- The spatial energy master plan is an energy pacification document which has no specific technical issues.	- Grand Lyon IT tool and model need to be adapted or developed.	- Development of specific energy model tools, a common database with energy data which can	- Energy data availability (directly related with the Grand Lyon competences)

			- Grand Lyon institution is not in possession of all energy relevant data on his territory	be partially managed as open data.	
Environmental	*Has the intervention impact on energy reduction, energy* efficiency, renewable energy and/or CO2 reduction?	- This approach has the advantage of being transversal and having indirect impact on the 3 environmental objectives	- The 3 environmental objectives are not directly quantifiable	- This approach is an opportunity to enlighten others policy on energy issues.	
Legal	*Is the intervention in coherence with the existing legal framework? Is it impacted by any legal barrier ?*	- National legal framework engaged in the 3X20 objectives associated with incentives to develop renewable energy and to invest on reduction of energy consumption. - These engagement and the incentive approach is declined at a regional level and at a communal level in a case by case basis	- The 3X20 objectives are not mandatory	- The national energy transition debate which will lead on a law on energy transition creates a favourable context to the Spatial Energy master plan approach - The "Métropole" policy may entrust Grand Lyon competences energy grids organisation.	- Delay of national policy implementation - The Grand Lyon competencies on grids administrations are not confirmed.
Governance	*Are all relevant stakeholders involved in the planning process?*	- The internal Grand Lyon stakeholders have been identified and will to be involved in this process.	- The local energy governance is not clearly defined. Many actors, redundancy for some topics and others topics not addressed	- This process will be an opportunity to involve external stakeholders and to clarify theirs roles (Region, cities, associations, industry, universities ...).	- The energy governance context is in transition and Grand Lyon competences on energy are not fixed.
Spatial	*Is spatial design (space and program) part of the intervention?*	The spatial design is the result of the Spatial Energy Master Plan	The spatial design can be limited by the data availability.	The spatial design is an opportunity to take into account the different level of intervention of the energy topics (regional level, town level, departmental level) and thereby identify related actors, roles and actions.	The level of accuracy in the spatial design will depend on the topic.

2 Theme 2- A new function of "flexibility developer"in the development of smart grids

2.1 Description and objectives

Theme 2 - A new function of "flexibility developer"in the development of smart grids	
Theme description	Smart grids are a subject of increasing interest in France. They are based on large-scale instrumentation of consumption and production sites, as well as transforming stations and other network equipment, using sensors (energy, power, temperature, sunlight, etc.). Smart grids offer an interesting way to: • reduce electricity consumption at peak periods, • sensitize users on reducing their overall consumption, • optimize electrical network operation and decrease loss, • improve network planning and management methods, • improve EnR integration, • improve municipal energy planning. These goals are attained through a central smart grid function which quickly restitutes consumption and production data (raw or processed) to a smaller geographical mesh. Five smart grid projects are being developed over the Greater Lyon area: Greenlys, Nedo/Toshiba, Smart Lyon, Watt et Moi and Move in Pure.
Objective with respect to the 3X20 goal (CO2, energy, etc.)	Experiments are being carried out, and it is difficult to determine deposits in terms of CO2 and energy. As an example of potential reductions in energy consumption, we can cite the following results which come from French research program feedback: • unitary impact of monitoring energy consumption (consumption display) is approximately -3% in the residential sector and -1% in the office sector; • the active tracking of energy services (load piloting, programming by use, etc.) can lead to a 10% savings in energy in the residential sector and from 30-40% in the office sector; • the minimization of loss and the possibility of postponing network investments through smart grid solutions are still difficult to evaluate and strongly depend on the penetration rate of certain equipment and local flexibility (load capacity and production to increase or decrease on demand) • the tracking of renewable production often allows detecting defects which lead to a loss in production. On photovoltaic installations, a breakdown which is undetected for one month in summer or spring can result in an annual production loss of around 15-20%.
Qualitative analysis of project status	A certain number of experiments have been started without the participation of Greater Lyon, which might present a problem when it comes to recovering results. Greater Lyon participates in the NEDO-TOSHIBA project. Expected results include benefits from the implementation of a territorial monitoring tool (for the moment, at the Confluence pilot site), benefits from the implementation of a tablet display in social housing occupied by a population which is not familiar with technological tools (Internet, etc.) and the ability to tie electric vehicle recharging to a PV installation. Current blocking points: access to consumption/production data (by the community), restitution of data to the public area, social acceptation of the technologies.
Costing of theme actions	Costing being established Tracking of different smart grid projects in the Greater Lyon area - already in place
Sub-theme proposition	Different sub-themes may be identified which do not involve the same level of technological deployment or the same players: 1. **End consumer approach**: smart grids as a tool to sensitize users to the reduction of energy consumption, specifically during peak periods. 2. **Community data approach**: how the community can use data from smart grids for territorial monitoring (analysis of the data and its legal status). 3. **Large Distribution Network (LDN) approach:** how smart grids can contribute to the

optimization of driving and operating the distribution network →value stems from the integration of these new means within planning methods; it is thus preferable to discuss this subject under Theme 4.

4. **LDN approach: planning methods to be implemented by the LDN to include** the new methods of forced drainage and injection into the production network (RT2012 construction types), new means of production and flexible use (contractual reduction of the peak) →this aspect is not discussed in other smart grid projects and is therefore interesting

5. Hybrid theme: the role of the community as an integrator of flexibility deposits (consumption and production which may be piloted to provide relief for the network): the community is a neutral third party which has knowledge of use, flow, etc., and can assume the role of achieving interaction between network managers and flexibility players (developers, building operators, property managers, producers, etc.).

6. **Transversal approach:**
   - What governance and business model are needed for a multi-energy smart grid covering a given district?
   - What role does the community play in implanting smart grids over its territory (related to the transformation of community roles)?

Associated Greater Lyon services		*Role of service*	*Commitment*
	Energy mission		Strong
	Urban area strategy		
	Data observatory and value creation		
	DGDEI		
	Part Dieu mission		
	DPDP (Forecasting and Public Debate Department)		
Key players		*Player's role with respect to the theme*	*Commitment*
	Electrical network management (ERDF)	- Responsible for equipping the network with sensors and installing new meters - Studies on the benefits of using different technologies in the network - Studies on the network impact of renewable energies	Strong
	Gas network management (GRDF)		Average
	Energy suppliers (GDF Suez, EDF)	- Experiment with different consumption display modes - Test new types of rates - Experiment with load piloting (shedding) - Measure the social acceptability of smart grid technologies	Strong
	Technological solution suppliers (Toshiba, Schneider, Atos, etc.)	- Supply technologies for load piloting and production in the residential and office sectors (energy box) - Supply technologies to improve network operation (management of voltage plans, self-healing of average voltage, etc.) and to have an idea of network topology (smartscan) - Experiment with charge and discharge of electric vehicles - Propose technical solutions for the implementation of territorial monitoring	Strong
	Consumer association (UFC Que Choisir)	- Represent consumer interests in discussion on data ownership and new meter functionalities	Strong
	Research institutes (INSA, NEDO, etc.)	- Supply alternative studies of the network - Study new energy configurations (photovoltaic-electric vehicle, fuel cell, etc.)	?
	Competitiveness center (Tenerrdis, etc.)	?	?
	Institutional funders (ADEME, Région, etc)	- Fund and supervise studies - Organize project feedback in France and Europe - Propose priorities and energy scenarios	Strong
	Decentralized energy producers (private individuals, companies, etc.)	- Supply system services (no regulatory mechanism has as yet been implemented) - Supply data on the production program (currently for major installations only)	Low
	Developers (SPL de	- Improve network dimensioning	Average

	Confluence, Mission Part Dieu, etc.)	- Maximize the 1% of renewable production - Test the introduction of technologies to reduce energy consumption	
	Consumers (private individuals, companies, etc.)	- Test technologies proposed by industrialists - Provide feedback on their usefulness (help reduce energy bill, etc.)	?
Link with the policies of GL services	Link with the smart city strategy / EST energy / PCET		
Capability of the community to implement	The capability to operationally implement the smart grid project is rather low. However, by positioning itself as a pilot territory for developing the smart grid demonstrator and by including this as a strong axis of its energy strategy, Greater Lyon can create (and has already created) true local momentum. Greater Lyon can position itself by encouraging certain aspects of the smart grid which correspond to territorial needs. But this is somewhat premature for now because the demonstrators do not yet show sufficient results.		
Synergy between GL services	Sharing of energy data (housing, travel, etc.) Sharing of communication tools between the different operators (water, gas, electricity, heating) and users		
Synergy between local players	Implementation of the different functionalities of a smart grid (certain of which are listed as sub-themes) requires coordinating a great number of the above-mentioned players. This coordination could be facilitated in part by Greater Lyon. Certain institutional players in other regions are positioned this way (this is the case of the CCI of the PACA Region, which published a smart grids charter for eco-neighborhoods).		
Territorializing of the implementation strategy	This theme allows territorializing the other themes.		
Examples of actions	**LDN approach: the new planning modes to be implemented by the LDNs to** - provide a framework for impact studies carried out over LDN territory which would correspond to the reality of a dense urban area (impact of different types of recharging stations on the electrical network according to their location, impact of energy renewal on contract power, impact of consumption display on behavior, etc.) **Community data approach:** - identify needs in terms of energy data (all services) to improve policies implemented (choice and evaluation) - work on data access to resolve CSI issues (commercially sensitive issues) - implement systematic multi-criteria feedback and compare the different demonstrators with each other and with other solutions (e.g.: personalized support for people in a precarious energy situation vs. consumption display in housing) **End consumer approach** - implement a display test campaign for daily consumption (or even real-time consumption) for a certain number of public buildings to encourage the private sector to do the same - Work on awareness of new technologies and their adoption by users and evaluate whether user needs have been taken into consideration for the different technological solutions proposed.		

2.2 SWOT analysis

Brief description:

This role consists in, first, identifying the flexibility potentials in production and consumption over a specific area and, second, interacting with the actors responsible for their implementation and activation (building constructors, land developers, retailers, producers, large consumers, etc.). These flexibility potentials may be sought through interoperability of networks, tools to control power consumption and power injected in the grid by decentralised means of production to optimise local grid sizing, etc.

The objective of this new function is to facilitate and guarantee the access to flexibility volumes so that they can be integrated in the planning tools of the distribution network operator and thereby impact investment planning.

As a third party acting in the public interest of the territory, independent of private interests, the municipality could take up this new role. However, an independent third party may also be created ad hoc to implement this function. This SWOT analysis is done on the theme considering that this function could be the responsibility of any independent third party.

Theme 2 - A new function of "flexibility developer"in the development of smart grids					
	Leading question	Strength	Weakness	Opportunity	Threat
Political	Is the intervention political supported?	- Strong local political support for smart grid projects. - This role stems from the implementation of an energy master plan that has solid political foundations. - Smart grid demonstration projects are running currently. They deal with innovative solutions based on mature technologies	- Currently, the intervention of the municipality in Smart grids projects is limited. The municipality does not have a clearly assigned role in the transition of energy networks towards smart grids. - No other third party has been yet identified to implement this intervention.	- The active role of the municipality as flexibility facilitator can allow translating political local climate and energy policies into practical realisations by influencing energy consumption and production, as well as prioritising choices. - This function may encourage and boost standardization and interoperability of electrical devices.	- Coordination between local energy policies and the global system must be put in place to avoid degrading the optimum of the whole system.

Economical	Is the intervention economically feasible? (is there a business case)?	- This function is an enabler to make savings on the funding of energy networks' development (gas, heat or electricity) through peak power injected/consumed reduction that may optimise the use of existing infrastructures and lowering the need for new ones. - Smart grid demonstration projects currently running show that the cost-benefit analysis of optimising multi-fluid energy consumption and production for controlling investments in grid is positive.	- Business model for the actor that will bear this function must be developed - Synergies may need to be found with other functions to find a sustainable business model. - The framework for sharing benefits of delayed investment in grids is not well defined. - Investments and costs control at different scales	- Improved knowledge of the territory may enable other benefits. - Job opportunities, creation of new economical areas - Added value thanks to innovation - Creation of a network of local partners with global competencies - Opportunity to optimize the economical local energy balance (energy supply and consumption).	- Sustainability of business model - Coherence amongst different levels of governance must be guaranteed, otherwise leading to a degraded value of the system as a whole - Difficulty to find an acceptable value transfer amongst actors to remunerate the actor responsible for this function. - The flexibility economical framework is for some aspects defined at a national level, which reduces the local latitude on defining new roles and business models. - Absence of a clear national regulation to value the flexibility and absence of dynamic tariffs on consumption.
Social	Will the intervention be socially accepted?	- Two municipality services working on public acceptance of smart grid tools and on data protection. - Some associations are actively participating with collectivities and private companies. - End user associations are actively participating to the debate on smart metering and smart grid	- The municipality needs to improve its efforts on smart grid integration and acceptance in the society.	- Third party that is independent of private interests may improve trust and participation of end-users in smart grids and also the perception of smart metering. - This function favours demand side management actions that help controlling the increase in the electricity bill of consumers.	- Reluctance of end-users to smart metering and smart tools in general, that are perceived as surveillance.
Technical	Is the intervention technically feasible?	- Knowledge of all large land development operations on the municipality's territory, ownership of the electrical grid and control over its concession. Same for gas networks and heat grids (except small private district heating grids). - Several ongoing smart grid demonstration programs and mature technologies. - Local competencies	- Demands a very clear view of existing energy flows and a capacity to anticipate the evolution of local consumption. This requires having access to a very important amount of data and thus coordination amongst many actors (see the SWOT of the masterplan). - Requires technical skills (capacity to roughly estimate flexibility potentials on a zone and grasp its impact on networks).	- This new role gives a clear objective to the finalisation of the masterplan. - Encourages work culture sharing amongst different actors since land planner, municipality services, energy experts and DSOs (at minimum) will have to work in common.	- Multiplication of interfaces between actors and technologies means more complexity - Municipality identifies flexibility potentials that have an availability that is too low to be taken into account in energy networks' planning.
Environmental	Has the	- Peak power reduction that may be	- Peak power reduction does	- Improved knowledge of the	- Uncertainty of achieved energy

	intervention impact on energy reduction, energy efficiency, renewable energy and/or CO2 reduction?	achieved through this action can displace the need for high GHG emitting electricity. - This function may also facilitates the integration of renewable energy that will lower GHG emissions and primary energy consumption. - This function may facilitate and lower the cost of network connection of electrical vehicule charging stations by optimising charging modes based on local constraints. This will decrease the carbon footprint of transportation.	not necessarily lead to energy consumption reduction. - This work may modify energy consumption at the margin but not profoundly reduce it, while being very time-consuming. - Indirect CO2 emissions of smart tools (control boxes, meters and other equipment on the network)	territory may lead to identify inefficient use of energy. - Improved resilience by having control over part of the production and the consumption and decreasing energy consumption. - Identify zones where storage units make economical and environmental sense.	savings through direct power control and price signals. -Impact of new technology (battery, ...) - Local optimization of peak demand may affect negatively peak national demand.
Legal	*Is the intervention in coherence with the existing legal framework? Is it impacted by any legal barrier ?*	- No clear legal barrier to the creation of this new function. - Current urbanistic rule (SRU) that encourages the densification of urban spaces has led to connection costs that reflect local constraints and thus value approaches to reduce energy and power consumption and a general approach to optimize network connection.	The actual regulation does not legitimize the municipality or any other third party is taking up this new role.	- The national energy transition debate creates a favourable context for local authorities to paly a greater role in the energy transition. - The "Métropole" policy may entrust Grand Lyon competences energy grids organisation.	- Instability of the actor responsible for this function - Actor may seek short term optimisation rather than long term optimisation - Arbitration between the interests of several network operators may be needed in search of global optimisation - Cyber-security, legal issues on data protection that constraint data transfer amongst actors
Governance	Are all relevant stakeholders involved in the planning process?	- Emerging relationships between different network users (social landlords, producers, etc.), municipality and DSOs. - The municipality has tight relationships with the energy network operators (gas, electricity, heat).	- Requires coordinator amongst a large number of private actors: private promoters, renewable energy producers, private tertiary enterprises, smart grid technology providers, retailers, etc.	- This new role is an opportunity to develop stronger ties with actors on the territory and to have better knowledge of weak points and potential solutions to attain the objectives of the Climate action plan.	- Actors of the market who tries to win market share: free riders - Not a clear role of each actor - Complex players' acting
Spatial	Is spatial design (space and program) part of the intervention?	- Grand Lyon is on the way of developing its master plan.		- Suggest how local and global optimisation may come together.	- Coherence must be guaranteed at different scales to guarantee global optimisation

3 Theme 3 - Citizen commitment to EnR over the territory

3.1 Description and objectives

Theme 3			
Theme title	**Citizen commitment to EnR over the territory**		
Theme description	In the context of its supporting role in EnR development, one of Greater Lyon's strategic goals in energy is to encourage the creation of EnR projects, in particular participatory projects.		
Objective with respect to the 3X20 goal (CO2, energy, etc.)	The European 3X20 goal is reflected in the Greater Lyon PCET project objectives by a four- to five-fold increase in EnR power in order to reach the goal of 20% energy consumption based on EnR by 2020. EnR production over the territory represents 5% of consumption. Target: + 200 GWh/year of EnR		
Qualitative analysis of project status	One way to encourage the development of EnR would be to study the financial aspect and the assistance Greater Lyon could provide for the implementation of citizen participation funds. Support could be financial; Greater Lyon could also play a communication role and could contribute by making municipal land available for these types of projects. Concerning this last point, discussions are currently being held with DLB to make land available for the implantation of a photovoltaic farm.		
Costing of theme actions	No costing		
Sub-theme proposition	How Greater Lyon could encourage the creation of participatory projects to develop EnRs over the territory		
Associated Greater Lyon services		*Role of service*	*Commitment to the theme*
	Energy mission		(strong, average, low)
	PCET		
	DEP		
Key players		*Role of the player*	*Commitment to the theme*
	Region		(strong, average, low)
	ALE		
	HESPUL		
	Communities		
	Banks		
Link with the policies of different GL services	This theme is a priority of the main service concerned and falls within PCET objectives.		
Capability of the community to implement	The analysis proposed would allow evaluating the community's capacity for implementation. Since the initial obstacles are financial, successful action depends on the budget which the community would want to allocate to this action.		
Synergy between GL services	Synergy targets: - The energy mission: participant in this approach - The PCET: participant in this approach through PCET - DEP: intervenes if Greater Lyon plans to create a fund dedicated to this type of participatory investment		
Synergy between local players	- ALE: contributes experience on and knowledge of this type of initiative - HESPUL: contributes experience on and knowledge of this type of initiative - Communities: like Greater Lyon, the communities can promote participatory investments. Certain communities can contribute their feedback.		
Territorializing of the implementation strategy	-> This theme is approached on the territorial level		
Examples of actions	- A work group can be initiated within the Transform project framework, with a goal of:		

- Making a first assessment of the participatory projects which have been implemented over the Greater Lyon area or other territories:
  - The way in which the project was organized and the associated participants
  - Identification of key factors behind success and obstacles
- Identifying the first action steps by communities in supporting this type of initiative (e.g.: financing or reimbursable down payment for preparatory studies, support structure, partnership with specialized structures of the shared-energy type).

3.2 SWOT analysis

Citizen investment in local renewable energy projects is a way to boost the development of renewable energy projects on the territory, improve acceptance of these technologies and support local economy. So far, several structures have supported this activity in France. Although the national regulation have a rather large impact of the feasibility of these projects (low feed-in-tariff, high connection costs, etc), the municipality can have a role in facilitating citizen investment and participation in local renewable energy projects through such actions as creating a fund to finance feasibility studies, providing access to public buildings' roof, interacting with the different actors, etc.

Theme3 - The role of the municipality in facilitating citizen investment and participation in local renewable energy projects					
	Leading question	Strength	Weakness	Opportunity	Threat
Political	Is the intervention political supported?	- This intervention is written in the Climate action plan of the municipality. - One project of this kind was realised over the summer 2013 in Grand Lyon. - Grand Lyon has ambitious goals for RES development.	- No involvement of the concerned services of the Grand Lyon, basically because this action is not borne by a specific service yet.	- Increase renewable energy installed power on the territory, increase energy autonomy - Inject momentum into private projects - Boost the development of local competencies in the installation of renewable energy systems	- A regional fund exists to support this kind of projects as well. The municipality has to be able to coordinate with this regional initiative.
Economical	Is the intervention economically feasible? (is there a business case)?	The Grand Lyon has dedicated specific human resources to work in this topic	- There is an uncertainty on Grand Lyon financial resources availability on this intervention to coordinate with the regional level to co-fund the projects.	- Support local economy (energy consultants, constructors/ installers) - Take advantage of building roof refurbishments to diminish the cost of projects.	- A large part of the economical feasibility of projects is impacted by national regulation (low feed-in-tariff, high connection costs, etc).
Social	Will the intervention be socially accepted?	- This action favours social acceptance of renewable energy projects	Even if attitudes are slightly changes, renewable energy development is not the first citizen concern.	ENR development is an opportunity to reduce CO2 emissions and improving citizens quality of life of the	Some RES solutions can not be well socially accepted (wind power)
Technical	Is the intervention technically feasible?	- One project of this kind was realised over the summer 2013 in Grand Lyon. The municipality may capitalise on this local example. - Local actors have competence in accompanying such projects and can support the municipality in designing its intervention. - Municipality has several levers in hand that it could use to boost	- Municipality has no internal competencies to accompany participatory projects. The municipality has to identify internal services or external actors able to manage technical aspects.	- Opportunity to give a transversal vision and commun strategy on RES and local politics, and making the link between RES development and urban reality an resources (availability of field, identification of new RES resources to exploit from wastes ...)	- Limitation of RES ressouces (for instance for solar power the limitation is on the roof availability) - Some RES technology are not sufficiently matures or have not reach the economic balance

		participatory projects: creating a fund to finance feasibility studies, providing access to public buildings' roof, interacting with the different actors, etc.			
Environmental	Has the intervention impact on energy reduction, energy efficiency, renewable energy and/or CO2 reduction?	- Favour the development of RES projects.	- This intervention has a limited impact on renewable energy volumes (example: solar power development is limited by urban density, building structure characteristics, and rules on town planning).	- New RES technology can emerge (valorisation of wasted energy : hot water from swimming pools …)	
Legal	*Is the intervention in coherence with the existing legal framework? Is it impacted by any legal barrier ?*	- The PLU-H (Local Urban and Housing plan) is a regulatory leverage to drive the RES development (land availability, specific roles). - The government give founds to develop RES, which can reduce the project ROI.	- Municipality is not entrusted to impose renewable energy targets in refurbishment operations in the private sector.	- Municipality put some conditions on private projects realised on its ownland (for instance, reserve a fraction of the investment to local citizens or more generally on RES investments). - Municipal aid to large RES projects in the tertiary sector may depend on citizen participation in the investment. - Install RES on buildings that are being renovated but where investment is a limiting factor.	- The government founds on RES development are regressive, this induce to a reduction of private investments. This can be compensated by the increase of retail energy prices (induce to do self consumption). - Rules on town planning are very strict as to what can be installed and where.
Governance	Are all relevant stakeholders involved in the planning process?	- Municipality, Region and local experts are already working together on related themes. This need to be improved	- Private investors and private building owners will have to be involved in the process. - No visibility for the Municipality and the Grand Lyon of the privates initiatives	- - Opportunity to improve the global governance - For the Grand Lyon to be the local institutional relay on this topic.	
Spatial	Is spatial design (space and program) part of the intervention?	- The special design is an essential part of the intervention to identify and prioritize RES development areas	-No existing tool to visualize potential RES development	- Opportunity to develop a spatial vision of RES potential project	-

Annex 4 -
THE 26ACTIONS OF THE TERRITORIAL CLIMATE-ENERGY PLAN

COMPANIES

- 4.7 Support small and medium-sized companies in improving energy performance
- 4.8 Support the development and structuring of the private offer (in particular for the sustainable building industry)
- 5.1 Promote the recovery of industrial waste incineration
- 5.2 Develop smart grids
- 6.1 Highlight the building and renovation of exemplary office buildings
- 6.2 Create a club for the main greenhouse gas producers and promote their actions to reduce emissions

TRANSPORT/TRAVEL

- 2.1 Continue the non-motorized travel plan
- 2.4 Organize the city to regulate car use
- 2.5 Optimize the motorization of private vehicles
- 2.7 Optimize motorization and improve the organization of merchandise transport
- 3.1 Act on travel behavior: promote the modal proportion and create a mobility hub;optimize roadway networks
- 3.2 Develop alternative uses to individual cars (car pooling and sharing)
- 4.3 Encourage modal transfer of cars to public transportation (increase of 25% in use of PT)

HOUSING

4.1 Build exemplary new social housing

4.2 Guarantee low consumption level for private homes and offices starting in 2012 and anticipate the TN in 2020

4.4 Ensure the thermal rehabilitation of the social housing pool

4.5 Develop the rehabilitation of private homes

ENERGY

2.2 Develop heat networks and biomas

4.9 Contribute to structuring the regional wood industry

4.10 Structure and develop renewable energies

TRANSVERSAL AREAS

1.1 Create a Greater Lyon Heritage and Services Action Plan

2.3 Create a Local Urban Planning schema that is compatible with "3 x 20" and "Factor 4"

2.6 Compensate CO_2 emissions with a Climate-Energy Fund

3.3 Promote behavioral changes

4.6 Ensure that 90% of the population is covered by a community Climate-Energy Plan by 2014 and accelerate the renovation of community holdings

7.1 Model "measurable, reportable, verifiable" emissions in the territory