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REGIONAL CLIMATE – AIR – ENERGY PLANS: A TOOL FOR GUIDING THE ENERGY AND CLIMATE TRANSITION IN FRENCH REGIONS

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The Regional Climate-Air-Energy Plan (SRCAE - *Schéma Régional Climat-Air-Energie*) was introduced by the Grenelle II legislation. The Plans are co-authored by the State through its decentralised services and the Conseil Regionaux (regional councils) with the objective to guide climate and energy policy in the 26 French regions through to 2020 and 2050. Starting from an assessment of regional greenhouse gas (GHG) emissions, the SRCAE establishes energy transition scenarios based on the sectoral and structural guidelines that constitute the principal framework of the regional strategy.

This report offers a detailed analysis of the strategies chosen by the various Regions for a successful transition to low-carbon energy sources, via the study of eleven SRCAEs that were opened to public consultation before the end of July 2012 (Alsace, Aquitaine, Auvergne, Bourgogne, Centre, Champagne-Ardenne, Ile-de-France, Midi-Pyrénées, Nord-Pas de Calais, Picardie and Rhône-Alpes regions). The wide range of methodologies used by the Regions, both to draw up their inventories of GHG emissions and for their scenarios, means that a quantitative comparison between regions or against the national objectives is not possible. Nevertheless, the report establishes a typology of regions and identifies policies that are common to all regions and those chosen in response to local characteristics. Certain guidelines could be applied by other regions of the same type, or could feed into discussions at national level. The report also indicates that the SRCAEs go beyond the competencies of the Regions, highlighting the role of local, national and European decision-making in the success of a regional energy transition.

Particular attention was paid to the building and transport sectors, often identified as having the largest potential for reducing GHG emissions, and for which responsibility falls more directly in the remit of the regions. A quantitative analysis of the energy transition strategies of the SRCAEs studied in this report suggests that regions are primarily focusing on the thermal renovation of buildings, the development of renewable energies and the development of public transport to achieve objectives.

The multitude of studies and research condected within the development of the regional SRCAEs could feed into both national and regional debates on the energy transition scheduled in autumn 2012. These debates will be used to prepare the national energy transition timetable legislation, planned for mid-2013.

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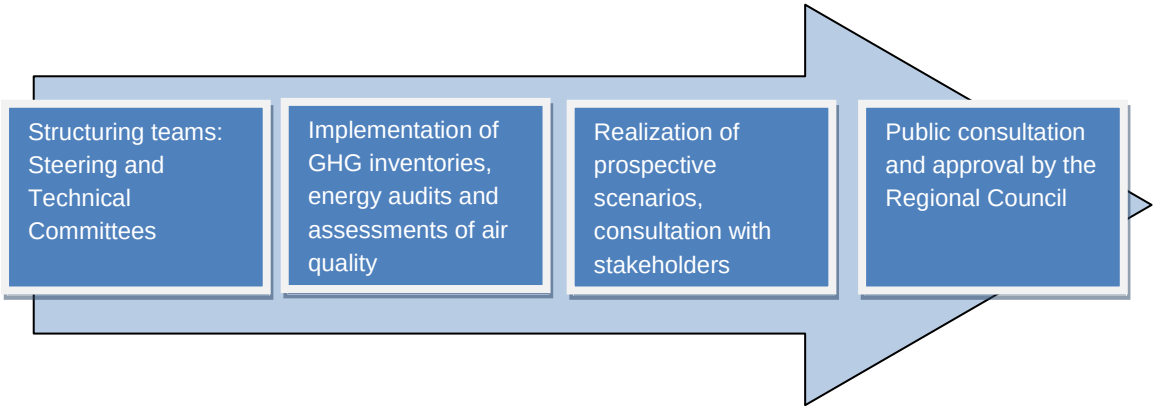
INTRODUCTION

The Regional Climate-Air-Energy Plans (SRCAE) are forward-looking documents for guiding regional energy, climate and air quality policies to 2020 and 2050. Jointly developed by the regional councils and the regional prefectures, the SRCAE stem from France's commitment to deliver a four-fold reduction in greenhouse gas emissions by 2050 compared to 1990 levels, and to help achieve the objectives of the EU energy-climate package[4].

Introduced by Article 68 of the law known as "Grenelle II" of 12 July 2010, the SRCAE must in particular set out the "guidelines for mitigating and adapting to the effects of climate change". The law also specifies that territorial climate-energy plans (PCET) must be compatible with SCRAEs[5].

Figure 1 below illustrates the stages in drawing up an SRCAE, as outlined in the official French decree of 16 June 2011. This decree sets out the structure of the SRCAE, which must include: a "report" based in particular on an inventory of greenhouse gas emissions (GHG) and atmospheric pollutants; an energy assessment[6]; an evaluation of air quality; an analysis of the development potential of renewable energies; a "guidance document" on reducing GHG emissions, adapting to climate change and air quality and an annex, entitled "regional wind power plan" which lists all the municipalities that lie in areas most suitable for wind power development. The SRCAE must then be opened to public consultation and subsequently approved by the regional council as well as through an order from the regional prefecture.

Figure 1 – Timetable for drawing up SRCAE



Source: Guide d'élaboration des SRCAE, MEDDE (2011)[7].

[4] The climate and energy package is a set of European legisation, adopted in 2009, that notably sets quantitative targets in terms of reductions in GHG emissions, the development of renewable energy and energy efficiency.

[5] This means that the "PCET should not undermine the fundamental options of the SRCAE" (see: www.srcae.fr). The law also states that the other strategic plans (SCOT and PLU) must henceforth take the PCET into account, and may only "depart from them if they can provide a justifiable reason" (ibid.)

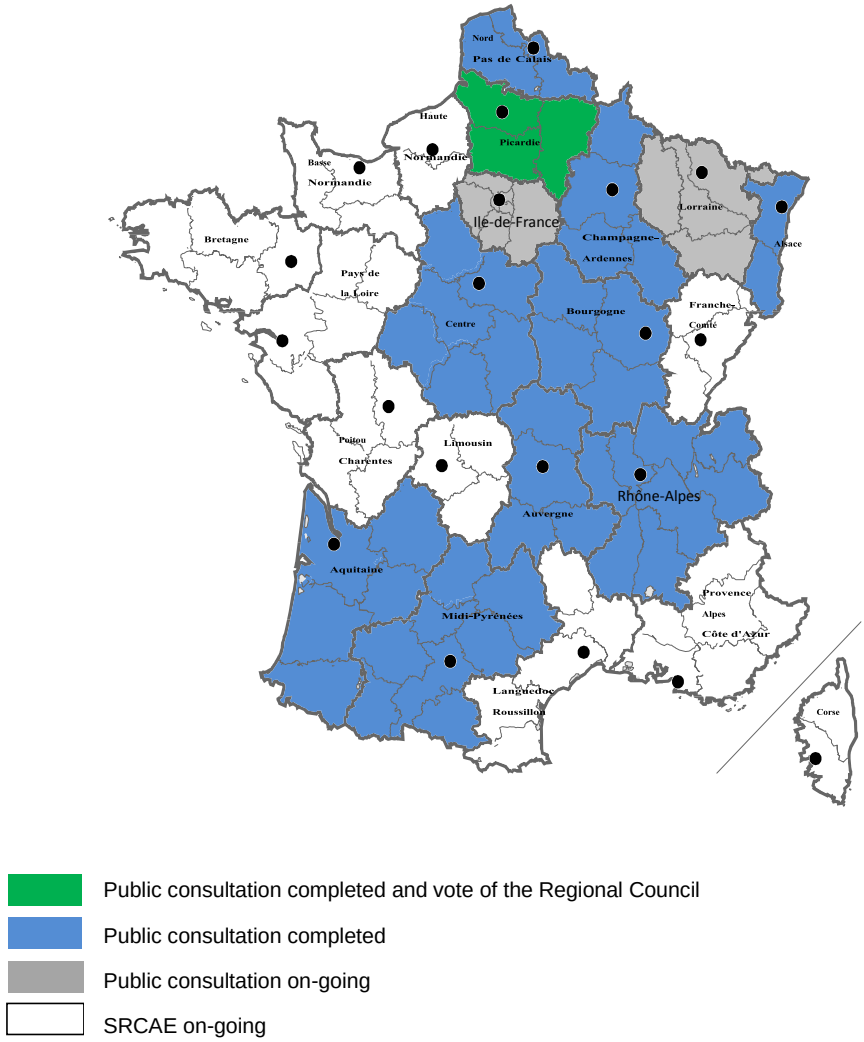
[6] More precisely, this is an inventory of direct and energy-use related emissions across the territory and an assessment of energy consumption carried out across the territory.

[7] This measure does not apply to Corsica which has been given two years to draw up its SRCAE. Furthermore, the drafting process is led only by the Regional Council, the State is simply associated with the process.

There are two important dates that affect the drafting of these straegic plan: if the entire SRCAE has not been published before 30 June 2012, the regional prefect alone will be will develop and approve the regional wind power plan before 30 September 2012[8]. In addition, SRCAEs that have not been approved or submitted for public consultation by 31 December 2012 will have to undergo an environmental assessment[9].

The progress of the various SRCAEs at the end of July 2012 is shown in Figure 2. Of the 26 French regions, only 10 metropolitan regions had completed the public consultation phase before 30 June 2012 (Alsace, Aquitaine, Auvergne, Bourgogne, Centre, Champagne-Ardenne, Midi-Pyrénées, Nord-Pas de Calais, Picardie, Rhône-Alpes). At the end of July, only Ile de France had submited their plan to public consultation, unlike the eleven other metropolitan regions[10]. French Guyana, which is not included in Figure 2, is the only overseas region to have launched the public consultation on its SRCAE, beginning on 1 September.

Figure 2 – Progress of the various SRCAEs at 31 July 2012



Source: Regional Council and DREAL websites.

[8] This measure does not apply to Corsica which has been given two years to draw up its SRCAE. Furthermore, the drafting process is led only by the Regional Council, the State is simply associated with the process.

[9] This procedure seeks to evaluate the impact of the municipality on the environment at all levels of its operation.

[10] The SRCAE of the Lorraine and Languedoc-Roussillon regions were made available for public consultation in August, but have not been taken into account in this report.

This delay can partly be explained by hold ups resulting from a lack of agreement between the regional council and the decentralised State services, particularly over assumptions concerning the future energy mix. In addition, the governance structure of the SRCAE requires the participation of multilple entities in the preparation of the document, including the Regional Directors for the Environment, Development and Housing (DREAL) and the Regional Councils. These entities are not managed in the same way and thus do not have the same decision-making process. These differences in working methods may partially explain certain disagreements and delays during the development of the SRCAEs, as the official decree does not define the specific procedure for resolving deadlocks.

This report draws on a review of the SRCAEs of 11 metropolitan regions that were submitted for public consultation before the end of July to answer the question: *Can SRCAEs identify and prioritise the most appropriate forms of action to drive an energy transition and the reduction of greenhouse gas emissions in the French regions?* It will seek to answer this question firstly by analysing the methodology chosen for developing the SRCAE, then by studying their scope and the policy actions identified. Further, by classifying the regions themselves, the study highlights the areas of intervention by sector specific to each region's context. This report focuses on the "residential-service" and "transport" sectors. As such, the aspects of SRCAEs specifically addressing air quality, the development of renewable energies and climate change adaptation strategies are not covered in this report.

I. THE SRCAE, A FORWARD-LOOKING REGIONAL TOOL TAKING INTO ACCOUNT THE LOCAL CONTEXT

A. A wide choice of methods for producing GHG inventories

The decree of 16 June 2011 states that an SRCAE should include "an inventory of direct greenhouse gas emissions from the regional territory and, where necessary, for the following emissions sectors: residential, service, transport, agriculture, industry, waste". Box 1 presents the main differences between this inventory and the GHG evaluation required for the PCET.

Although the decree specifies that the GHG inventory concerns direct emissions within the regional territory from the various sectors, it allows the regions leeway in their interpretation of this requirement. The decree does not provide an exhaustive list of the GHG to be included in the inventory, nor a baseline year to use.[11] This flexibility allows each region to use existing data and inventories, but makes it very complicated to compare the resulting regional inventories.

Table 1 illustrates this wide diversity, showing some of the SRCAE methodologies used in three regions.

[11] The baseline year recommended in the handbook is 2005, but not all regions have been able to prepare an inventory from that date. In addition to their own work and any pre-exising inventories, the regions have been able to draw on either an inventory produced by their approved air quality monitoring agency (AASQA), whether or not within the framework of a regional observatory, or a regional inventory produced by the the CITEPA (the interprofessional technical centre for studies on air pollution).

Table 1 – Methodologies and assumptions for GHG emissions inventories in the SRCAEs of three regions

	Picardie	Rhône-Alpes	Nord-Pas de Calais
Types of emissions	Direct and energy-related*	Direct and energy-related*	Direct and energy-related*
Baseline year	2007	2005	2007
Gases covered	CO_2, CH_4, N_2O, fluorinated gases	CO_2, CH_4, N_2O	CO_2, CH_4, N_2O, fluorinated gases
Data source	Data: Energie Demain**** Coefficients**: ADEME (energy emissions); CITEPA and MEDDE (non-energy emissions).	Data: OREGES **** Coefficients**: ADEME (energy emissions); CITEPA and MEDDE (non-energy emissions).	Data: NORENER**** Coefficients** : NORCLIMAT
Other assumptions	Inclusion of UTCF***	Inclusion of UTCF***	UTCF*** not included

*Notes: *Direct GHG emissions are emissions that are directly linked to an activity in a region (for example the emissions from an industrial process). Energy emissions are those related to the consumption of energy associated with these activities (the regions used the guidelines on the CO_2 content of a KWh in France produced by the ADEME and EDF). Emissions related to the production of energy are not counted in order to avoid double-counting.*
*** GHG assessments use emissions factors from various sources of GHG that make it possible to measure emissions against the consumption of resources (fossil fuels, fertilisers, industrial processes).*
****Land use, land use change and forestry.*
***** Norener is a local energy statistics body, OREGES is an AASQA and Energie Demain© is a consultancy firm.*
CITEPA - The Interprofessional Technical Centre for Studies on Air Pollution
ADEME - French Environment and Energy Management Agency
MEDDE - Ministry of Ecology, Sustainable Development and Energy

Source: SRCAE Picardie, Rhône-Alpes, Nord-Pas de Calais

Preparation of the SRCAEs has been facilitated by the creation of an interactive website, run by the State via the "Territoires et changement climatique" section of the CETE (*Centre d'études technique de l'équipement*/Public Works Regional Engineering Centre) in Lyon (www.srcae.fr/), and the distribution of a guide produced in collaboration with the regional councils and the regional prefectures.

Box 1: What is the difference between the SRCAE GHG inventories and the PCET (Territorial Energy-Climate Plans) GHG assessments?

The regional councils: Authors of the SRCAEs and the PCETs

The PCETs were created by the Grenelle I and II laws, and are compulsory for any municipality of more than 50,000 inhabitants, including regional councils. They consist of an assessment of GHG emissions for which the municipality is legally responsible, an action plan to reduce GHG emissions (with quantitative objectives), adapt to climate change, and develop renewable energies, as well as a monitoring programme.

SRCAEs and PCETs therefore have different approaches but they are complementary: The PCET must bring together all the policy levers available to the municipality, (its competencies, the management of its assets and its wider role as a key player within its territory) to implement and roll out the regional guidelines expressed in the SRCAE within the area under its jurisdiction. The SRCAE created a shared regional strategic framework within which the regional and infra-regional authorities will place their PCET.

Methodological differences and complementarity

This difference between the PCET and the SRCAE can be seen in the methodology used for collating the GHG emission data. The PCETs – which are the municipal action plans – use assessment methods relating to its municipal competencies, which take into account the various types of operational emissions (direct and indirect emissions, relating to the energy consumed), whereas SRCAEs – which act as a framework for all the municipalities and infra-regional players, and therefore collate all the emissions data within an administrative perimeter - use inventory methods that only cover the emissions directly produced within the territory or linked to imported energy consumption (electricity and heat).
The uses made of the results of the assessments and inventories therefore differ:

- The PCET GHG emissions assessment is needed by municipalities to identify policies they can put in place to reduce GHG emissions linked to their responsibilities and assets. By providing the municipality with the GHG impact of its operations, it represents the first stage in improving this impact by reorienting the organisation of the municipality according to GHG emission reduction criteria.

- The SRCAE GHG inventory gives the Region and the State a regional snapshot of emissions by sector, as a basis for guidelines and future scenarios: It allows the Region to understand which sectors are the most direct emitters within its territory and to target its actions whilst mobilising all those involved. This inventory uses the same methodology as the national inventories use for the reporting required by the Kyoto Protocol. This methodology, which is restricted to direct emissions, makes it possible to avoid counting GHG emitting activities within regions twice when inter-regional emissions are being calculated.

Thus, the SRCAE makes it possible to encourage players within the territory to limit the GHG impact of their activity, making use of a sectoral inventory which highlights the role of each sector in the direct emissions of the territory. The PCET, on the other hand, is designed to reduce the municipality's emissions as an organisation, drawing on a GHG assessment which includes its direct and indirect emissions. PCETs and SRCAEs therefore offer a complementarity between an organisational approach centred on the Region and an approach which mobilises the stakeholders in the regional territory and defines the maior directions to follow.

B. The scenarios: Illustrating the variety of profiles and ambitions of the SRCAEs

The decree states that the SRCAE guidance document must define guidelines for each sector for reducing GHG emissions, improving energy efficiency and controlling energy demand as weel as define quantitative objectives for developing land-based renewable energy capacity. The timeframe for these guidelines and objectives must fit with France's domestic and international climate change commitments, namely 2020 and 2050.

With this in mind, the regions have drawn up energy-saving and emissions-reduction scenarios for their territories. These scenarios take the form of "*an assessment by sector of the potential energy savings, energy efficiency improvements and control of energy demands and the resulting reductions in greenhouse gas emissions*".

However, the decree allows freedom of interpretation by not imposing any particular methodology for producing these scenarios. A methodology and a set of assumptions are nevertheless recommended by the Handbook. Three types of scenario, which can be prepared simultaneously, have been chosen for the SRCAEs:

1. Current trends/BAU (*business as usual*): This is the baseline scenario, it describes activities continuing unchanged.
2. Grenelle measures/National measures: This scenario presents the results of the implementation of current measures, mostly those from the Grenelle laws.
3. Proactive/Optimal/Grenelle Objectives: This scenario presents the results of implementing all the identified policy levers, in order to achieve, or exceed, the objectives of both the Grenelle laws and the European climate and energy package.

Of the 11 SRCAEs that have been studied, it should be noted that only five of them use the "Grenelle Measures" scenario, and that only three have developed BAU scenario. However, the "proactive" scenario is always present. In certain cases it corresponds to the absolute potentials of GHG emissions reduction and energy savings. In others, it embodies these potential reductions, while equally taking into account the economic, social and structural obstacles to achieving them. These scenarios have been constructed through dedicated workshops, bringing together staff from the appropriate regional and territorial departments and representatives of the State.

The proactive scenario illustrates the variety of profiles and levels of ambition of the SRCAEs. The GHG emission reduction targets of the regions studied appear varied: They may be lower, equal to and sometime greater than the targets of the European climate and energy package. These variations are linked to the constraints that the regions have imposed on their forecasting exercises as well as the widely differing potential for GHG emission reductions and the development of renewable energies in the different regions. Certain regions have chosen to create scenarios with very flexible assumptions, allowing for the possibility, for example, of radical changes in technology, changes in the electrical energy mix or envisaging a significant change in behaviour. This flexibility allowed them to achieve a high percentage of emissions reductions. On the contrary, other regions have chosen more restrictive assumptions (no radical changes in technology, no change in the electricity mix), thus making their targets less ambitious.

The Regions therefore made a compromise between the targets that they would like to achieve and the means they plan to use. This compromise is a result of political and social choices and the discussions carried out with stakeholders (municipalities, businesses and civil society) in the region.

Box 2 : Feedback on the citizens' workshop in Rhône-Alpes

In addition to its public consultation, the Rhône-Alpes Region conducted a citizens' workshop in parallel to its thematic workshops. The participating citizens were chosen by lottery and took part in a workshop over three week-ends which allowed them to meet experts, administrations (State, ADEME, municipalities), elected officials and associations, etc. The results of their work, which was supervised by a specialed organizer, were taken into account in the SRCAE guidelines.

The citizens' workshop brought together 35 volunteers who illustrated the variety of profiles to be found in the Rhône-Alpes region, in terms of age, gender, socio-professional category, urban/rural, etc. The participants received training on climate change and identified eight policies for reducing GHG emissions. The participants used the tools developed by the ADEME (Coach Carbone®) and the ASDER (Association for Developing Renewable Energies in Savoy: The Climate in our Hands) in order to reflect on the ways of reducing their carbon footprint.

Two main conclusions were drawn from this exercise:

1. There are a number of everyday actions that can reduce GHG emissions;
2. Citizens' action alone will not be enough to reach the targets for 2020 and 2050.

The Region's objectives in organizing this workshop were twofold: Firstly, it allowed the Region to determine the extent of awareness of climate-energy issues amongst the regional population, and secondly to raise participants' awareness of these issues. It should be noted that a public consultation alone does not always all allow the points of view of the inhabitants of a region to be heard in a such a direct and in-depth manner.

C. SRCAEs go beyond the jurisdiction of the regions

Because SRCAEs adopt a territorial approach and involve both elected officials and civil servants from the region, the State and other territorial bodies, their policies exceed the remit of the regions. For example, SRCAEs cover the agricultural and industrial sectors, whose GHG emissions are dependent on national and European measures (e.g. the EU Emissions Trading System and the Common Agricultural Policy, etc.) and at times include assumptions on the development of these supra-regional measures when drawing up scenarios. Similarly, SRCAEs make proposals that depend on infra-regional capacities (urban planning, public transport management) or simply on citizen's initiatives (awareness-raising activities, environmentally-friendly behaviour). The SRCAE therefore has a role to play in raising awareness amongst stakeholders at all levels: it informs political decision-makers about the measures to be taken in their areas of responsibility, and regional needs with regard to the legislation; it communicates to companies and municipalities across the territory about the measures that can be taken to mitigate climate change; and it informs citizens of what they can do to limit their carbon footprint.

As an example, the guidelines shown in Table 2 illustrate this range of influences. Most of the SRCAEs chose to include them.

Table 2 – The range of SRCAE interventions

Sector	Guideline	Level of main intervention
Residential-service	- Encourage the refurbishment of buildings	European, national, regional
	-Provide training to the building industry on energy efficiency	National, regional
Transport	-Develop less polluting vehicles	European
	-Develop alternatives to the private car, through planning policies and available alternatives	Regional, local
	-Limit car use and its impacts by promoting new mobility practices	National, regional, local
Industry	Develop carbon footprint assessments and incentive measures for the energy efficiency of industrial facilities	National
Agriculture	Facilitate the reduction of nitrate inputs	European, national

Note: The two building guidelines are related, the refurbishment of buildings can only occur if the industry is trained in carbon efficient methods.

Source: CDC Climat Recherche based on the SRCAEs of the Alsace, Aquitaine, Auvergne, Bourgogne, Centre, Champagne-Ardenne, Ile-de-France, Midi-Pyrénées, Nord-Pas de Calais, Picardie and Rhône-Alpes regions of France.

II. EMISSION REDUCTION STRATEGIES THAT DIFFER ACCORDING TO REGION TYPE

A. Emissions profiles and reduction potentials vary greatly according to the region

The emissions of the various sectors by region

Table 3 shows the emissions profile of the eleven regions studied here. It aims to give an idea of the scale of emissions per sector for each region. However, the regions cannot be compared to each other as emissions have not been calculated using the same methodology and equally vary according to the economic context, the size and the population of the regions.

Table 3 – Emissions per sector of the various regions (in MTCO2e and as a percentage of total emissions from the region)

Regions	Residential - Services	Transport	Industry	Agriculture	Waste	Population (Millions of inhabitants)	Surface Area (Km²)
Alsace	3.1 (19%)	4.0 (25%)	7.7 (47%)	1.4 (9%)	0.0 (0%)	1 .9	8 280
Aquitaine	4.7 (19%)	9.4 (38%)	5.7 (23%)	4.9 (20%)	0.0 (0%)	3.2	41 308
Auvergne	1.8 (15%)	3.2 (25%)	1.8 (14%)	5.0 (46%)	0.0 (0%)	1.3	26 013
Bourgogne	3.3 (21%)	4.7 (30%)	2.4 (15%)	5.3 (34%)	0.0 (0%)	1.6	31 582
Centre	5.8 (25%)	6.6 (28%)	4.3 (18%)	6.7 (29%)	0.0 (0%)	2.5	39 151
Champagne-Ardenne	2.5 (18%)	3.7 (26%)	4.1 (29%)	3.7 (26%)	0.1 (1%)	1.3	25 606
Île-de-France	24.49 (49%)	16.16 (32%)	5.16 (10%)	3.39 (7%)	0.7 (1%)	11.7	12 011
Midi-Pyrénées	5.3 (21%)	6.8 (27%)	3.8 (15%)	9 (36%)	0.25 (1%)	2.8	45 348
Nord-Pas de Calais	9.8 (23%)	7.7 (17%)	21.8 (50%)	3.3 (7%)	1.4 (3%)	4	12 414
Picardie	3.6 (23%)	4 (25%)	4.5 (29%)	3.3 (21%)	0.4 (2%)	1.9	19 399
Rhône-Alpes	13.8 (26%)	14.6 (25%)	10 (29%)	8.0 (17%)	1.4 (3%)	6.2	43 698

Source: *INSEE and SRCAE Alsace, Aquitaine, Auvergne, Bourgogne, Centre, Champagne-Ardenne, Ile-de-France, Midi-Pyrénées, Nord-Pas de Calais, Picardie and Rhône-Alpes.*

Next, the sector-based analysis of the eleven SRCAEs examined the four largest GHG-emitting and energy-consuming sectors: residential-service, transport, industry and agriculture. The waste sector was not included as it does not appear in all SRCAEs and represents a low percentage of GHG emissions.

Table 4 presents the average impact of each sector on regional emissions. The highest-emitting sector is transport with an average of 27%, whilst industry and agriculture each contribute around a quarter of regional emissions on average, and the wider building sector contributes 20%.

Table 4 – Impact of GHG emissions by sector in the eleven SRCAEs studied

	Residential-services	Transport	Industry	Agriculture
Average	20 %	27 %	25 %	24 %
Standard deviation	3 %	5 %	12 %	12 %

Note: The standard deviation measures the dispersion of the data. Here it allows us to see how the impact of a sector varies between regions. This variation can be due to regional characteristics but may also result from differences in the methodology used for the inventories.

Source: CDC Climat Recherche based on the SRCAE of the Alsace, Aquitaine, Auvergne, Bourgogne, Centre, Champagne-Ardenne, Ile-de-France, Midi-Pyrénées, Nord-Pas de Calais, Picardie and Rhône-Alpes regions of France.

With a standard deviation of 3%, the impact of the transport and residential-service sectors in total GHG emissions shows more stability between the regions than the impact of industry and agriculture, which differ more markedly. This can be explained by the variety of agricultural and industrial contexts in the French regions.

The emissions profile for each region depends on two main factors:

- The consumption of electricity or heating (housing, service) or refined fuel (transport);
- Agricultural production (fertiliser, methane) and industrial production (primary and secondary energy, production process) which are more closely related to the particular context of the region.

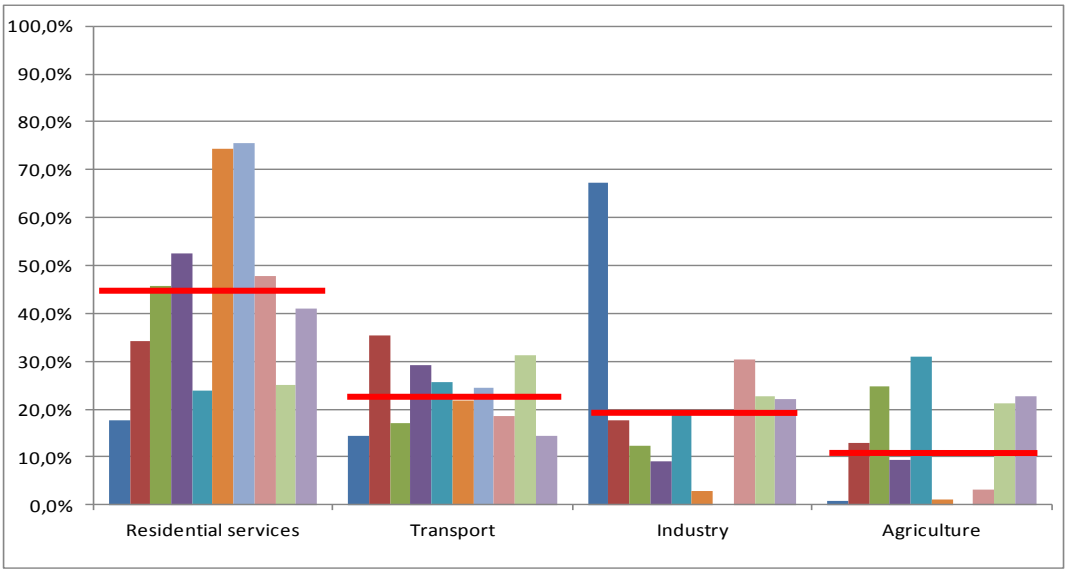
Impact of the different sectors in the reduction potential

The theoretic reduction potential is the volume of GHG emissions that could be saved by addressing all the sources of emissions identified by the SRCAE[12]. This report looks at the *theoretic reduction potentials to 2020* when they are mentioned as such, or at the targets of the most proactive scenarios in the SRCAEs studied.

Figure 3 shows the average impact of each sector in the regional reduction potential of ten of the SRCAEs examined. It allows the different sectors to be compared and identifies those that should, in theory, be the most decisive in reducing GHG emissions.

The housing and commerical sector is expected to play the biggest part in reducing GHG emissions (43%), in contrast with agriculture which represents only a small part in these reductions (13%). The transport and industrial sectors each make up around a quarter of GHG emission reductions.

Figure 3 – Impact of each sector in the theoretical reduction of GHG emissions by 2020 in 10 SRCAEs.



Notes: The red line indicates the average impact of each sector across the ten regions.

Source: CDC Climat Recherche based on the SRCAE of the Alsace, Aquitaine, Auvergne, Bourgogne, Centre, Ile-de-France, Midi-Pyrénées, Nord-Pas de Calais, Picardie and Rhône-Alpes regions of France.

[12] — The maximum potentials of SRCAEs have always been identified during thematic workshops with the aid of a consultancy firm, the final choice being made by those in charge of SRCAEs at the state and regional level.

B. Analysis of regional climate strategies by region type

Are GHG emission reduction strategies influenced by territorial characteristics and the origins of the emissions? To analyse these influences, we have drawn up a typology of regions, based on their characteristics and their emission profiles, which will allows us to compare the various strategies according to the type of region.

Typology of regions created for the analysis

Table 5 shows the variables used to characterise what, in theory, influences the region in its climate strategy.

Table 1 - Variables utilised for the typology of regions

Variable	Role of the variable in the analysis
Agricultural GHG emissions (%)	Takes into account the carbon footprint of the agricultural sector
Industrial GHG emissions (%)	Takes into account the carbon footprint of the industrial sector
Building GHG emissions (%)	Takes into account the carbon footprint of the building sector
Transport GHG emissions (%)	Takes into account the carbon footprint of the transport sector
Per capita GDP (thousands of euros)	Measures the financial capacity of the region to invest in limiting its emissions
Surface area (km²)	Takes into account the size of the territory which influences the types of GHG emissions reduction actions
Urban population/rural population (%)	Takes into account how homes and the population are distributed across the territory.
Total population (thousands of inhabitants)	Determines the size of the region in terms of number of inhabitants

Source: CDC Climat Recherche based on INSEE (La France et ses regions) and the GHG inventories published by MEDDE

More details on how the typology was developed and applied are given in Annex 1. The typology has been prepared from these variables using a principal component analysis: this is a statistical tool that makes it possible to visualise the regions on a two-dimensional graph according to a number of variables. The aim of this analysis is to categorise the regions according to the characteristics that best represent them. It has shown that there are three types of region.

Table 6 shows the typology chosen for the metropolitan French regions, except Corsica.

Table 6 – Typology of regions

Industrial region	Agricultural regions	Urban regions
Alsace Lorraine **Nord-Pas de Calais** Normandie PACA	**Aquitaine** **Auvergne** Basse Normandie **Bourgogne** Bretagne **Centre** **Champagne-Ardenne** Franche-Comté Languedoc-Roussillon Limousin **Midi-Pyrénées** Pays de la Loire **Picardie** Poitou-Charentes	**Île-de-France,** **Rhône-Alpes**

*Notes: The regions in **bold** indicate the 11 SRCAEs studied*

Source: CDC Climat Recherche

Three types of regions emerge:

i. **Industrial regions:** This type of region is characterised by its high level of industrial emissions. Even though there is a certain diversity in terms of surface area (between Alsace and Provence-Alpes-Côte d'Azur, for example), the proportion of industrial emissions is more significant than the other categories of emissions and thus defines the type.

ii. **Agricultural regions:** This group is characterised by high agricultural emissions, a low urban/rural ratio and low per capita GDP. This category corresponds to regions with a high percentage of agricultural activity and low density housing that is not concentrated in large urban centres (with the exception of Aquitaine and the Bordeaux agglomeration).

iii. **Urban regions:** This category consists of two regions whose characteristics include a high proportion of GHG emissions from the building sector and a high urban/rural ratio. Ile-de-France occupies a singular position in the French regions, notably in terms of population density and per capita GDP. However, it is pertinent to include Rhône-Alpes and Île-de-France in the same category as they are subjected to similar constraints: high emissions as a result of the age of their buildings, and the number of car journeys made by their large populations. For these two variables in particular, the Rhône-Alpes region more closely resembles the Ile de France than the other regions.

Overview of guidelines adopted according to the type of region

The measures identified in the guidelines and the scenarios determine each region's operational strategy and the main policy levers that can be applied within their territory.

By carrying out an exhaustive review of the guidelines, this report seeks to identify the strategies proposed by the various types of regions. It should be noted that regions classified as "industrial" and "urban" are represented by just two regions. This limits the possibilities for interpretation and should be taken into account in the results that follow.

Tables 7 to 10 present the various guidelines used by each category of region and for each sector. They differentiate between the guidelines that have been mentioned by all the regions of a single type, those that have been used by more than one region and those only included in a single SRCAE.

Table 7 – Guidelines of the various types of region in the residential-service sector

Residential-service	All regions	Some regions	One region
All types of regions	Generalise the thermal renovation of existing residential buildings with a focus on low energy consumption.		
Industrial regions	Seek ambitious energy performances in residential new build		-Inform and educate the building industry to support the rapid implementation of future thermal regulations for new construction. - Encourage the installation of heating systems that use renewable energies
Agricultural regions	Support the building sector's transformation towards improved energy performance	-Define and support initiatives for financial and contractual engineering (particularly in terms of fuel poverty and large condominiums). -Diversify the sources of energy in territories by developing the production of renewable heat and heat recovery (other than wood) in buildings. Renew and develop the pool of wood burning boilers by promoting efficient and clean technologies. -Define and recognise shared criteria of best practices in terms of RE and air quality: Eco-conditionality in public contracts, bio-climatic design and eco-materials in new builds, thermal building regulations -Reduce fuel poverty	Promote sustainable construction for new build.
Urban regions	New construction should be exemplary in terms of meeting building standards and energy efficiency		-Encourage energy savings in buildings and guarantee sustainable performances -Mobilise existing financial tools and develop innovative approaches to financing

Source: CDC Climat Recherche based on SRCAEs from: Alsace, Aquitaine, Auvergne, Bourgogne, Centre, Champagne-Ardenne, Ile-de-France, Midi-Pyrénées, Nord-Pas de Calais, Picardie and Rhône-Alpes.

Table 8 – Guidelines of the various types of region in the transport sector

Transport	All regions	Some regions	One region
Industrial regions	-Optimise the transport system and its use by freight and passengers -Rationalise road haulage and passenger road transport		-Encourage the use of vehicles that produce the least GHG and atmospheric pollutants - Limit car use and its impacts by promoting new mobility practices
Agricultural regions	Create conditions that encourage intermodality and the development of soft forms of transport	-Encourage the use of vehicles that produce the least GHG and atmospheric pollutants - Develop and disseminate knowledge on passenger journeys and freight transport, their impacts on climate-energy-air and the tools that elected officials, users and transport sector stakeholders have at their disposal - Encourage cooperation between shippers and operators to develop freight that saves energy and pollutes less.	-Improve the public transport available and encourage its use - Impact on individual transport behaviour (whether forced or chosen) through the provision of information and awareness-raising - Limit artificial land cover
Urban regions	-Fully integrate air and climate issues into urban planning - Prepare for the mobility of tomorrow whilst preserving air quality - Optimise freight transport by encouraging logistics systems that save energy and pollute less. - Encourage new technologies for mobility and transport.		Support local decision-makers by publicising the technical tools for taking the SRCAE into account in their development projects.

Source: CDC Climat Recherche based on SRCAEs from: Alsace, Aquitaine, Auvergne, Bourgogne, Centre, Champagne-Ardenne, Ile-de-France, Midi-Pyrénées, Nord-Pas de Calais, Picardie and Rhône-Alpes.

Table 9 – Guidelines of the various types of region in the industrial sector

Industry	All regions	Some regions	One region
Industrial regions	Control greenhouse gas emissions and improve the energy efficiency of businesses		-Limit the losses on energy transmission networks - Anticipate and accompany technological changes in the industrial sector, particularly in the choice of raw materials
Agricultural regions		Identify and encourage the spread of processes , organisations and technology that are more water efficient, more energy efficient and which are low emitters of atmospheric pollutants	-Encourage research, innovation and the optimisation of processes in liaison with public and private research institutes and transfer centres. - Support businesses with the distribution of technical and financial tools (including partnerships, calls for projects, etc.) Promote cooperation between stakeholders on the principles of industrial ecology (implantation, process, transport, procurement, building) - Encourage the social and environmental commitment of businesses.
Urban regions	Make energy savings in the various industrial sectors		-Make energy savings in the various industrial sectors - Encourage synergies and mutualisations between economic players in the same area of activity.

Source: CDC Climat Recherche based on the SRCAE from: Alsace, Aquitaine, Auvergne, Bourgogne, Centre, Champagne-Ardenne, Ile-de-France, Midi-Pyrénées, Nord-Pas de Calais, Picardie and Rhône-Alpes.

Table 10 – Guidelines of the various types of region in the agricultural sector

Agriculture	All regions	Some regions	One region
Industrial regions	Control GHG emissions and improve the energy efficiency of regional agriculture		Take into account the issues around reducing greenhouse gas and particle emissions in livestock farming practices
Agricultural regions	-Encourage low-input (water, fertilizer), productive agricultural practices that do not harm human health and improve the operation of ecosystems -Support farmers and winegrowers in reducing their dependency on fossil fuels	-Improve regional estimates of carbon sinks in forests, (carbon sequestration in above-ground biomass and the ground, in wood products) as well as in pastures - Optimise the use of forest resources and adapt the choice of species and practices to the current and future changes in climate.	-Strengthen the link between the world of research and the agricultural world on the issues of climate-air-energy - Develop the livestock/arable farming balance across the whole agricultural area and also by farm - Preserve and develop wooded countryside and encourage agroforestry by drawing on improvements in knowledge - Improve the range of products available from local and diversified agriculture
Urban regions	Promote agriculture that closely respects the needs of territories		-Promote responsible, forward-looking agriculture and forestry - Develop the value of local non-food agricultural resources in the form of energy products or building insulation materials

Source: CDC Climat Recherche based on the SRCAE from: Alsace, Aquitaine, Auvergne, Bourgogne, Centre, Champagne-Ardenne, Ile-de-France, Midi-Pyrénées, Nord-Pas de Calais, Picardie and Rhône-Alpes.

Tables 7 to 10 show that the regions all have similar guidelines that are often very general. For example, in the building sector, the thermal renovation of old buildings and the best practices for new construction (such as using the French “BBC” low-energy standard) are essential, for all types of region. The use of public transport and intermodality in the regions is also found across the three types. These points have little relation to the characteristics of the territories, but their practical implications will depend on local contexts, and particularly on the competencies of the authorities in these areas. Indeed, other than the thermal renovation of buildings, no single guideline appears in an identical form in all the SRCAEs. Although they all address the same themes, the regions modulate their guidelines according to their territorial context. For example, if we look at transport, the industrial regions have chosen to “optimise transport systems”, agricultural regions have chosen to "encourage soft forms" of transport whilst urban regions propose "to integrate air and climate issues into urban planning".

Tables 7 – 10 also highlight innovative regional proposals that could be a useful source of inspiration for the local policies of other regions and also nationally. For example the guideline “mobilise existing financial tools and develop innovative approaches to financing” was only chosen by a single region but it aims to find new ways of financing the energy transition that could be useful to all stakeholders.

For agricultural emissions, the “agricultural” regions agree on two guidelines: 1) promoting low-input, productive systems and ii) reducing dependency on fossil fuels. They also formulate more specific recommendations such as: “Preserve and develop wooded countryside and encourage agroforestry by drawing on improvements in knowledge”. Regions are increasingly aware of their potential and seek to enhance the value of their agricultural and forestry resources, either as carbon sinks or as sources of renewable energy. These more specific proposals look to use the territory's assets for climate change mitigation, here by mobilising local resources to replace classic fossil fuels.

“Agricultural” regions have also launched quite in-depth evaluations on how to address fuel poverty and the new financial and contractual instruments that can be developed to support GHG emission reduction projects. This concern could be explained by the lower wealth of inhabitants in this type of region but could also be of interest for the other categories of region.

It is more difficult to draw conclusions about the specific features of the “industrial” and “urban” regions, as they are less represented in this report, with only two SRCAEs analysed for each of these two categories. However, it can be noted that “industrial” regions have defined quite precise guidelines for the industrial sector, such as: “Limit the losses on energy transmission networks” and are also looking at the technological changes needed to reduce GHG emissions. Lastly, the “urban” regions have developed a number of guidelines relating to freight and passenger transport, but have been less prolific and precise in the other areas, although they have focused on the essential aspects: The renovation of existing buildings and energy-saving measures in the various industrial sectors.

III. FOCUS ON INDIVIDUAL SECTORS: AREAS OF INTERVENTION IN THE RESIDENTIAL-SERVICES AND TRANSPORT SECTORS

As the residential-services and transport sectors are typically directly linked to the jurisidictional capacities of the regions than the other sectors, this report has examined these two sectors in greater detail to highlight the specific measures retained by each region. Table 11 shows the main indicators used to analyse SRCAEs strategies in the residential-services and transport sectors. These numerical indicators allow the strategies to be quantitatively analysed.

Table 11 – Main sector indicators of the environmental strategies of the eleven SRCAEs studied

	Residential- services	Transport
Energy source	Percentage of renewable energies (RE) used for heating	Level of biofuels
Structural context	Level of renovation of buildings to French BBC standard (low energy consumption) in 2020	Level of public transport use in the territory in 2020
Improving practices	Reduction in specific electricity consumption	
Technological aspect	Level of RE in the energy mix	Increased engine efficiency

Source: CDC Climat Recherche based on SRCAEs from the Alsace, Aquitaine, Auvergne, Bourgogne, Centre, Champagne-Ardenne, Ile-de-France, Midi-Pyrénées, Nord-Pas de Calais, Picardie and Rhône-Alpes regions of France.

A. Thermal renovation and renewable energies: the pillars of regional building strategies

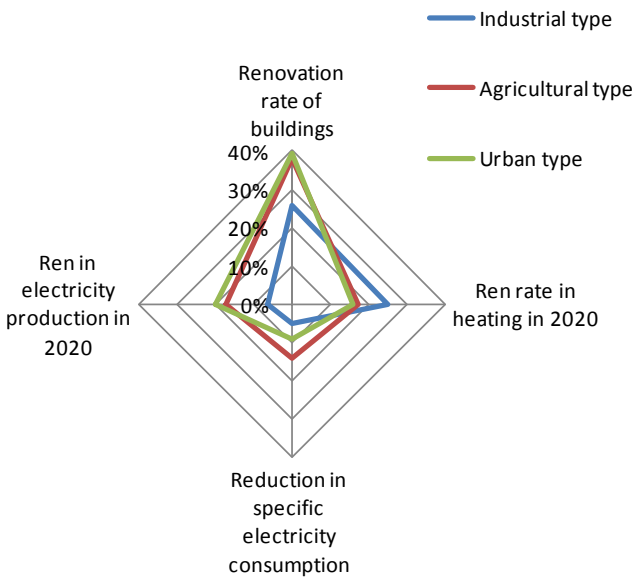
Figure 4 shows the results of this quantitative analysis for the building sector. The three types of regions present different strategies:

- The "industrial" regions focus more than any other type of region on a strong development of RE in heating, such as wood fuel and heat pumps. As the energy mix of these regions is carbon-intensive[13], there is great potential for reducing CO_2 emissions through the development of thermal renewable energies to replace oil and domestic gas.
- The indicators of the "agricultural" and "urban" regions present values that are closer to each other than those of the "industrial" regions, but nevertheless there are certain differences: Agricultural regions are more ambitious in terms of reducing specific electricity consumption, whilst the urban regions give more importance to the development of renewable electricity (their target is higher than the national target of 20% of RE in 2020). Agricultural and urban regions both target a high level of building renovation. The agricultural regions have to contend with a diffuse habitat, often built before 1975, which leads to heavy energy losses. The urban regions (Île de France and Rhône-Alpes) have much building stock that is old and poorly insulated (57% of

[13] 22% solid mineral fuel (coal) ; 28% oil-based products ; 29% gas, for Nord-Pas de Calais for example.

primary residences in Rhône-Alpes were built before 1975). These two types of region therefore have great potential for reducing emissions from the building sector. Although building renovation is an important policy lever for the “agricultural” and "urban” regions, putting it into practice will involve different instances in each case. Agricultural regions will have to encourage individual initiatives in order to renovate housing stock that is scattered across its territory, whereas the “urban" regions will have to include housing associations and property managers.

Figure 4 - Analysis of strategies by type of region for building stock



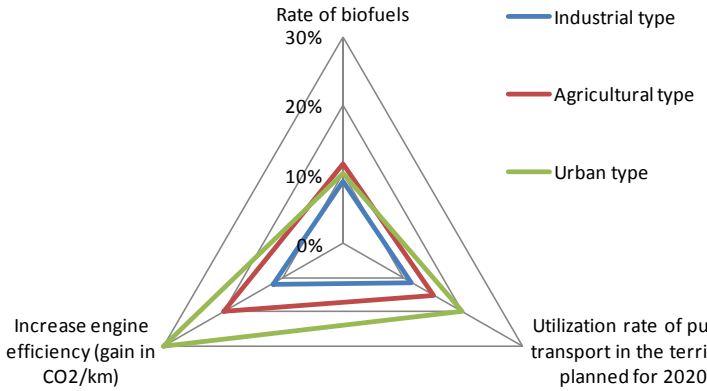
Note: The level of renovation of residential buildings was calculated from the number of renovations per year to BBC or equivalent level, forecast by the SRCAEs for 2020 compared to the total number of primary residences in the region. The reduction of specific electricity consumption corresponds to a forecast drop in energy consumption through energy-saving measures and as a result of the increased energy efficiency of household electrical goods. The axes give the level of use of each lever per region (for example, the axis “level of RE in electricity production in 2020) gives the percentage of RE in the total electricity production for each region). The various axes should not be compared as each level has a different impact on GHG emissions. This information should only be read and understood axis by axis to compare the different use of an action (an axis) between the three categories of region.

Source: CDC Climat Recherche based on the projected technical specifications and feedback from technical workshops of the SRCAE of Alsace, Aquitaine, Auvergne, Bourgogne, Midi-Pyrénées, Nord-Pas de Calais, Picardie and Rhône-Alpes.

B. Engine efficiency and modal shifts: Two key axes in the transport sector

Figure 5 presents the results of the analysis for the transport sector, where the strategies are less differentiated than in the building sector.

Figure 5 - Analysis of strategies by type of region for transport



Note: The level of biofuels is the percentage of biofuels within total fuels in 2020. The increase in engine efficiency is the percentage reduction in CO2 emitted per km forecast in the SRCAEs for 2020. The level of public transport use in 2020 corresponds to the modal share (market share) of public transport in passenger transport for 2020. The various axes should not be compared as each level has a different impact on GHG emissions. This information should only be read and understood axis by axis to compare the difference in use of an action (an axis) between the three categories of region.

Source: CDC Climat Recherche based on the projected technical specifications and feedback from technical workshops of the SRCAE of Alsace, Aquitaine, Bourgogne, Midi-Pyrénées, Nord-Pas de Calais, Picardie and Rhône-Alpes.

As transport has a significant impact in the "urban" regions (30% of total emissions), these regions have set more ambitious targets for this sector than those of the other two categories of region. This can be explained by the high population density and also by residence-work journeys and road freight, with the populations living in the suburbs and outlying areas creating more pollution from their consumption than the populations in the urban centres or rural areas, according to CERTU (2011).

However the urban regions, which are very densely populated, particularly in their urban centres, have great potential for developing public transport and have placed the emphasis on this in their SRCAEs. Without limiting their action to city centres, the development of public transport networks could significantly reduce GHG emissions from commuting. This area of intervention is particularly suited to the urban environment where it is easy to identify population movements (employment and housing clusters can be quite precisely identified) compared to rural and suburban travel which is more diffuse.

These regions have also been more ambitious than the others in terms of improving engine efficiency, forecasting a much higher use of electrical vehicles than the other regions, particularly in cities.

Another possibility for emissions reduction, the development of biofuels, has been promoted by the "agricultural" regions, which corresponds to their territorial profile.

CONCLUSION

This report has analysed the preparation and the guidelines proposed by the SRCAEs that were submitted for public consultation and whose aim is to define regional climate and energy policies to 2020 and 2050. It has highlighted the policy areas identified in the SRCAEs to encourage a climate and energy transition in the regions.

The main drawback of SRCAEs is related to the fact that they are guidelines and strategic documents, and this means they lack specific identified measures that include details on implementation and funding. In addition, as a result of how SRCAEs are developed, typically allowing latitude in the methodology, the comparison of SRCAE objectives against the objectives of the Grenelle laws and the climate and energy package is not easy. It is therefore difficult to estimate the real contribution of the SRCAE in meeting the French national commitments.

Although this analysis is based on only eleven published SRCAEs, four key points are clearly evident:

- The definition of climate and energy strategies requires consultation with all the stakeholders in the territory as it goes beyond the scope of the regional administrations (the decentralised state services and regional councils). As a result, the SRCAE process offers an opportunity to raise awareness amongst local stakeholders and citizens (see the example of the citizens' workshop in Rhône-Alpes and the compulsory public consultation) on the theme of climate change and the challenge of energy transition, and allows for consensual guidelines to be established.
- The specific features of the territories play an important role, both in the current emissions profile of the region and in the choice of guidelines: The analysis by type of region confirmed that certain guidelines fit well with the energy-climate profile of the region and could be adopted by other regions in this category, and even in some cases be applied across the country (see Tables 7 – 10).
- Two sectoral issues appear to be key: Reductions in emissions from buildings and the territorialisation of energy. All the SRCAEs emphasised the crucial role of the building sector in the regional climate strategy and placed an emphasis on renovation to improve the energy efficiency of existing buildings and the spread of best practices for new build. With regard to energy, the drawing up of the SRCAEs has highlighted the importance of the choice of assumptions regarding the energy mix to be retained. All the SRCAEs focused on the development of renewable energies, particularly those relating to forestry resources in “agricultural” regions, and on wind power.
- The implementation of SRCAE guidelines will require mobilisation at all levels of responsibility, including at infra- and supra-regional level: the participation of the various stakeholders (representatives of regional councils, the state, the private sector, citizens, etc.) produced a certain number of consensual guidelines, which sometimes depend on other stakeholders than the region. These may involve policies at the European level (e.g.: the level of ambition of the European Emissions Trading System on industrial sites), the national level (e.g. the level of inclusion of biofuels) or infra-regional (for the densification of city centres for example). Some of them also require private initiatives, in particular where guidelines in the agricultural and industrial sectors are concerned.

This report, which is one of the first to analyse the SRCAEs, gives an overview of territorial issues for France’s energy and climate transition. This theme will be at the heart of the political debate in the coming days and months during a number of key events. Firstly the environmental conference of 14 and 15 September 2012, where participants will include representatives from local and regional authorities, and which will address the energy transition (with a sub-topic on the thermal renovation of housing), environmental taxation (with a sub-topic on financing the measures) and governance (with a sub-topic on the study of new

responsibilities for local authorities) – sub topics which are also covered in the SRCAEs. Next will be the national debate on energy transition, scheduled for Autumn 2012, with a significant territorial focus. This could draw on the work already carried out for drafting the SRCAEs and detailed in this report. Lastly, a law giving a timetable for the energy transition is planned for mid-2013 and should announce major long-term investments, in particular in the renovation of buildings and the renewable energy sector.

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ANNEX: CREATING THE TYPOLOGY FOR FRANCE'S METROPOLITAN REGIONS.

Table 12 shows all the variables used to characterise what, in theory, influences the region in its climate strategy.

Table 2 - Variables utilised for the typology of regions

Variable	Role of the variable in the analysis
Agricultural GHG emissions (%)	Takes into account the carbon footprint of the agricultural sector
Industrial GHG emissions (%)	Takes into account the carbon footprint of the industrial sector
Building GHG emissions (%)	Takes into account the carbon footprint of the building sector
Transport GHG emissions (%)	Takes into account the carbon footprint of the transport sector
Per capita GDP (thousands of euros)	Measures the financial capacity of the region to invest in limiting its emissions
Surface area (km²)	Takes into account the size of the territory which influences the types of GHG emissions reduction actions
Urban population/rural population (%)	Takes into account how homes and the population are distributed across the territory.
Total population (thousands of inhabitants)	Determines the size of the region in terms of number of inhabitants

Source: CDC Climat Recherche based on INSEE (2010) and the GHG inventories published by MEDDE.

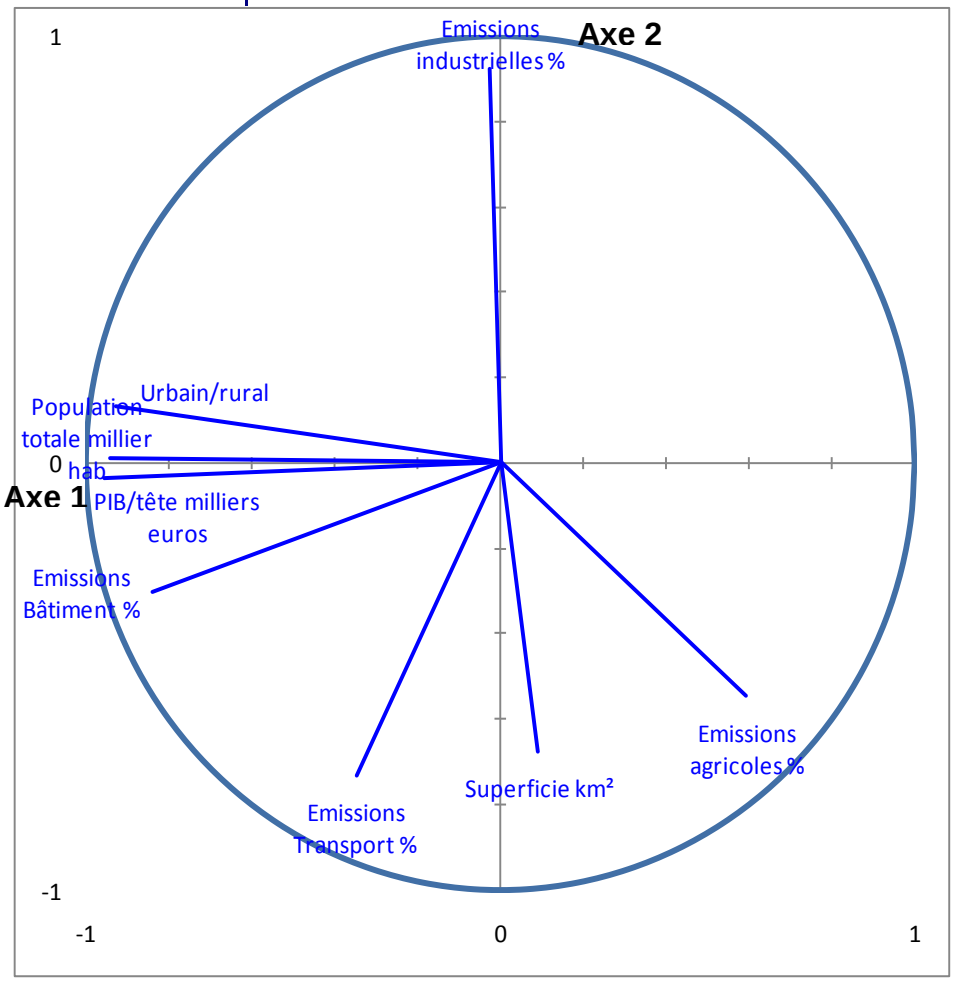
The variables were chosen to test their influence on the emissions profile of the regions and the possible measures for reducing these emissions. For example, the organisation of a public transport network can be influenced by a prominent urban structure in a region: The typology must make it possible to verify that transport-related emissions reduction actions are influenced by this variable. These variables also sanction the financial feasibility of the actions: Per capita GDP is an estimation of the region's financial capacity.

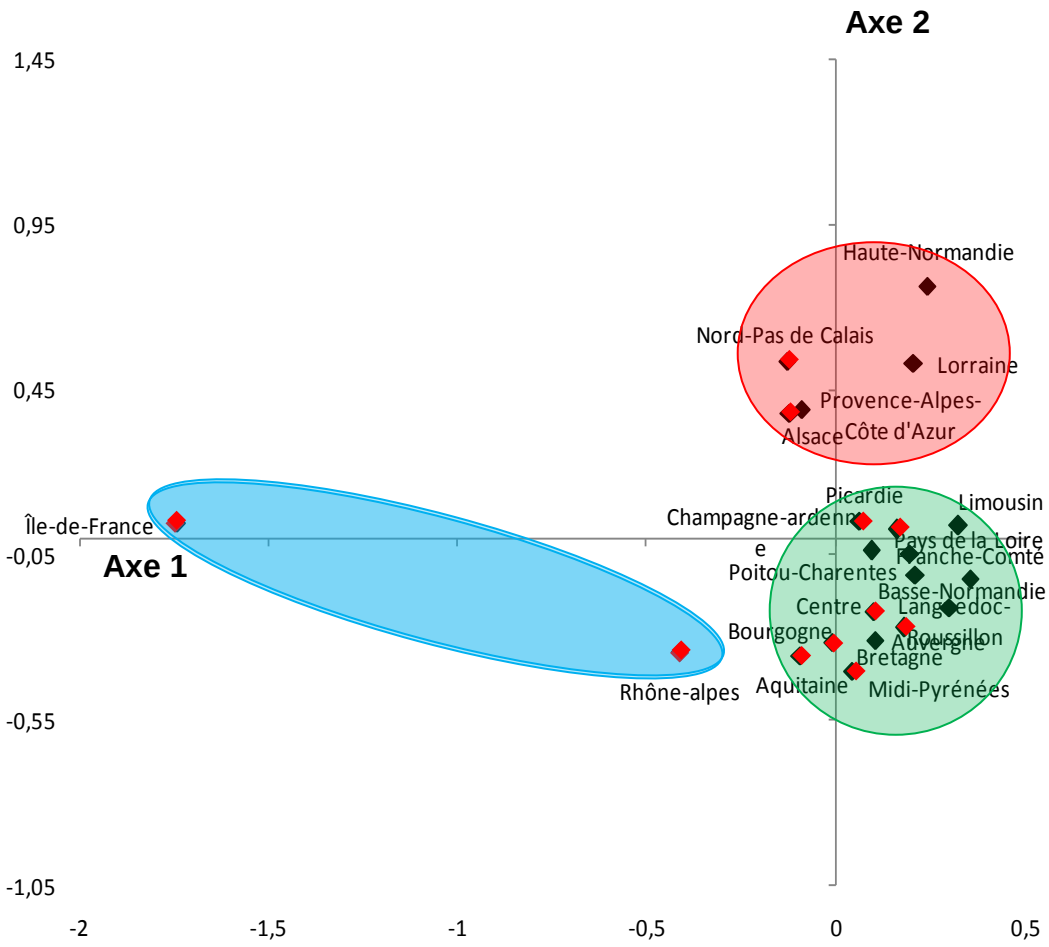
The typology was created from these variable using a principal components analysis: this is a statistical tool that makes it possible to visualise the regions on a two-dimensional graph according to a number of non-redundant variables[14]. Figure 6 shows the results of this analysis. The graph on the left shows the various regions, distributed over two axes: These two axes make it possible to represent the correlations existing between the variables and the relative importance of these variables. The graph on the right gives the details - The variables are represented by a line: i) The closer together the lines, the closer the variables correlate, ii) the closer the extremity of the line is to the circle, the more influence the variable has on the positioning of the regions in the graph.

The aim of this analysis is to categorise the regions according to the characteristics that best represent them. It has highlighted the existence of three types of regions, characterised by their proximity on the graph.

[14] The Principle Component Analysis (PCA) is in this case enhanced by the use of variables that have the least possibe correlation, in order to avoid certain variables having disproportionately more influence than others. For example, the absolute values of GHG emissions have not been used as a variable as they are correlated with the surface area of the region.

Figure 6 - Typology of metropolitan regions.

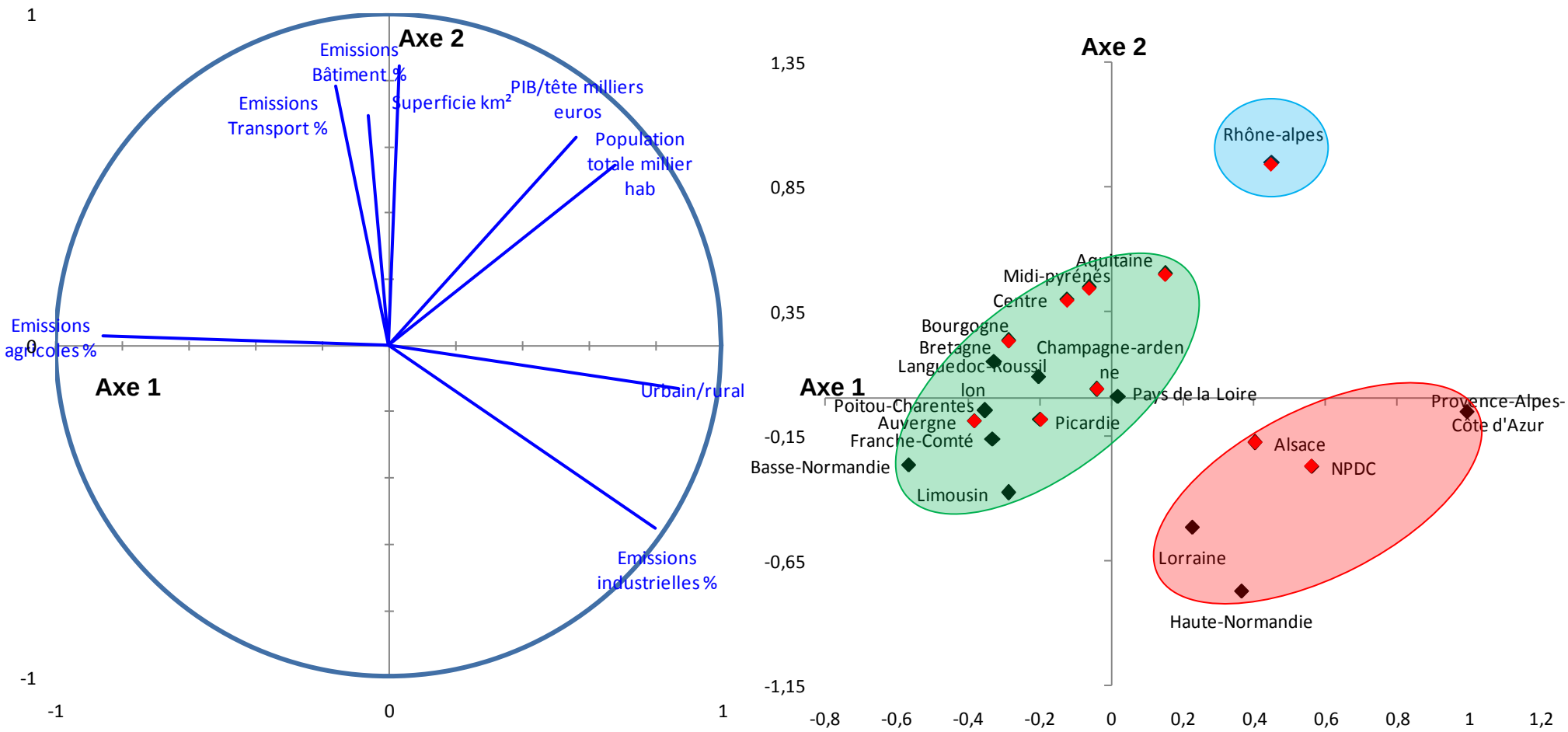




Note: The red points represent the regions studied in this report.

Source: CDC Climat Recherche based on INSEE (2010) and the SRCAEs of the regions studied

Figure 6 - Typology of metropolitan regions except the Ile-de-France



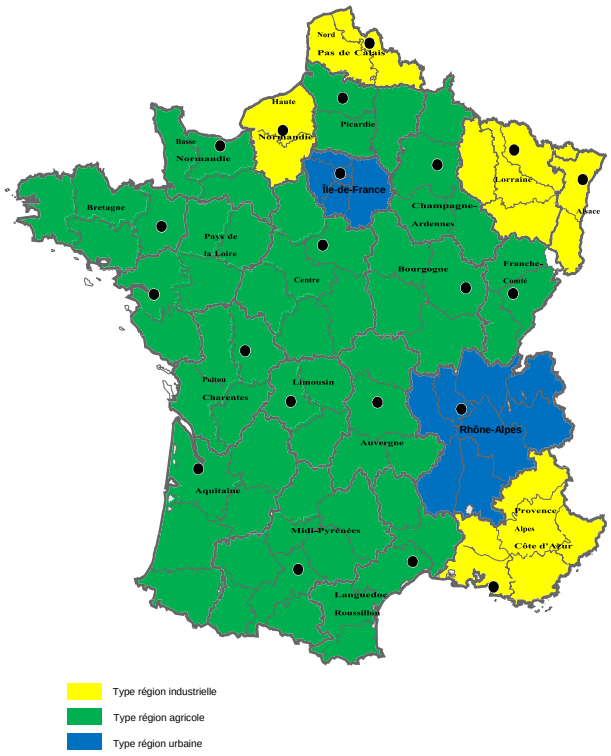
Note: The red points represent the regions studied in this report.

Source: CDC Climat Recherche based on INSEE, La France et ses régions (2010) and the SRCAEs of the regions studied

Figure 7 presents the results of the typology without the Île-de-France region, as the urban dimension of this region means it presents very different characteristics from the other regions, which extends the graph in Figure 6. Figure 7 highlights the particular position of the Rhône-Alpes region, whose transport and building emissions have more impact than in the other regions.

Figure 8 presents the results of the typology of the regions, except for Corsica.

Figure 8 - Typology of regions



Source: CDC Climat Recherche

Three types of regions emerge:

i. **Industrial regions:** This type of region is characterised by the high level of industrial emissions (see axis 1 of Figure 6). Even though we can see a certain diversity in terms of surface area (between Alsace and Provence-Alpes-Côte d'Azur[15], for example), the proportion of industrial emissions is more significant than the other categories of emissions and thus defines the type.

ii. **Agricultural regions:** This group is characterised by high agricultural emissions, a low urban/rural ratio and low per capita GDP. (see axis 2 of Figure 7). This category corresponds to regions with a high percentage of agricultural activity and low density housing that is not concentrated in large urban centres (with the exception of Aquitaine with the Bordeaux agglomeration).

iii. **Urban regions:** This category includes two regions where the characteristics include a high proportion of GHG emissions from the building sector and a high urban/rural ratio (see axis 2 of Figure 6). Ile-de-France occupies a singular position in the French regions, notably in terms of population density and per capita GDP. However, it is pertinent to include Rhône-Alpes and Île-de-France in the same category as they are subjected to similar constraints: high emissions as a result of the age of their buildings, and the number of car journeys of their large populations. For these two variables in particular, the Rhône-Alpes region more closely resembles the Ile de France than the other regions.

[15] The Provence-Alpes-Côte d'Azur region has not been included in this report as its SRCAE had not been published at the end of July. Its presence in the group of "industrial" regions can be explained in part by the steel plants at F os-sur-Mer which have a high impact on GHG emissions.

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