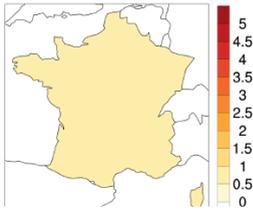


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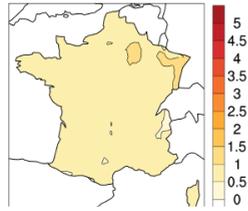


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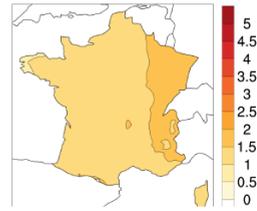
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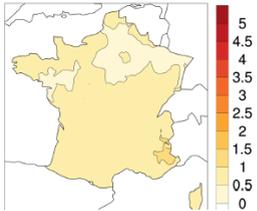


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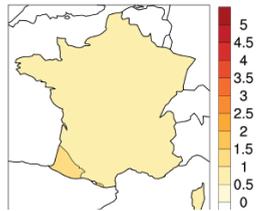
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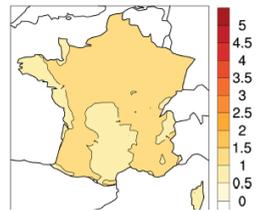
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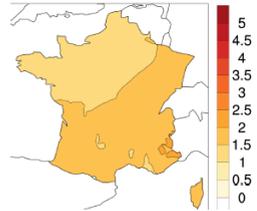
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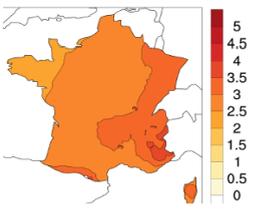


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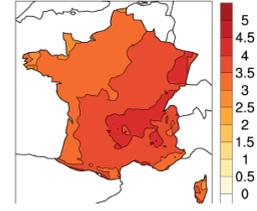
**France's adaptation to
global climate change**

Antoine Bonduelle
Jean Jouzel

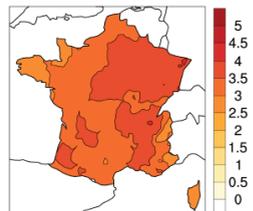
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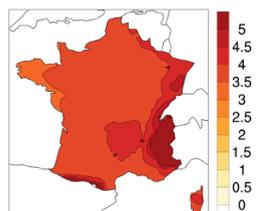
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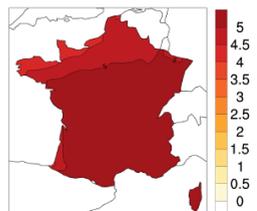
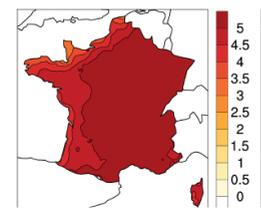
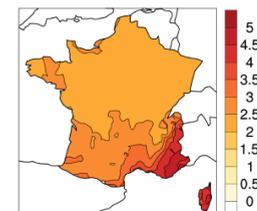
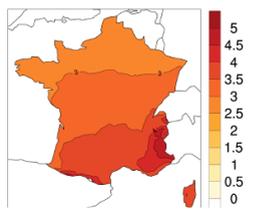
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RÉPUBLIQUE FRANÇAISE
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CONSEIL ÉCONOMIQUE
SOCIAL ET ENVIRONNEMENTAL

Les éditions des
JOURNAUX OFFICIELS

2014-13
NOR : CESL1400013X
Friday 23 May 2014

OFFICIAL JOURNAL OF THE FRENCH REPUBLIC

Mandate 2010-2015 – Session of 14 May 2014

FRANCE'S ADAPTATION TO GLOBAL CLIMATE CHANGE

Opinion of the Economic, Social and Environmental Council
on the report submitted by

Mr Antoine Bonduelle and Mr Jean Jouzel, rapporteurs

on behalf of the
Section for Environment

Question referred to the Economic, Social and Environmental Council by a decision of its Bureau dated 10 July 2012 applying Article 3 of the amended Ordinance no. 58-1360 of 29 December 1958, concerning the organic law relating to the Economic, Social and Environmental Council. The Bureau entrusted to the Section for Environment the preparation of an opinion entitled: France's adaptation to global climate change. The Section for Environment, presided over by Ms Anne-Marie Ducroux, appointed Mr Antoine Bonduelle and Mr Jean Jouzel as rapporteurs.

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FRANCE'S ADAPTATION TO GLOBAL CLIMATE CHANGE

Summary of the Opinion¹

In the face of climate change linked to human activity, adaptation is essential. There is, of course, still a critical and urgent need to limit global warming to less than 2°C by reducing greenhouse gas emissions (see IPCC report). Even at this level, detrimental consequences will be felt in the overseas territories and then in mainland France. For this reason, France must prepare for the changes and increased risks associated with the challenge of climate change.

The already noticeable changes to the climate will continue to have increasingly detrimental consequences. Each region will face its own challenges, be these new diseases or allergies, coral mortality, risks to peatlands and vulnerable rainforests, or fires in areas already made fragile by coastal urbanisation and the degradation of natural zones. In addition to the threat of sea level rises and flooding, the impacts will be felt in the form of increased drought in the Mediterranean basin, more frequent heat waves and extreme rainfall.

This ESEC opinion focuses on adaptive measures for humans, particularly in their interactions with water, biodiversity, land and marine ecosystems, agriculture, fisheries, forestry and health in mainland France and the overseas territories. It takes into account the Climate Change Action Plan, prepared and steered by France's National Observatory on the Effects of Global Warming (ONERC), currently undergoing its mid-term review. This plan has been put into action very unequally from sector to sector. To progress further, this «Adaptation» opinion insists on the need for dialogue and learning at the regional and supra-regional level. This is the natural level at which climate change responses should be planned (II-I). Credible climatic projections and arbitration systems will be needed to ensure that public interests continue to be served, despite crises and changes (ii-ii). Finally, research will be required in order to increase the theoretical and practical knowledge needed to cope with a climate that is very different from the current climate (II-III).

Create a shared vision for climate action in the regions

To tangibly involve all actors in adaptation, data and studies will need to be popularised and made accessible. Each actor must be in a position to help develop informed responses to changes that are certain, but of as yet undetermined extent and scope.

The implementation of concrete, targeted services for each sector or region will be a key requirement for this mobilisation. This will involve the generalisation of observatories in the major regions, which will need to work jointly with citizen and professional networks. In addition, scientific teams should be asked to formulate regional indicators.

¹ **The draft opinion was adopted in its entirety by public vote with 161 votes and 2 abstentions** (see annexed voting results).

Furthermore, risk factors must be the object of consultation between the State, the communities and representatives of economic, social and environmental actors, with support from experts. Specific work needs to be conducted with the insurance sector.

- **Health.** Adaptation will need to be taken into account in the National Health-Environment Plan and in national health and research strategies. The idea is to adapt the framework of regional health strategies to global warming priorities, in particular Regional Health-Environment Plans, and to involve the hospital and research sectors in the formulation of Territorial Climate-Energy Plans.
- **Agriculture.** The aim is to harmonise different adaptation and action time frames, from short-term consultancy to medium and long-term changes. Production systems for each region will also need to be improved, with priority given to agronomic solutions to prevent soil impoverishment and to combat erosion in the face of extreme rain and drought.
- **Forestry.** The grouping of private owners and the creation of sustainable management plans must go hand in hand with the development of a vision for adaptation that is shared by private landowners and public-sector forestry managers.
- **Biodiversity.** The priority is to safeguard ecological continuity as identified in national and local government plans. Reflection will need to begin on policies for protected spaces with regard to currently observed or future climate change. Emerging know-how will need to be developed in terms of the integration of plant and animal biodiversity in urban planning, in light of the heightened risk of heat waves.
- **Seas, oceans and fisheries.** Priority must be given to ecosystem preservation and restoration, and in particular to remarkable ecosystems such as mangrove forests, coral reefs and wetlands, and to the reduction of artificial coastal development. There is a need for reflection on coastline vulnerability and management, and on the reappraisal of all built-up infrastructure and areas as regards potential climate change.

Incorporate climate adaptation into public action based on common rules

For the planning and implementation of adaptation policies, the ESEC is firmly committed on the one hand to national-regional regulatory frameworks, and on the other hand to operational local climate plans centred around appropriately-sized inter-municipal programmes. These policies must be coordinated with mitigation actions. The strategy must be coherent, ambitious and link all areas of the country. In particular, future risk prevention must be the object of a higher degree of enforcement.

The ESEC also proposes that reference projections and vulnerability maps for climate change be incorporated into planning documents. These reference climate projections and vulnerability studies must be accessible to all prior to the formulation of climate plans.

As regards Civil Security, the Council recommends incorporating available knowledge on future climates and their impacts into risk prevention and management documents, specifically by updating local urban planning plans. To reflect this, the term «natural risk» could be removed from their titles.

Public adaptation policies will require a high level of national solidarity, particularly as regards the Overseas Territories.

Develop basic and applied knowledge

The scientific community must be supported, particularly in the formulation of climate projections with an emphasis on the regional level, and in impact modelling for territories, natural areas and professional sectors.

These objectives will require the development of new calculation models and codes and associated methods, and of climate services for assessing impacts and the vulnerability of economic, environmental and societal activities to climate change. Particular attention will need to be given to extreme phenomena and the risks associated with the most pessimistic scenarios. In order to do so, basic and applied interdisciplinary research will need to be conducted both in terms of integrated climate-impact modelling and socio-economic and cultural issues.

Moreover, health-environmental research must be given greater priority through clear policy decisions and the corresponding budgetary resources. These choices must be reflected in the priorities of the French National Research Agency (ANR).

Finally, agronomic research and agricultural innovation must be consolidated in order to promote the development of better-adapted and more resilient agriculture: by anticipating the development of diseases and pests, and by reaffirming the centrality of the food safety objective.

We need to espouse the idea of a future that is significantly different from the present and factor this parameter into all studies of production sectors, conditions governing the exercise of occupations, professional practices and the anticipatory management of jobs and skills at all levels.

Opinion

Observation

Contextual factors and definitions

Context: Organise to confront the challenges of climate change

The winter of 2013-2014 brought with it a number of extreme events: major droughts in Australia and California, an exceptionally cold spell in the eastern United States, severe flooding in France and the United Kingdom with both countries battered by giant waves on their seafronts, and all this during a winter that was warmer than most historical records. With the global financial crisis and the failure of the Copenhagen Summit in 2009, the climate debate been somewhat sidelined. These events brought it back into the headlines.

Since 2010, thousands of scientists from all over the world who met for the Intergovernmental Panel on Climate Change (IPCC) had been preparing their fifth report, which was recently published in three volumes to be accompanied by a summary document. These volumes separately examine scientific factors (i), impacts, vulnerability and adaptation (II) and mitigation (III) and confirm and expand upon the assessments of previous reports. These assessments are very timely, with one year before the «Paris 2015» climate conference, «COP 21»: the reality of climate change is no longer in doubt, its consequences could be major, limiting warming to less than 2°C is becoming difficult and will require a high level of political will.

In 2011, France adopted a National Climate Change Adaptation Plan (PNACC) setting out climate scenarios. Furthermore, we are seeing, albeit in a somewhat fragmentary manner, the drafting of «adaptation» sections into the actions of coordinating bodies and the work of observatories, regional land-use planning programmes and local government climate-energy plans. Other actors, particularly in the business sector, are beginning to address the subject. However, it is vital for our country to become organised in order to meet the challenges of climate change.

Adaptation and mitigation

Adaptation to climate change is defined by the IPCC as *«adjustment in natural or human systems to a new or changing environment. Adaptation to climate change refers to adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. Various types of adaptation can be*

distinguished, including anticipatory and reactive adaptation, private and public adaptation, and autonomous and planned adaptation.»

Adaptation is therefore the result of the observation that climate change is happening, that its effects may already be felt across a number of natural and human systems and that preventive measures are necessary. It is clearly distinct from mitigation efforts, which must be carried out through «*an anthropogenic intervention to reduce the sources or enhance the sinks of greenhouse gases*».

Action in both directions is vital. Without an emissions mitigation policy, the resources required in order to adapt to climate change upheavals will be inordinate. Without an adaptation policy, human societies and environments will be condemned to suffer the worst consequences of the effects of global warming, since mitigation policies are unable to offer any protection from the changes already inherent to coming climate changes.

The adaptation debate involves a series of core concepts such as uncertainties, impacts and risks, vulnerability and resilience (see glossary). Accordingly, the *uncertainty* inherent to any adaptation strategy indicates the need to develop cohesion and *resilience* on the part of society and its institutions. There is an increasing need to draw a distinction between effects that are certain, for example global warming or sea level rise, and the increasing risks of meteorological events or flooding, characterised by their increased frequency and severity. Likewise, *vulnerability* is linked to the risk of a phenomenon, to the possibility of harm, depending on whether or not humans, installations or valuable natural areas are located where the phenomenon occurs, and finally to the preparedness of society. Societies themselves are able to set acceptable *limits* for adaptation.

Some further points that draw a fundamental distinction between adaptation and mitigation are:

- their *time scales* vary since limiting warming to 2°C requires committed action to stabilise global emissions between now and 2020, followed by an approximately three-fold reduction between 2020 and 2050. As regards adaptation, the most serious consequences such as sea level rises will occur more in the second half of the century and beyond;
- the *collective interest* as regards adaptation is defined at the level of the area lived in, the region, and, less commonly, the continent. Accordingly, there is no need to wait for a global agreement for a decision to be taken at the appropriate level to construct a seawall or a floodplain. Economists speak of a «microeconomic» problem. This is totally different for climate change mitigation, which is an overarching issue involving the management of a global public asset;
- the *measurement* of mitigation can be in tonnes of carbon dioxide equivalent emitted or avoided. This universal measurement is not appropriate for adaptation, which must be based on environmental and economic vulnerability indices, and on the preparedness of societies to deal with an uncertain future. Such indices are still unstable and non-consensual. There is also the issue of measurement of the cost-benefit ratio for adaptation measures.

What links adaptation and mitigation is the search for win-win strategies referred to as «*no regret options*». These actions would be advantageous for a region, country or group of countries from an environmental, social and economic point of view, even if the rest of the world were not to take any action, or if the targeted risk were not to materialise. For example, the planting of hedges to protect an area against erosion and flooding.

Conversely, uncertainty regarding the impacts of climate change, and also short-term choices or a poor assessment of the value of certain areas could lead to the wrong policy being applied, which is termed «maladaptation». For example, a building not designed for comfort in the summer and built using old standards will be very expensive to adapt for summers with soaring temperatures.

Key climate impacts and risks at the continental level

The worrying diagnosis of the IPCC

The second volume of the IPCC's fifth report adopted at the end of March 2014 amply covers the difficulty of reducing uncertainty regarding impacts. It often draws a distinction between the period spanning from now to 2050, for which impacts will be of equal magnitude whatever the global level of mitigation is, and the second half of the century in which risks and damage that are certain to occur will be much greater and more extensive in the event of warming that exceeds the target level of +2°C.

Emerging risksⁱ relate, in particular, to a combination of the deterioration of various different Earth systems, the urbanisation of maritime zones and the increasing vulnerability of societies. Therefore, functional governance is a prerequisite in order to combat the consequences of climate changeⁱⁱ when an increasing number of States appear incapable of organising the most vulnerable societies.

At the global level, major impacts are expected from the next few decades onwards, even in optimistic scenarios in which warming is lower:

At the global level, major impacts are expected from the next few decades onwards, even in optimistic scenarios in which warming is lower:

- for natural environments, the impoverishment and even the irreversible collapse of coral reefs and associated species, and the risks of the drying of forests and tropical peatlands which have become vulnerable to fire. In addition to the major loss of biodiversity, this deterioration of essential Earth systems may accentuate climate change^{iv};
- for agriculture, perturbation of rainfall patterns is already considerable in exporting regions such as Australia and the Western United States, and could affect regions with already dry climates such as certain regions of India, the Mediterranean basin and the Sahel. An increase in the number of poor harvests will affect the cereals markets and will have serious consequences for dependent countries. The global food system is therefore vulnerable;
- for Arctic regions, the significant warming of the North Pole region is bringing about a radical change of natural environments, increasing summer ice melting and limited snow cover on the ground. The few anticipated economic and social benefits - the extension of cultures northward, the opening up of maritime routes and mineral resources - are counterbalanced by the emerging risk of methane emission from thawing landmasses.

Such climate change acceleration events, in which thresholds are exceeded and societies are left potentially unable to deal with them, constitute a serious risk identified

by the IPCC. These threshold levels are still not known with certainty, but such risks will be limited by committed mitigation action, by the preservation of ecosystems and by reducing human vulnerability^V.

More modest harm in Europe

In Europe, the expected impacts in the next few decades will be measurable but still modest in comparison with the rest of the world. The most serious consequences may be due to external impacts, for example the price of cereals, or conflicts and migration between continents linked to the impoverishment of dry regions that are already marginalised.

On our continent, the general warming forecast by models is characterised by decreased rainfall in the Mediterranean and increased rainfall at high latitudes. The models suggest an increase in certain extreme events, drought and particularly high rainfall with milder winters and dryer summers. However, this is merely a general trend which may vary considerably from one area to the next. The IPCC has set out the consequences of this:

- droughts and heat waves will have major impacts on forest fires, economic activity and agriculture, and also on buildings. This is the most critical issue for forestry activities;
- in towns and cities, heat waves in combination with pollution and pollens could pose a danger if societies are not prepared. Also, livestock farming will be significantly impacted by heat waves. Decreases in river flows also means an increased risk of pollution, particularly from nitrates;
- an increase in extreme rainfall is also highly likely. This will affect buildings, infrastructure and water quality;
- rising sea levels may alter the form of extreme tidal events or storms. The rise will range between 30 and 80 cm according to models and scenarios at the end of the century, and will continue thereafter. The erosion of dune systems poses a threat to coastlines;
- the climate change will have negative impacts on biodiversity and will weaken all local ecosystems, including a risk of the spreading of invasive species;
- for forestry, warming could result in massive dieback seriously threatening its long-term survival, timber production and the provision of associated ecosystem services;
- in addition to increased risks linked to heat waves and pollen levels, human and animal diseases could appear or spread. This is already the case for Lyme disease which is spreading and threatening certain tourist activities. Even more serious is the extension of dengue and chikungunya-carrying mosquitoes and the more long-term risk of leishmaniasis, which have been cited by the IPCC;
- at 5°C warming on our continent, which is foreseeable at the end of the century in a high greenhouse gas emission scenario, the number of catastrophic years for agriculture is at risk of increasing (three to nine years out of every ten for 50% of production as opposed to three years currently), to the extent that the IPCC suggests that Europe's food self-sufficiency could be under threat.

Address the impacts of climate change at the political level

Adaptation in line with the UN vision

The principles of international climate action are based on the UN Framework Convention on Climate Change (UNFCCC) signed in Rio in 1992, and currently ratified by 195 countries. Under the auspices of the Convention, «COP 21» has been organised, which will bring together all of the Signatory Parties. Although discussions will primarily address mitigation, the very principle of the Convention also pertains to adaptation. Its ultimate objective is to prevent any dangerous interference by human activities in the climate, so as to enable *«ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner»*. This has resulted in the international community committing to a global average limit of 2°C. Even so, some fifty very vulnerable countries are continuing to demand a limit of 1.5°C from the UN.

However, only Commitment No. 1 (e) of the Convention pertains directly to adaptation, stipulating that the States shall *«cooperate in preparing for adaptation to the impacts of climate change; develop and elaborate appropriate and integrated plans for coastal zone management, water resources and agriculture, and for the protection and rehabilitation of areas, particularly in Africa, affected by drought and desertification, as well as floods»*.

Moreover, it is anticipated that mitigation measures will, in turn, have major consequences, not all of which will be positive. The Climate Convention and the Kyoto Protocol make provision for indemnification of countries affected by the negative impacts of mitigation strategies, which is interpreted by certain oil-producing countries as a right to compensation in the event of energy savings in consuming countries! In a more serious vein, the option of a severe curtailment of aviation has been cited, which is no doubt needed in the long-term according to the IPCC: this could have a major impact on island countries and regions that depend on tourism.

On a more speculative note, the international community is also highly reticent about **geoengineering** techniques which involve deliberate actions designed to counteract climate warming by acting on solar radiation or on the carbon cycle.

Adaptation in the policies of the European Union

After a Green Paper in 2007, followed by report by the European Environmental Agency in 2008, the Commission published a White Paper in 2009 entitled «Adaptation to Climate Change: Towards a European Framework for Action». This emphasised the importance of preventive measures, and of an integrated and coordinated approach at the Community level, supporting measures taken at the national, regional and local levels. The implementation of measures provided for in the White Paper have been the object of an impact analysis^{vi} published in February 2013.

The majority of the envisaged measures have been undertaken, however *«adaptation is in most cases still at an early stage, with relatively few concrete measures on the ground. Some Member States have developed sector-specific plans, such as plans to cope with heat waves and droughts, but only a third carried out a comprehensive vulnerability assessment to underpin policy. [...] indicators and monitoring methodologies have hardly been developed»^{vii}*.

The Commission presented the European Union (EU) strategy in April 2013^{viii}, together with a Green Paper on the insurance of natural and man-made disasters, which was clearly articulated within the context of Europe's increasing exposure to risk as a result of global warming. The issue of insurance is becoming increasingly significant as *«the minimum cost of not adapting to climate change is estimated to range from €100 billion a year in 2020 to €250 billion in 2050 for the EU as a whole»*.

For the EU, uncertainty is no excuse for inaction. Measures to be undertaken must take into account and give priority to what are termed «win-win» or «no regret» measures. The strategy also highlights the fact that *«Ecosystem-based approaches are usually cost-effective under different scenarios»*. Finally, measures taken must be coordinated and adopted in synergy with all disaster risk management measures, both at EU level and at Member State level.

To encourage Member States to adopt comprehensive adaptation strategies, the Commission will develop an adaptation preparedness scoreboard to measure Member States' level of preparedness. On the basis of this scoreboard, it will determine whether or not to propose the adoption of a legally-binding instrument during the assessment scheduled for 2017.

The desire to integrate climate resilience into EU policy is based on three key actions:

- facilitate its integration into the common agricultural, fisheries and cohesion policies;
- improve infrastructure resilience through work on standards in the industrial, energy, transportation and construction sectors, and formulate guidelines aimed at project developers;
- promote insurance and financial products for «climate-proof» investment decisions.

The draft Multiannual Financial Framework for 2014-2020 proposes increasing climate-related expenditure (mitigation and adaptation) to 20% of the EU budget. This concerns all EU financing programmes, particularly structural and European investment funds (cohesion funds, ERDF, ESF, EAFRD and EMFF).

This European strategy was the object of an opinion by the European Economic and Social Committee and an opinion by the Committee of the Regions. The Committee is concerned about possible limitations on the contracting of insurance, or hikes in the cost of policies, and has highlighted the risk that certain urban areas will become «*uninsurable*». For the European ESC, the adoption of a legally-binding instrument needs to be envisaged without delay.

The French context: a National Adaptation Plan and other actions currently under way

Contextual factors

In France, following a legislative amendment to the Environmental Code in 2001, «*the fight against the intensification of the greenhouse effect and the prevention of risks linked to global warming are recognised as being national priorities*». This law established the «*National Observatory on the Effects of Global Warming (ONERC) in mainland France and in the overseas departments and territories*» tasked with the collection and dissemination of information, studies and research on risks linked to global warming and extreme climate phenomena.

Reporting to the General Directorate for Energy and Climate (DGEC), within the Ministry for Ecology, Sustainable Development and Energy (MEDDE), the ONERC issues reports that may include «*recommendations on potential measures of prevention and adaptation in order to limit the risks associated to climate change*». It prepared the National Adaptation Strategy, which was adopted in 2006. In 2009, the Grenelle Law I announced «*a National Adaptation Plan for a variety of areas of activity*» by 2011. The report of Messrs Perthuis, Hallegate and Lecocq on the economics of climate change adaptation^x was produced during the same period.

To prepare the measures, two climate projection scenarios^x were used as a reference, an optimistic and a pessimistic scenario. Warming is similar for both projections for 2030 and 2050, at between + 0.5°C and + 1.5°C. Conversely, at the end of the century it becomes greater for the pessimistic projection (between 2.5 and 3.5°C) than for the optimistic projection (between 2 and 2.5°C). For rainfall, the pessimistic scenario envisages a 10% decrease towards 2050, and a 30% decrease by 2090 for the summer season, whereas this decrease occurs later in the optimistic scenario. Finally, the number of days on which the maximum temperature is anomalously high will increase sharply in both cases, with marked lengthening of summer droughts in all regions. It should be noted that the highest emissions scenario for the last IPCC report leads to summer warming of more than 4°C in a large portion of France.

A consultation phase gave rise to two hundred and eleven recommendations which were drawn upon by the National Climate Change Adaptation Plan (PNACC) published in

the summer of 2011. The revised budget for the Plan stands at one hundred and sixty-eight million Euros.

The approach taken by the PNACC appears to be a joint learning process that allows for the identification of issues. The guiding principles of the Plan are improving knowledge on the effects of climate change, integrating adaptation into existing public policy, informing society with a view to an understanding of the issues, and taking into account interactions between activities.

Components of the Plan

The PNACC has set itself three priorities: to increase knowledge, to identify methodologies for taking adaptation into account, and to consolidate observation and alert mechanisms.

To this end, it recommends numerous actions and measures, particularly in the research and observation fields. In total it includes twenty «action» sheets which primarily concern the living world in the broadest sense (health, water, biodiversity, agriculture, forestry, fisheries and aquaculture) and the most vulnerable zones or infrastructures (coastline, mountains, transport infrastructure and services, urban planning and the built environment, and natural risks). Each sheet contains between one and five actions for which the plan designates «leads» (directorates of central government departments or public-sector entities) and partners, sometimes from civil society (associations), and promotes a flagship action. The PNACC emphasises issues pertaining to methodology, the development of observation, data collection and data availability, the creation of specific indicators or the integration of adaptation into existing indicators, impact studies on activities or vulnerability inventorying, and the consideration of adaptation in strategies and plans, etc.

As the ONERC representatives stated in their hearing, the approach initiated by the PNACC consists of enabling all actors to become capable of adapting to future climatic conditions, the details of which are uncertain. The first stage in this approach is awareness of the sensitivity to climate of living organisms and human society, and of efforts to adapt to the current climate which must be made from now on.

Appraisal factors

Opting for division by subject area makes it easier to allocate responsibility for each issue to a ministerial department by means of a sector-specific approach. However, it is unfortunate that the PNACC was not validated by the Inter-Ministerial Committee for Sustainable Development, which last convened back in 2010.

The content of the sheets and actions is very diverse, reflecting a highly unequal degree of mobilisation among sectors, which is itself a result of significant disparities in progress made in terms of reflection on adaptation. For this reason, very few inter-disciplinary links have been established at this stage by the PNACC.

The scheduled mid-term review was presented to the National Council for Ecological Transition (CNTE) (and then published on the Ministry's website in January 2014: 92% of planned actions have begun, 60% are in on course to meet their objectives and 35% may

only partially attain their objectives. The percentage of actions that are behind schedule or have been stopped is low overall, but for four out of the twenty thematic sheets - interdisciplinary actions, health, energy & industry, and financing & insurance - the percentage of actions that are behind schedule, yet to start or have been stopped varies between 40 and 60%. This percentage is 20% for forestry and education and training sheets and 25% for the infrastructure and transport systems sheets. The actions are broken down into measures, and certain component measures within an action may be delayed or adjourned without the action being considered to be delayed or to have been stopped.

During their hearing, the ONERC representatives mentioned this review and the guidance to be given. They highlighted both the necessity and the complexity of the work required in order to forge cross-cutting links between sectors.

In the opinion of the ESEC, the overall unity of governance and the interconnection between the various levels require work in some respects. In terms of economic activities, particularly as regards accompaniment and transition, even though a number of joint analyses have been conducted, in the very near future it will be necessary to examine the adaptation capabilities to be developed, the local dynamics to be promoted, and the changes to be pursued. In its opinion of September 2013 «*Financing environmental and energy transition*»^{xj}, the Council recalled that «*the National Climate Change Adaptation Plan provides for an analysis of the costs of adaptation, yet this remains to be carried out.*» Finally, one significant area of work concerns indicators to assess the efficacy of the measures undertaken.

Referral to the ESEC

The impacts of climate change are still poorly understood, and with good reason, as they are based on climate models and scenarios which are by definition uncertain. Moreover, studies on the impacts of extreme scenarios are undertaken precisely in order to spell out a future that we refuse to accept. Accordingly, they spur us into action, so unacceptable are whole swathes of the future scenarios described by scientists for our societies, for the young people of today who will have to deal with the consequences of global warming in the second half of this century, and for future generations. Furthermore, whatever level of warming is experienced, a myriad of consequences will ensue for environments and economies country-wide and these will impact all of our fellow citizens. This is why choices had to be made.

This opinion, in response to a referral to the Section for Environment, gives priority to studying adaptation measures pertaining to living organisms, particularly as regards their interactions with water, biodiversity, ecosystems, agriculture, fisheries, forests and health in both mainland France and the overseas departments and territories. Therefore, it does not address the hazards of climate change as regards geopolitics or the global economy. Even though such issues will be raised, it does not deal with the issue of climate refugees, or impacts on transport infrastructure, energy industries and numerous other issues that still need to be addressed.

Although it makes no claim to be exhaustive, this opinion nevertheless endeavours to begin with the current adaptation situation in our country and to suggest avenues for accelerating the organisation of French society in the face of this threat. Indeed, the efforts needed for France to adapt will require the adherence and cohesion of the French

people and of all forces within society, both within mainland France and in the overseas departments and territories. This cannot be consensual for all aspects, but must be decided upon democratically, with the participation of all social, economic and environmental stakeholders.

This being acknowledged, the opinion is concerned with the dialogue and learning process required in regions both small and large. This is the natural level at which to plan climate change responses, within the context of a sustainable future (ii-i). To ensure unity at the national and European levels, arbitration systems will be need to be identified to ensure that public interests continue to be served, despite crises and changes (ii-ii). Finally, research will be required in order to increase the theoretical and practical knowledge needed to deal with climate challenges (II-III).

Proposals

Create a shared vision for climate action in the regions

How can we increase the involvement of our fellow citizens in adaptation to climate change? At this stage, it is not a question of creating new institutions or decision-making bodies but rather:

- identifying and evaluating existing frameworks for the planning and management of risks posed to communities;
- establishing links with measures from the national plan where relevant;
- making the best quality information available to all;
- pooling knowledge and observations to ensure their further development;
- and finally discussing possible responses at the regional level.

This primarily involves being able to have an informed debate on the consideration of risks by citizens, businesses and the community. Drawing on the most recent scientific knowledge, this debate should contribute to the creation of a collective culture that is prepared for future impacts and their associated uncertainties because it has taken these on board.

Reflection and planning at the regional level

Territorial organisation to be defined

What is now required is the increasing involvement of actors and movement towards tangible action. First and foremost this requires the mobilisation of existing collective planning capabilities, so as to incorporate adaptation into the regulation of our societies. Informed responses need to be developed to cope with changes that are certain but of as yet undetermined extent and scope.

The region is the foremost actor concerned, both through the organisation and planning competences of the region as an entity, and through its size, which is well-suited for public debate. It is also the level at which collective programmes are developed and subsequently voted upon and adopted, which are already envisaged as entry points for adaptation. Foremost among such programmes is the Regional Climate Air Energy Scheme (SRCAE), a master plan, the consolidation of which will be recommended further on in this opinion (II- 2.). **The ESEC therefore recommends the development of cooperation and multiple, coordinated partnerships between the regions, the State, local authorities and all actors.** The aim is to provide impetus for debate and study before thoroughly integrating adaptation priorities into the policies of these territories and bodies, through a more effective use of the potential offered by the existing institutional framework. In the overseas departments and territories, which face significant challenges, local authorities will enjoy considerable prerogatives (very broad Statutes of Autonomy for the overseas

collectivities (COM) and New Caledonia, and the possible granting of legislative powers for the overseas departments (DOM)). These will need to be fully exploited so that these communities improve their ability to implement effective public policy and regulations that are adapted to local priorities.

The first of these cooperative efforts concerns an appraisal process, with, on the one hand, the initial assessment of the PNACC, and on the other hand the regional and territorial plans and risk management plans. The identification of the incorporation of adaptation into these first-generation plans and an evaluation of the quality of this consideration could be made available to all. This appraisal would also highlight how the PNACC is taken into account by the sectors concerned and their level of maturity as regards adaptation.

Accordingly, our assembly takes the view that there is a need for initiatives and initial feedback to be assessed, evaluated and made available to all actors at the territorial level. Data enrichment, the circulation of information and exchanges of experiences should enable good practices to emerge and help communities that still have little involvement in adaptation to address the issue. This will also enable all stakeholders to move forward together, which is a necessary precondition for the formulation of an informed strategy with which to tackle the climate challenge.

Mainstream observation mechanisms

From the most advanced policies and the observations of those responsible for the PNACC, it emerges that local actors and citizens primarily seek knowledge, information and data regarding climate change and how this change is unfolding, and the knock-on effects that it will have on the environment and on activities, etc. In order to convince, mobilise and persuade these groups to act, there is a need for knowledge to be provided, and for information to be shared on climate change itself, on its effects and on the adaptation measures required.

The ESEC supports the idea of entrusting the Agency for the Environment and Energy Management (ADEME) with the pooling of research conducted within the context of SRCAE elaboration as comprehensively as possible, including the associated studies. To this end, our assembly recommends the use of existing regional observatories or of collective networks for the observation and evaluation of impacts, robustness and risks at the level of the region or homogeneous territories. This pooling, evaluation and research work should be conducted on a long-term basis.

Accordingly, a number of scientific teams exist within the regions whose work intersects with the issue of adaptation or the impacts of climate change. Their mobilisation, and the formation and steering of local networks of scientists tasked with addressing impacts, risks and policy decisions will be of vital benefit for the mobilisation of society. Knowledge, particularly as regards vulnerabilities, will need to be broken down at the local level as this is the level at which adaptation policies are implemented.

Like the tools used within the context of participatory science programmes, our assembly recommends combining networks of citizens or actors with observation programmes. Indeed, the association and professional actors concerned can play an important role in this process, since the issue of resilience is often coupled with that of biodiversity. This participation would have a multiplier effect which would benefit information provision on the one hand, and awareness raising on the other hand, as the actors concerned would become effective ambassadors for the cause.

With regard to impacts and risks, **interdisciplinary scientific teams should also be asked to develop regional indicators.** These statistical indicators should be designed so that they can be used by professions, professional sectors or chambers of commerce with a view to developing adaptation measures. This data could be aggregated at the national level by the CGET or the observation and statistics department of the Ministry for Ecology, in synergy and in conjunction with the ONERC.

Finally, knowledge creation (see chapter ii-iii) should also assist in the creation of scenarios that are consistent with science, and which could also be broken down by profession and by sub-region. The Agency for the Environment and Energy Management (ADEME) has already developed a teaching tool called «climate impact», which can simulate climate change impacts across a given area, and provide a preliminary analysis and some prioritisation hypotheses. Along with the provision of this tool, the agency is developing an accompaniment policy for sub-regional actors. Perhaps the future French Biodiversity Agency will adopt a similar approach. **Communities must now take a proactive approach incorporating these new instruments to initiate or fine-tune their adaptation policy.**

Towards a shared culture for addressing risks

The development of a genuine culture of adaptation to climate change among actors is a prerequisite. Beyond this, it remains to be established what should fall within the scope of regulation, negotiation or the voluntary initiative of actors or groups of actors. In this regard, discussions remain open.

The ESEC takes the view that this issue must be addressed jointly by the State, elected representatives, experts, trade unions, associations and companies, including those in the insurance sector. In its opinion on adaptation to climate change, the Prevention and Precaution Committee (CPP) pointed out that *«the implementation of adaptation measures will require (...) legal work to harmonise legislative and regulatory texts in a number of fields, with the introduction of a number of territorial development mechanisms»*. It is important that this project is completed in all of its areas.

Our assembly considers that the discussions will also need to cover what should be addressed at the national, regional or local level. . Indeed, not everything can be the product of decisions at the national level which claim to be exhaustive and are intended to be applied within the territories, even though a higher level of arbitration and collective standards will be necessary between diverging interests and in order to deal with new risks (see section II-3.). The concept of adaptation is becoming more widespread in French society, through projects that have been running in this field for a number of years at the national level (study on the cost of adaptation^{xii}, national adaptation plan, etc.) as well as the territorial level. The reflections generated by this dynamic are developing competence and a more open and comprehensive vision of the reality on the ground and the context in which activities will develop in coming years. All adaptation work is proving instructive and inspiring for the actors concerned.

The risks engendered by climate change and their inherent uncertainties nevertheless remain difficult to fully grasp in terms of the form these will take, the extent of their effects within the territories and the probability that they will arise or reoccur. Adaptation and risk management measures will therefore depend upon assessments conducted at the appropriate territorial level, as set out in the foregoing section. The CPP notes in its opinion^{xiii} that the analysis of risk management experiences has shown that stakeholders are consistent in their identification of two levels of risk: acceptable and intolerable. This categorisation delineates three areas: one in which the level of risk is acceptable and in which insurance cover and the satisfactory organisation of emergency services will be sufficient; another in which the level of risk reaches or exceeds the threshold for what is deemed to be intolerable and justifies the deployment of prevention programmes, even when these are costly; and a third level, falling between the first two, in which the risk is categorised as «alarming» by the CPP. This will apply either to rare and possibly dangerous events or to frequent events that are less serious in nature. In these situations, which give rise to differing assessments, it becomes difficult to reach agreement on the resources to be mobilised for prevention.

As a result, risk management by actors, in particular public authorities, must involve all stakeholders, not only in risk assessment but in the decision-making process as well. As decisions are taken within a context of uncertainty, they must also be flexible enough to be easy to revise or adapt, thereby avoiding the pitfalls of maladaptation.

In order for risk culture (as it exists in certain countries with regard to natural risks, for example) to take root in our country, the ESEC considers that it must form an integral part of environmental and sustainable development education in school curricula, vocational training modules, and in non-formal education. Reciprocally, when providing actors with data and analyses pertaining to climate change and its possible consequences in a given territory, a broader perspective must also be imparted which includes the role of ecosystems as a resilience factor (benefits of wetlands to regulate water flow, particularly upstream of watersheds and in floodplains).

Moreover, the ESEC considers it necessary to provide education to actors and citizens regarding risks, and systemic risks in particular. This would primarily take the form of an educational measure targeting populations, particularly those which are most exposed in the short and long term. This will involve, on the one hand, breaking down scientific results in order to show how serious the impacts are, and on the other hand showing that financial decisions need to take the long-term into account. Certainly, the cost of inaction will be far higher for the community than the upstream cost approved to limit warming and adapt to its consequences. This awareness-raising programme could be supported, in particular, by community education associations, which have developed techniques to ensure participation by all and in particular the most vulnerable communities.

In the absence of any certainties as to which approaches and methods to prioritise in order to inform and convince actors of the sound logic of integrating climate risk into their analyses and decision-making processes, **our assembly recommends the provision of audiovisual materials, evidence and tools to inform public opinion about public policy pertaining to the issue of climate change (particularly the link between mitigation and adaptation). It would also encourage the mobilisation of «popularisers» and specialists in human and social sciences in order to implement this change.**

Envisage future adaptation services, open up the debate within society

How can we get our fellow citizens involved and prepare them for the future climate? Even if the media, elected representatives and actors within society are fully involved, there is a risk that discussions will be limited in comparison with the population affected. And these discussions will only be useful if individuals understand the consequences of future climate change in a tangible way, for their families, their occupations and their environment. To take climate change adaptation further, it will be increasingly necessary to provide each individual with tangible services and information. This is how the certain new constraints and emerging risks will be taken on board for homes, managers of natural and agricultural areas, economic decision-makers and healthcare services.

This stage of adaptation will not remove the context of uncertainty or possible contradiction between professions or population categories. But it will encourage the increased involvement of all individuals and will demonstrate the need for coherence between actions. It will also increase the relevance of the actions proposed and their evaluation.

Since we have decided to focus this opinion on living organisms, the following proposals concern health, agriculture and forestry, biodiversity, oceans and fisheries, coastline and freshwater bodies, and the economy. These proposals suggest that specific services could be offered to our fellow citizens without, however, advancing a vision of adaptation that is set in stone, although they will form an integral part of the journey towards a better prepared society. For the most part, these proposals can be adapted to specific overseas contexts. Indeed, some are specifically designed for the overseas departments and territories.

Health

As was emphasised by Professor Alain Grimfeld during his hearing, although certain types of harm can be anticipated - for example, harm caused to ecosystems, to agriculture, to coastlines - the impact of future health crises is more difficult to grasp, particularly because of the paucity of studies. The health risks are not independent from one another, but rather can be correlated or systemic in nature. Studying these potential sources of harm and their impacts is particularly complicated.

Global warming will have direct and indirect effects on health, and will facilitate the emergence of illnesses associated with heat waves, which may or may not be pollution-linked, particularly south of the Loire. It may lead to the emergence or re-emergence of infectious or viral diseases in areas where these did not previously exist or had been eradicated. In the intertropical zone, the increase in vectors (insects) will facilitate the emergence of these types of disease as well as other pathologies if the quantity and quality of water and certain foods are affected, as is foreseeable (cholera, etc.).

Veterinary health, owing to zoonoses (infections that can be transmitted by animals to humans and vice-versa), the potential economic impact of animal diseases, and animal well-being, must also be addressed. For mainland France, climate change will notably cause changes in the distribution of pathogen vectors such as certain insects.

The overseas situation obviously differs from one territory to the next. In its dedicated report, the ONERC highlighted the fact that in Guyana and Mayotte, the level of equipment is insufficient. Population increase, problems accessing drinking water and the presence of yellow fever in Guyana are factors that already exist and which may worsen the situation. Overall, the ONERC notes that «*access to healthcare in general is still relatively deficient in certain overseas territories... regional healthcare plans (PRSP) are not always flexible enough to incorporate new knowledge...*»^{xiv}. The hearing of Mr Dorso, former Director General of Healthcare Services in Mayotte, also highlighted the closure of local prevention facilities. A report and an opinion issued by our assembly on «The healthcare offer in the overseas collectivities»^{xv} set out proposals that are all the more applicable now within the context of global warming.

In the PNACC, although it appears that the «*flagship measure*» concerning human health risk assessment, by the High Committee for Public Health's «*Health-Climate*» Group will be able to deliver results in 2015 (report coordinated by Jean-François Toussaint on the «*Health Consequences of Climate Change*», the objective of which is to anticipate the consequences for health of the adaptation measures proposed by the PNACC), the measure pertaining to the structuring of research deserves the utmost attention. The National Research and Innovation Strategy (SNRI) issued proposals regarding the health-climate issue, but did not allocate a dedicated group to the subject or designate it as a core area. **The ESEC recommends that this subject be fully addressed by the National Health-Environment Plan and in the National Research Strategy currently being prepared, one of the core areas of which is «resource management and adaptation to climate change».**

The ESEC supports the idea of adapting the framework of regional health strategies, and particularly of regional health-environment plans, to global warming priorities, which are medium to long-term priorities.

The hospital sector and medical networks need to participate in the formulation of territorial climate-energy plans. It would be desirable for healthcare personnel in general to be provided with education and awareness programmes on the priorities for adaptation and that these be incorporated into their initial and continuing training.

The resilience of hospital and civil security infrastructures (fire department, etc.) to the consequences of a disaster, and their ability to swiftly resume operations must be evaluated whilst incorporating the risk of major unforeseeable climate events, the effects of which could, in certain cases, be exacerbated by a public health crisis. Robust installations must become the norm, in relation to foreseeable climate change, both in mainland France and in the overseas communities.

In the overseas communities, reflection by regional areas, particularly maritime regional areas, should be given priority, in the interests of improving prevention and the pooling of resources for health monitoring and actions within the various territories. In this context, the development of telemedicine must be pursued to help improve the organisation of the various crisis management structures within these territories and to ensure an increased level of monitoring and faster treatment of vector-borne diseases.

Agriculture

At the PNACC's mid-term point, the Agroecology Project for France and the 2014-2020 Common Agricultural Policy (CAP) are focusing on the development of agricultural policies and on adaptation efforts in this sector. Indeed, farmers are among the first to observe the effects of climate change.

Even so, the problems to come have not been anticipated, let alone solved at the individual farm-level. In particular, decreased humus content in soils, particularly in the major agricultural regions, calls into question the ability of these regions to withstand more frequent drought and heat waves, especially in Mediterranean regions. The sensitivity of certain types of livestock to heat may have significant impacts on their production.

The risk of increased rainfall variability also raises the issue of soils and concomitantly of hedges and trees to combat erosion. These also play a role in evapotranspiration in drought situations. As regards irrigated productions (currently 5.8% of utilised agricultural land), there is also the often controversial issue of the sharing of water for irrigation between farmers and with other users.

Over and above the issue of access to water, the individuals heard, such as Mr Levraut (Chambers of Agriculture Group) and Mr Soussana (INRA) would suggest that uncertainty also exists regarding future agricultural yields. In this regard, wheat yields have reached an upper limit due in part to climate change - in addition to other factors such as soil impoverishment.

In the overseas communities, it appears that one of the principal constraints is the lack of water which affects islands with a tropical climate. Special attention must be given to this issue. Also, soil erosion, the development of diseases and parasites, crop damage caused by extreme events, and soil salinisation linked to rising sea levels have now been identified by the ONERC.

In order to set agriculture and agrifood on a path to sustainable adaptation to climate change, our assembly recommends firstly:

- **consolidating agronomic research and agricultural innovation to promote the development of a better-adapted and more resilient agriculture through the agroecology project;**
- **using research efforts to anticipate coming changes in terms of diseases and pests;**
- **reaffirming the central importance of the food safety objective in agronomic research.**

Agriculture adaptation actions are composed of both agronomic and technical solutions.

Agronomic solutions:

- develop «service» plants capable of restoring soil fertility or controlling parasites;
- recommend crop rotations that are both multi-annual and multi-activity (agriculture/livestock), at least at the level of the local territory;
- promote the most drought-tolerant varieties and change crop rotations;
- encourage livestock raising that is adapted to climate conditions, particularly through the use of adapted species and breeds.

Technical solutions:

- judiciously manage available water volumes to tackle water shortage and periods of drought.

More generally, there is a need to structure production chains and design them to be more innovative and flexible, so that they are able to incorporate change. More generally still, market regulation and the maintenance of food safety are also major priorities for adaptation.

The issue of the mobilisation of agricultural stakeholders must also be raised. During his hearing Mr Hervieu, Vice President of the General Council for Agriculture, Food and Rural Areas (CGAAER), highlighted the need to develop shared ideas on climate change, using approaches that are not authoritarian or standards-based. Facilitating this convergence between the way in which global warming is perceived in the agricultural sphere and the ways in which it is perceived by society is all the more legitimate and necessary given that farming is the occupation that has seen the highest increase in training levels over the course of the last ten years. Furthermore, farming has long involved a «culture of uncertainty» in the short-term which must evolve in order to address more long-term changes.

The ESEC considers that the joint definition of a number of adaptation scenarios and several levels of action are a prerequisite for the mobilisation of agricultural actors. Professional agricultural networks (chambers of agriculture, agricultural cooperatives, technical institutes, etc.) are committed to this approach. The dissemination and popularisation of their actions will help improve the support and mobilisation of agricultural actors.

In terms of time frames, taking into account the importance of the consultancy dimension, the objective must be to establish links between very short-term or one-year consultancy, the examination of emerging trends for subsequent years, and ten-year and twenty-five or thirty-year time frames. As regards this long-term time frame, the analysis of actual situations will serve to anticipate decisions, ranging from simple changes to the definition of new strategic guidelines.

Agroforestry, a form of agriculture that combines crop and tree-growing, is one of the most compelling examples of these approaches. The integrated creation of wooded countryside and new cultivation practices serves the purpose of preserving essential soil capital, moderating wind speeds and therefore evapotranspiration, and also maintaining or restoring ordinary biodiversity. It is also more than likely that climate change will lead to changes in cartography and criteria for allocation of quality signs and labels, particularly for wine producers.

Regarding action levels, it is important to correctly identify priorities that will be adapted to each individual action, from the local to the national level. Priority needs to be given to identifying, creating and analysing coherent solutions within the framework of territory-level projects, taking into account geography and systems, whilst being free of government constraints when these are not relevant.

In their reports, the PNACC and the ONERC have highlighted the need to promote more water-efficient agriculture.

The Council would draw attention, in this regard, to the proposals set out in its opinion of April 2013 on water management and usage in agriculture:

- **to carry out research on the resilience of production systems for each region, and in particular, participatory research on rain-fed agriculture^{XVI};**
- **to set up a national groundwater access bank, which is the only way to create fair conditions for groundwater access.**

As in mainland France, the development of agronomic solutions facilitating adaptation to changes currently under way must be applied in the overseas territories.

This must include the improvement of production processes; fostering of agriculture/livestock multi-activity, companion planting and service plants; the promotion of plants that are less sensitive to variability and do not require high levels of inputs (tuber crops, etc.), will boost the resilience capacity of overseas agricultural systems.

Forestry

French forestry, which has grown continuously since the 19th century, extends over twenty-five million hectares, nine of which are overseas. It constitutes over 30% of the national territory and plays an essential role in climate regulation.

In an opinion adopted in the autumn of 2012^{XVII}, our assembly underlined the importance of «*preparing forestry*» by integrating four parameters including the impact of climate change. Adaptation of trees can be physiological and then genetic, or by means of geographical migration, provided that the changes to be faced do not occur too rapidly. Forestry will have to adapt, particularly through plantation techniques, both to the increased frequency of and to the consequences of core changes that are already under way. **The ESEC would also like to see an expansion of the concept of the «forestry station»:** expanses of terrain with homogeneous physical and biological characteristics identified by forest owners, in a way that would enable the improved sharing of terrain knowledge, in view of better adaptation.

During his hearing, Mr Soussana, INRA Environment Scientific Director, spoke of an overall reduction in mainland forest growth, as a consequence of the 2003 drought, of 25-40% over three to five years. He emphasised the fact that the recurrence of drought causes greater damage than the intensity of isolated extreme events, and that a repeat of multi-year droughts would lead to population by other species.

Overseas, anthropic pressures will add to the consequences of climate change and affect the health of forests. The principal forests are concentrated in Guyana and in mountainous tropical islands. In the French Pacific Islands, the majority of forests have been afflicted by deforestation, which has encouraged the propagation of invasive species. One serious cause for concern is the mangrove forests, which provide protection from the elements and a «nursery» for aquatic life.

As regards adaptation, it needs to be borne in mind that a forest will be better equipped to tolerate climate stress if it is in a good state of ecological health. It will be beneficial to:

- maintain or create refuge areas;
- reduce forest fire risks and safeguard the ability to intervene;
- develop knowledge to promote forest adaptation management;

- integrate the financial profitability of the forestry sector more rationally, particularly to develop added value and the uses of adapted new species at an early stage;
- reduce anthropic pressures to strengthen the resilience of mangrove forests.

The PNACC, which has set itself the objective of keeping forests in good ecological health, is implementing measures aimed at the improvement of knowledge, the preservation of genetic resources, and research, and is also working to develop synergies between actors. Forestry management involves a «*long cycle*» which may explain the interest shown by the sector in adaptation measures and its quite unique involvement in the National Adaptation Plan. The integration of adaptation into the performance contracts of forestry organisations is accordingly occurring at a «*relatively rapid*» pace.

On the European continent, almost three quarters of French forests are held by private landowners. In the overseas territories, forests are largely under public ownership with the exception of Polynesia and Martinique, and up to 100% publicly owned in Guyana. **The grouping of private owners and the creation of sustainable management plans, deemed essential by the ESEC, must go hand in hand with the development of a vision for adaptation that is shared by private landowners and public-sector forestry managers. Tree diversity and non-fragmentation of forest land must number among the objectives to be achieved.**

The ESEC also recommends incorporating the impacts of global warming into the inventorying of regional sylviculture plans and integrating adaptation measures into their management objectives. Indeed, these plans have regulatory force and have precedence over the sustainable management plans created by private landowners (simple management plans or standard management regulations, for example).

The ESEC calls upon public-sector forestry managers, the State, communities, and public-sector entities to demonstrate an exemplary approach in sustainable forestry management, particularly overseas, and the utmost responsibility as regards maintaining the sound ecological health of forests. Safeguarding the sound ecological health of forests, preserving the services that they provide, designing forests that are planted with a diverse range of varieties, particularly at forest edges, are challenges for society, for the economy and for the protection of assets and individuals.

Our assembly wishes to reiterate its proposal to extend the scope of intervention of the National Institute for Geographical and Forestry Information (IGN), tasked with the continuous inventory of national forest resources, to the overseas territories.

Biodiversity

To address the issue of biodiversity, the specialists consulted all insisted on the fact that the threats are already multiple in natural environments, with climate change constituting a major additional pressure (see also the section on forestry and seas). They emphasised the danger of the more general impoverishment of environments, and the need to safeguard ordinary biodiversity and ensure the maintenance of the conditions required for its adaptability.

A number of uncertainties still need to be addressed regarding the reactions of land ecosystems to current and future climate changes, in its diversity. However, numerous studies have already identified three major sets of symptoms which attest to the impact of

climate change on ecosystems: changes in the distribution of many organisms, alterations in the time frames of the various stages of their life cycles, and uncertainty regarding future demographics for certain species.

These sets of symptoms may be summarised as follows. In the first case, plant or animal migration is occurring, northwards or to higher altitudes, with colonisation/extinction dynamics at the outer edges of distribution areas. Species lacking the capacity or the possibility of adapting accordingly are declining or becoming marginalised, whereas others thrive and/or occupy even larger ecological niches. Furthermore, the environment is becoming more conducive to the acclimatisation of exotic species which were hitherto impossible to introduce. Changes in life cycles are observed either in the early flowering of trees or ripening of fruits, or in the *phenology* of living things, namely the times of year at which the phases of their life cycles occur and the duration of these phases. In this regard too, species are proving more or less able to adapt to climate change, and accordingly to survive and flourish, depending on their ability to change their *phenophase*. Finally, concerns regarding the demographics of certain species stem from the fact that the links that render species dependent on the same ecosystem are altered, together with the *trophic networks* of which they form a part.

Faced with this situation, there appears to be an urgent need to mitigate global warming - according to certain specialists, the survival of many species cannot be guaranteed in the event of a temperature increase above 2°C - and, at the very least, to facilitate possibilities for migration.

To limit the impoverishment of biodiversity and maintain the good ecological condition of ecosystems, **our assembly wishes to reiterate that the priority must be to safeguard the terrestrial and aquatic ecological continuities identified in the plans of the State and local authorities.** Beyond the preservation of reservoirs of biodiversity, **it insists that ecological corridors, be these linear, discontinuous, or landscape corridors, must be maintained in their functioning state or restored and clearly incorporated into the Regional Environmental Coherence Programmes (SRCE) which must be adopted in full by 2015, and then in urban planning codes,** in accordance with the Grenelle 2 Law. This is an effective and inexpensive adaptation solution. The «green and blue belts» mechanism, which was originally designed to counteract the fragmentation of natural areas, appear to be the best response to facilitate the development of areas and the migration of species, either into or out of France. One important challenge is therefore **to further increase this ecological coherence.**

Three of the PNACC measures pertaining to biodiversity could not be completed due to a reduction in intervention credits: they are intended to overcome uncertainty through the creation of robust indicators of the effects of climate change on biodiversity, how well climate change is addressed in the management of protected areas, and the ex situ conservation of plants that are threatened by climate change. **The ESEC requests that these measures be implemented without delay and that discussions begin on policies for protected areas on the basis of currently observed or future climate change.**

Our assembly also supports the action for the evaluation of ecological functions and ecosystem services (EFESE), which numbers among the PNACC actions, and the ambitious integration of national biodiversity policies into sector-specific policies. Biodiversity plays a fundamental role in a multitude of areas potentially affected by global warming (food and timber production, water quality, pollination, flood prevention, living

environment, usage for recreational activities, etc.). This means that maintaining the good health of ecosystems and ordinary biodiversity is itself an adaptation solution. **As a result, long-term management plans must be developed to increase knowledge on how ecosystems operate and the services that they provide, along with their ability to store carbon and to reduce pressure from invasive species. The ESEC also recommends that the future National Biodiversity Agency, and also Regional Biodiversity Agencies, address the issue of climate change with the latter mobilising all of the competences of territorial actors.**

Convinced that inter-disciplinary approaches are needed to combine adaptation solutions, ensure their coherence and make them mutually reinforcing, **our assembly recommends that sector-specific policies, including those of adaptation, systematically take into account their potential impacts on biodiversity.** This approach is particularly important for land-use planning and infrastructure projects. In addition, engineering, consultancy and project management assistance companies are beginning to incorporate this parameter into their studies.

The ESEC also recommends developing emergent know-how on the integration of aspects of plant and animal biodiversity into urban planning. The contribution of multi-functional urban revegetation (climate, ecosystem services, crop cultivation, etc.) and relationships between the climate and green and blue belts in relation to heat islands, services provided by trees, the influence of evapotranspiration on the climate and temperatures, the effect on water run-off and the effect of vegetation on pollution all merit more in-depth study, in order to assess the scope and limits. It already appears that the re-naturalisation of urban areas and the limitation of land urbanisation also have the social benefit of partially off-setting the extreme impacts of heat waves in urban areas.

Finally, by way of a reminder, our assembly would like to point out that the overseas communities are home to 80% of France's biodiversity, across 22% of the national territory. The International Union for Conservation of Nature (IUCN) emphasises that the overseas communities are situated in biodiversity «hot spots», i.e. they possess a rich and unique biodiversity. Their very high level of **endemism** is also a fragility factor.

For this reason, in the case of the overseas territories, networks of protected areas and ecological continuity must be stepped up within the framework of the concerted management of land use planning; to obtain supranational support (EU mechanism) for the overseas territories, to obtain dedicated financing and to make populations and decision-makers aware of the importance of ecosystem services.

Seas, oceans and fisheries

Coastal flooding due to the effects of rising sea levels and the increased impact of storms and heavy rainfall in coastal regions is frequently the most often-cited effect of climate change. It is also the effect presenting the greatest number of hazards for human life, and impacts on infrastructure and economic activity. However, there are many less conspicuous impacts that nevertheless require continuous adaptation efforts. Ocean acidification is one of these.

The starting point for adaptation is of course to adopt an integrated approach to the sea and the coastline, which is not currently the case, due to the complexity of the administrative division of such areas. Initially, the various public policies for the sea and coastlines will need to be harmonised and and incorporate adaptation.

The ESEC recommends, in particular, engaging in reflection on coastline vulnerability and management in order to better take into account phenomena such as erosion and flooding, by identifying usage and at-risk zones, by promoting prevention, and by anticipating risks wherever possible. The issue of the protection of or retreat from certain at-risk zones must not be swept under the carpet and must be the subject of public debate.

In particular, the ESEC suggests reviewing all existing infrastructure and built-up areas - as set out in the PNACC - in the face of possible climate change. Given the fluctuating nature of the coastline, long-term management must increasingly give consideration to the protection or the integrated management of a wide strip of land and sea.

In the opinion of the ESEC, priority must be given to ecosystem preservation and restoration, in particular to such remarkable areas as mangrove forests, coral reefs and wetlands, and to reducing coastal urbanisation. More resilient protection solutions need to be developed and ecological defences designed in order to encourage the fixation of marine organisms.

Finally, in this opinion, the ocean calls for a substantial research requirement to be met, particularly as regards the specific needs of the overseas communities (see chapter ii-iii). With New Caledonia, which is home to the second largest barrier reef in the world (1,600 km long), the future of coral reefs emerges as a primary concern with regard to climate change. Polynesia, for its part, is home to 15,000 km² of coral reefs.

Overseas, ocean acidification could affect all marine organisms with a calcareous skeleton (coral, urchins, certain molluscs and zooplankton). In the Mediterranean Sea, French waters are highly impacted, as are those of all neighbouring countries due to the fragility of this enclosed sea, subject to high *anthropic* pressures.

Adaptation must also address rising sea levels. The degradation of coastal zones needs to be reduced or eliminated through the control of upstream impacts (agricultural effluent, wastewater and pollutants). There is also an urgent need to limit the clearing of coastal and riverbanks. More broadly, the communities must possess an integrated management mechanism for coastal zones. The ONERC recommends containing the risks of coastal flooding and erosion through the conservation of coastal ecosystems.

Finally, the setting up or consolidation of networks of measures is necessary, namely to evaluate the condition of ecosystems and their resilience to climate change. **The ESEC proposes, by drawing upon existing networks of measures, systematising measurements of acidity, changes in currents and swells in both sea and lagoon environments, and of pollutants causing the greatest impact on marine and coastal ecosystems.**

Professional maritime fishing, which is governed by common European policies, will also need to adapt. The uncertainty and even controversy surrounding fisheries resources can only be diminished through increased knowledge of biological cycles and catches. The latter requires more accurate knowledge regarding the activities of European vessels, as well as those from other countries, which requires further advancing cooperation at the level of the maritime zone, and dedicating the necessary resources to this. Specifically, the exploitation of new zones or migrant species must be prevented until capacities are known with certainty. In addition to the knowledge required to provide an explanation, resources must be traceable in order to provide opportunities to the most responsible fisheries.

In the overseas territories, small-scale fishing and aquaculture are at risk of being affected by climate change. And yet they play an important social and cultural role. **The ESEC recommends studying the ability of this activity to adapt to climate change as soon as possible, particularly as regards species migration or invasion, changes in fishing zones, new opportunities and technical possibilities for adaptation.**

Freshwater: adaptation at catchment level

In addition to the coastal flooding and submersion portrayed in the media, the risks of worsening pollution have increased substantially in cases of excess rainfall and also drought. This pollution will be accompanied by a series of knock-on effects for habitats and for mussel and oyster farms (see also point 3: «agriculture»). **Integration of adaptation management across all catchment basins is therefore needed to deal with new risks, including the coastline.** The Plans for Development and Water Management (SAGE) and the Programmes for Development and Water Management (SDAGE) are currently the main relevant planning levels. Integration could take into account the scenarios currently being published by the MEDDE.

The increase in risk must also be further addressed through restrictive programmes (see chapter ii-ii-3.) and through the harmonisation of territory-level policies on coastal urbanisation (see above). In fact, as a result of the inevitable sea level rise, coastal urbanisation will increase risks to human activity, and also alter the capacity of coastal ecosystems to adapt, given that these play a major role in the protection of coastal areas.

The economy and enterprise

It would be over-ambitious to cover the adaptation of enterprise and the economy from all angles in this opinion. The ESEC will undoubtedly have cause to return to the major changes brought about by climate change. Our hearings have revealed that a number of businesses are beginning to think about their adaptation to climate change. **The ESEC supports the involvement of insurers and reinsurers** and improved involvement of local businesses in the planning process at territory level.

As regards insurance, the hearing of an insurance company manager suggests that this sector will only be able to implement effective preventive policies if public authorities select standard scenarios and draw prescriptive consequences on acceptable risks. If this is done, insurers will then be able to create incentive signals and participate in collective education on adaptation to future climates. This issue of climate standards will be looked at in more detail in chapter II-II-1.

For local-level enterprise, the mapping of new risks and accessible resilience testing for the activity of businesses, their customers and their logistics, will also lead to a development of awareness. Furthermore, increased participation in spatial planning or risk planning will improve the quality of these public plans, whilst providing businesses and site managers with the opportunity to debate the long-term approach.

The ESEC suggests that the «adaptation» component of PCET plans should include a mandatory information and discussion component with the industrial and commercial sectors. Scientific, administrative and regulatory information could be disseminated across employment areas to Committees for Health, Safety and Working

Conditions (CHSCT) tasked with assisting in the formulation of various different risk prevention and compensation proposals.

The ESEC recommends encouraging businesses with a risk management process to incorporate adaptation into their agenda. This process, which seeks to determine a strategy, and establish evaluation and standard vulnerability indices, would be jointly implemented in collaboration with social partners.

Lastly, and more generally, the popularisation of scientific work at regional level or for occupations, as recommended in section ii, will facilitate the choices of decision-makers in dealing with the certainty of change and increased risk, but also regarding long-term developments in markets and technical guidelines.

Incorporate climate adaptation into public action based on common rules

This section covers three objectives: develop reference projections for public policy, clarify and consolidate adaptation planning and, thirdly, guide the choices of the emergency services and civil security in order to adapt to the climate of the future.

As we have seen, adaptation requires a shared vision and a new form of collective organisation for the future. It also requires the adoption of new rules in the face of forecast changes and new risks. These choices must take into account 2050 or 2100 climate forecasts, and no longer be based on past events.

This new reference for the future climate and new or increased risks (ii.1) must be based on the most recent science and be broken down within the territories for all activities that pose current and future risks. This reworked collective framework will need to guide the planning and implementation of adaptation within the territories (ii-2.). It also impacts the public safety plan (II-3.) in its addressing of risks already covered: flooding, health, heat waves. **The choice of the ESEC is to prioritise preventive adaptation across the board and for all actors: this concerns public and occupational regulations, the management of territories and risks, and choices of activity and location- even relocation and reconversion - for these activities. These policies must be coordinated with mitigation actions.**

In their report, Messrs Hallegatte, Lecocq and de Perthuis identified four fields of public authority intervention regarding adaptation: information dissemination; adaptation of standards, regulations and fiscal policy; preparation for risks and crises; and finally adaptation of spaces, infrastructure and land-use planning.

The ESEC would like to add to this the development of reference scenarios, broken down by major region or climate unit and not masking areas of uncertainty. This is an indispensable basis for identifying future vulnerabilities and to enable decision-makers to prepare the choices required for adaptation. Finally, public authorities have a responsibility to create the conditions for solidarity among citizens, between territories and with the rest of the world.

On a more general note, the ESEC would like to reiterate that it is the role of the legislature and the government to:

- **establish a national framework for action, therefore the National Climate Change Adaptation Plan will imperatively need to be periodically updated;**
- **ensure equality between territories and within society in relation to the measures and policies to be implemented;**
- **ensure national solidarity in the face of major risks and crises;**
- **distribute competences and responsibilities clearly and transparently in order to promote the emergence of adapted territorial responses.**

Create reference climate projections within territories

As has been recalled, local climate events are dependent on much wider phenomena occurring at the planetary level. However, in order to anticipate and limit the potentially devastating effects of climatic disruption in general and extreme events in particular, human societies must act at the far smaller and unified level of the territory. They can only do this using the most reliable scientific data possible on coming changes and their associated risks.

The need to develop reference climate scenarios is highlighted in the PNACC. This entails the task of identifying which climate projections are to be used, and which involve the main actors of the French climate community, drawing largely upon the climate projections analysed by the IPCC. **We recommend that this task be perpetuated so that the reference climate scenarios for France benefit from progress made by the international scientific community in terms of climate projections at the global and regional level.** This process, which is currently limited to physical climate parameters (temperatures, rainfall, sea levels, etc.) could be factored into the current drive for climate services creation and could be extended to of the impacts of climate change. It is also vital for these scenarios to be broken down at the regional level.

The ESEC recommends the creation of evolving reference scenarios based on these complex data (geographic, climate, ecosystem, productive activities, etc.). This initial work is intended to be the start of a long-term process that is updated and fine-tuned over time. It is on this basis that scenarios will become operational, fully assume their role in the formulation of public policy and prevention and adaptation, and will provide support for economic and social strategies: transforming or relocating activities, developing occupations, training and/or redeployment of employees, etc. Since climate models are not accessible to the uninitiated, **the process of making scientific data intelligible and ensuring its widespread dissemination must be stepped up.**

Accordingly, the ESEC recommends significant upstream cooperation between all stakeholders, particularly between representative actors within the economic, social and environmental fields, in order to examine the implications of climate change already occurring in relation to foreseeable changes, with all the uncertainties and scientific and technical controversies. These discussions must also provide an opportunity to identify the convergent or contradictory interests that exist. These are a prerequisite for the development of more prescriptive planning.

Break down scenarios in detail

Being extremely diverse, the potential manifestations of, and harm caused by climate change concern practically all inhabited areas and all sectors of the economy and society. Therefore, **the ESEC considers it vitally important to break down reference scenarios by region, taking into account specific geographical considerations, and by major activity sector.** Indeed, natural environments are subject to specific conditions within a given administrative region: the challenges to be overcome in mountainous areas are not the same as those faced by the coastal strip. Accordingly, it must be possible for scenarios to address areas in which the natural environment predominates as well as urbanised areas where heat islands are located, i.e. areas in which increases in maximum diurnal and nocturnal temperatures occur. These micro-climates can have serious consequences on the health of the most vulnerable. The need for revegetation of these artificial environments in which human activities are concentrated can only be addressed with reference to specific scenarios that are of necessity divergent from - without being disconnected from - those pertaining to changes foreseeable in forest or dune areas.

By the same token, the ESEC considers that reference scenarios must be broken down by activity sector, be these goods-producing sectors (agriculture, aquaculture, sylviculture, industry, etc.) **or service sectors** (energy, transportation, tourism, etc.). Climate disruption will affect all of the major activity sectors differently, to the point of changing operating conditions and productivity to a greater or lesser extent. This applies, for example, to winter tourism in mountainous areas if there is a lack of snow, or to a coastline producing shell fish if there is ocean acidification. **Such a breakdown must incorporate a number of different time frames as far as possible**, as production imperatives must take account of both seasonal variations and more long-term structural changes, which would be critical for activities such as arboriculture, viticulture and livestock farming, for example. However, long-term forecasts, which involve the majestic equilibriums of the natural world (oceans, glaciers, hydrological systems for plant life) and socio-economic systems, are still characterised by numerous uncertainties and require the pursuit of basic research in multiple fields.

To consolidate the operational nature of reference scenarios, **our assembly recommends that an evolutionary risk scale be created.** The risks associated with the consequences of climate change will become clear over time as uncertainties are overcome and the economic and social organisation of the territories evolves. Like the Prevention and Precaution Committee, the ESEC considers it necessary to objectively evaluate risks through a dual process consisting of:

- **identifying risks**, including those that are correlated or systemic in nature, using a series of indicators;
- **assessing these risks, by attributing an economic or societal value to the indicators.** Such an assessment, the aim of which is to guide risk management, can only result from a process of cooperation in which choices are made between risks that are considered acceptable and those deemed intolerable in terms of costs and impacts for society, in line with the local context and imperatives.

□ *Integrate risks into civil engineering and infrastructure*

Having a better understanding of risks and a sharper awareness of their scope will lead to the ability to anticipate these and make natural areas and socio-economic systems more resilient. **The Council considers that from now on, the risks linked to climate change, particularly vulnerability to extreme events, should be incorporated into all long-term design processes (land-use planning and infrastructure projects, etc.). The goal is to adapt such planning in terms of its design, usage and maintenance, to the climate risks of the areas in which it is situated.** Being able to address climate risk in this way will depend on the ability to make use of local data and operational schedules. In the opinion of the ESEC, the development of an adaptation culture must include:

- **the mandatory integration of the «adaptation» parameter into technical specifications, in line with regulations and directives pertaining to adaptation policies**, as is the case for other fields (energy performance, water, seismic zones, etc.);
- **much higher investment than is currently the case in upstream studies, calculated in accordance with the life cycles of the constituent parts of all large scale projects (infrastructure, CAZ, industrial plant, etc.)**. Through this expenditure, infinitely more costly losses and disasters will be limited in the future.

Through development structured around these three core areas, anticipatory management should progressively replace reactive management.

Incorporate adaptation planning into territorial policies

Having observed the adaptation policies in five European countries, including France, CDC Climat Recherche^{xviii} highlights the importance of decentralisation. A number of individuals heard have provided support for this view, particularly Ms Latouche, Climate Unit Director at the Regional Resource Centre for Sustainable Development (CERDD), a joint State-Region body in the Nord-Pas-de-Calais region. She emphasised the fact that the regional level is the level at which both the decentralised State services and those of the Region are provided, and that, furthermore, the law of 27 January 2014 establishes the Region as the lead partner for the communities within its territory for the exercise of climate-related competences. The overseas communities, which are greatly impacted by climate change and which possess a very high degree of autonomy, are also the best placed to implement ambitious adaptation policies.

For the planning and implementation of adaptation policies, the ESEC is firmly committed on the one hand to national-regional regulatory frameworks, and on the other hand to operational local climate plans centred around appropriately-sized inter-municipal programmes. The aim is for the mechanism to be coherent and ambitious, and to link the whole territory using exhaustive, high-quality information.

This mechanism emerges from two types of plan which currently address climate change adaptation and mitigation, expounded upon in the following sections: the Regional Climate, Air, Energy Plan (SRCAE - see sub-section 2.1 below) and the Regional Climate Energy Plan (PCET - see sub-section 2.2 below).

□ *Regional Climate, Air, Energy and Ecological Coherence Plans*

Created by Grenelle Laws I and II, the Regional Climate, Air, Energy Plans (SRCAE) and the Regional Ecological Coherence Plans (SRCE) coordinate territorial action through the provision of a strategic and regulatory framework. These Plans are in fact jointly developed by the State and the Region following consultation with the territorial communities concerned and their groupings. The draft plan is also made available for public consultation for at least one month in order for the public to participate, with the plan only being submitted for approval by the Regional Council and for signature by the Regional Prefect at the end of this process.

Thus far, the manner in which the twenty-six SRCAE have addressed adaptation has been cursory, although provided for by legislation. What is more, the institutional edifice is not without its flaws: enforceable urban planning schemes (SCOT, PLU) are required to «take into account» the PCET, which must remain compatible with regional programmes (SRCAE and SRCE). Within this complex structure, the legal links between the SRCAE, the Regional Climate Energy Plans (PCET) and urban planning schemes, water management and natural area management schemes exist at the lowest levels of enforceability, of which there are three: compliance, compatibility and consideration.

Increasingly, regional State-Region programmes will be designed to encompass State and regional territorial adaptation policies, but also climate change mitigation and energy transitioning policies. Concerning these findings, **the ESEC takes the view that adaptation policies must be backed by a coherent, convergent and effective territorial mechanism. This involves expanding the scope of the prescriptive components of the SRCAE and SRCE beyond the wind component alone, for both climate change adaptation and mitigation. In particular, future risk prevention (flooding and submersion prevention, limitation of heat islands, ecosystem continuity) must be enforceable at a higher level and must be steered either jointly or by delegation by the State and the region.**

The ESEC also proposes that reference projections and vulnerability maps for climate change be incorporated into the next State-region planning schemes.

In this regard, the State will be required to verify that the SRCAE as a whole, both for adaptation and mitigation, meet the collective objectives and commitments of our country.

□ *Territorial climate-energy plans*

Climate plans and PCET currently apply to all types of communities (regions, departments, inter-municipal areas, communes, etc.). The six hundred and ten PCET adopted or initiated (2013 figure) theoretically include a dedicated component for adaptation to climate change. The PCET are sometimes the climate component of the Territorial Sustainable Development Projects (PTDD) or Agenda 21 plans which communities possess so as to build jointly with civil society actors. Although mandatory for large communities (more than 50,000 inhabitants), they are not currently binding either for territorial authorities below this threshold, or for territorial projects (regional natural parks, provinces, networks of towns and cities, etc.).

The designated aims of these plans have been very uncertain, and as a result are not yet in operation: the PCET is neither universal nor mandatory; it still lacks coherence with the ideals of the national objectives (as regards both mitigation and adaptation); and it is sometimes very incomplete in terms of the information on which it is based. Finally, its objectives do not necessarily coincide with the competences of the communities concerned which can render the objectives set in this regard somewhat redundant.

The ESEC therefore recommends that the PCET (or PCAET) should become a more operational plan, covering the whole of the territory in an ambitious manner that is consistent with the regional plans, and combining mitigation and adaptation. The Energy Transition Bill - currently under discussion - could adopt this approach.

In the interests of coherence, the ESEC supports more direct links between the SRCAE and the PCET. This means, on the one hand, a bottom-up information and research approach incorporating climate projections and the involvement of local actors in the formulation of regional strategies, and on the other hand, a top-down approach that is more prescriptive than is currently the case. **Specifically, the breakdown of climate projections and the conducting of local-level vulnerability studies must be prerequisites for the formulation of climate plans.**

Finally, it seems important to incorporate a component for solidarity and decentralised cooperation between communities into the climate plan.

Prior to these changes, the PNACC is planning to review all SRCAE and PCET. The mid-term review of the PNACC indeed highlights the difficulty encountered by all public authorities *«in really integrating knowledge into the decision-making process for projects, plans and programmes»*. **As is provided for by this mid-term review, the Council calls for the surveying and subsequent evaluation of adaptation governance.** This concerns both the sub-regional levels (PCET, SCOT, PLU, SAGE) and the inter-regional levels (missions for the study and development of inter-regional and European cooperation, plans for the mountain regions), for which little available information exists. Creation of a shared base for these programmes (both for adaptation and mitigation) by the ADEME will be an important tool in this regard.

In addition to tools for the diagnosis, formulation and monitoring/evaluating of plans, particularly those set in place by the ADEME, **our assembly would like the choices made in plans for adaptation to and prevention of climate risks undergo regular evaluation, irrespective of the community concerned. Stress-testing of these plans should therefore be able to determine whether the measures decided upon are adequate in terms of future climate risks and evaluations.**

Incorporate climate risk into civil security

The Council recommends the incorporation of available information and knowledge concerning future climates and their impacts into the decision-making process for risk prevention and risk management projects, plans and programmes. To reflect this, the term «natural risk» could be removed from their titles.

Risk prevention has long been considered a national government prerogative, particularly by local elected representatives. However, over the course of the last twenty years, the latter have become increasingly aware of their responsibility in this area. That being said, the organisation emerging from the 2003 law on technological and natural risk prevention and compensation for damages, and from the 2004 law concerning the modernisation of security, reflects the influence of State actors. The general organisation of planning is a civil security role: *«The objective of civil security is to prevent risks of all kinds, to inform and alert populations and to protect individuals, assets and the environment against accidents, losses and disasters through the preparation and deployment of the appropriate measures and resources, under the authority of the State, the territorial communities and other*

public or private persons... The State is the guarantor of coherence and civil security at the national level. The State defines the governing doctrine and coordinates its resources^{XIX}».

National Risk Prevention Plans (PPRN) are formulated by Prefects in collaboration with the communities, and their provisions are imposed on urban planning schemes. Communal Contingency Plans (PCS) are created by mayors on either a mandatory (for communes with a PPRN) or an optional (but highly recommended) basis, and must include a communal information scheme on the major risks along with a diagnostic tool (DICRIM). In 2005, when the PCS decree came into effect, eleven thousand communes were required to create their own PCS within a two year period. In 2013, 45.7% of these had fulfilled this obligation^{XX}, while one thousand three hundred communes, for which this was not mandatory, had committed to developing a PCS voluntarily. However, this is still an unsatisfactory system for ensuring that elected representatives assume responsibility for what is an increasing risk. Indeed, according to MEDDE figures, eighteen thousand communes are affected by the risk of flooding. The real estate pressures in play on the coast and at the outer edges of urban centres could lead to urban planning regulations being amended. Raising awareness among mayors is particularly important, since their liability in terms of risk management is in fact a personal liability that is liable to involve criminal charges. **The Council asks that all elected representatives involved in risk management be made aware of climate risks.**

The regular updating of future risk maps, to be conducted at the regional level, must be regularly incorporated into local urban planning codes, for example every five or ten years.

Adapting to global warming means starting right now to develop a genuine civil security culture at the local level, involving citizens. The integration of future climate references and increased risks must also be a requirement for major risk planning. Specifically, the planning of «ORSEC» plans at the departmental level and of sea walls must include severe crises and new threats. This must also be a requirement for the various forms of these plans in the case of technological or industrial risk.

When confronted by an extreme risk, jeopardising the safety of persons, assets and the environment at an extensive level, the responsibility for the decision-making, including any trade-offs, falls to the State representative. Indeed, it is the government's role to pursue such an operational prioritisation in the emergency protection of the interests involved - with the protection of persons always being the first priority - particularly when implementing ORSEC plans. **This prioritisation must be anticipated at the risk and vulnerability identification stage, in the corresponding planning schemes.**

Give insurance a role in prevention

The French Insurance Code stipulates that the financial consequences of a disaster incorrectly designated as natural, and of a technological disaster, shall be covered, subject to certain conditions, by a special regime. Pursuant to article L-125, insurance policies taken out by any natural or legal person other than the State and providing cover for fire damage or any other damage to assets located in France, grant the insured party entitlement to cover for the effects of natural disasters.

Furthermore, if the insured party is covered for operating losses, this cover extends to the effects of natural disasters, within the meaning of *«direct, uninsurable material losses having had as their determining cause the abnormal intensity of a natural phenomenon, where the measures habitually taken to prevent such losses were unable to prevent their occurrence*

or could not have been taken». A state of natural disaster is established by inter-ministerial order which identifies the zones and duration of the disaster and the nature of the covered damage resulting from it..

Premiums from multi-risk household policies and vehicle insurance policies allow for the financing of compensation. With a State guarantee, insurers can take out reinsurance from the State reinsurance fund (CCR). The major natural risks prevention fund (FPRNM), known as the Barnier Fund, supports the financing of vulnerability reduction measures, particularly the various planning processes carried out by public authorities. It is funded by a deduction from the insurance policies of natural and legal persons (household, vehicle, operating losses) in respect of «natural disaster» cover. The continual expansion of its scope of intervention - fourteen legislative extensions since 1997, the latest of which was contained in the Initial Budget Act (LFI) for 2014 - has resulted in its expenditure exceeding its revenues.

In the opinion of Mr Soulias, President of the Sustainable Development Commission of the French Insurance Association, insurers estimate that over the next twenty years, the extra financial cost associated with extreme climate events will be in the order of thirty billion Euro, half of which is specifically attributed to the effects of climate change. In his view, a premium or a refusal to insure can only be justified in accordance with the public authorities and on the basis of planning schemes. Conversely, insurers are already able to reduce premiums for policyholders who implement a prevention process.

The Council would like insurance and reinsurance actors to continue with their joint reflection on the impacts of climate change and its consequences in cooperation with the public authorities and civil society. It would like sector professionals to set in place a premiums reward system for policyholders carrying out adaptation measures through the voluntary reduction of their assets and activities to vulnerability and conversely a penalty system for situations that will potentially be dangerous in the future. Risk zoning should allow insurers to refuse to insure the most exposed assets. This would be facilitated through the incorporation into regulation of vulnerability scenarios and a risk scale in regional planning and coherence plans. Equally, the FPRNM ought to be able to support actors who have implemented a prevention process.

Further expansions to the domain of competence of insurance pooling mechanisms are foreseeable, given the scope of the coming challenges. **The Council would like comprehensive reflection to be initiated on the respective roles of the State, insurers and solidarity instruments with a view to adaptation to the effects of global warming.**

Solidarity

Climate change constitutes a considerable challenge for a large part of the world. This referral does not cover adaptation as a whole, nor its financing or solidarity mechanisms for the most vulnerable countries. But even at the French national level, currently occurring or future changes will have very varied consequences. This will create or further entrench inequalities between territories. In their contribution to the report *Vers l'égalité des territoires*^{xxi}, Mr Vincent Vigié and Mr Stéphane Hallegatte, citing heat waves, floods, landslides, forest fires and dwindling water supplies, made the following comment: «*the probability of their occurring is increasing collectively, i.e. all of the risks listed are increasing in parallel. Accordingly, it is to be expected that these will occur at the same time, which would greatly increase the difficulty of dealing with them.*»

Among the six groups of territories identified by our assembly in a 2013 report and opinion on reducing territorial inequality and land planning use^{xxii} some of these combine climate vulnerability and situations of inequality and concentrated poverty: the overseas territories above all, but also the Nord-Pas-de-Calais, Languedoc-Roussillon, Corsica and Provence regions. The existence of solidarity funds must be made known (solidarity funds for territorial communities, emergency funds for overseas territories) but these must increasingly be deployed preventively, as the National Office for Water and Aquatic Environments (ONEMA) has already done, and not only in the event of natural disasters.

The view of the ESEC is that public adaptation policies require greater national solidarity efforts. Our assembly recently requested that vertical and horizontal equalisation funds be maintained and expanded. However, as the ESEC also pointed out in its opinion of November 2011, «What functions and what organisation for the State in the territories?» equalisation measures are reaching their limits: «the ESEC takes the view that it is one of the functions of the State to reformulate tax policy based on the values of equality, citizenship and solidarity. It highlights the benefits (...) of aiming for a fairer, simpler, more transparent and more stable tax policy and to reassess relations between the State and the local authorities. Accordingly, it is calling for comprehensive reform»^{xxiii}.

In the overseas territories, in view of the extent of the challenges, the national solidarity effort remains vitally important. It should accompany tax relief mechanisms for productive investment in key, targeted activity sectors in relation to the priorities for adaptation by overseas companies to climate change.

Develop basic and applied knowledge

Understand the threats and correct weaknesses

Among the eight component actions of the «EU Strategy on Adaptation to Climate Change», adopted in April 2013, is Bridging the Knowledge Gap. The number of research programmes is increasing and adaptation is being taken into account internationally by the IPCC and through national plans (PNACC in France), as well as at the regional level. However, the guidance provided by the European Union essentially concerns the climate, climate services and risk analyses, with a view to improving the decision-making process. These are based on standard economic logic (cost-benefit and cost-efficacy) intended in particular to stimulate innovation and support the market. Upstream of this process must be the acquisition of scientific knowledge in order to bridge current gaps. Knowledge improvement is a prerequisite for any thorough evaluation of the implications that changes currently under way will have on economic activities and occupational sectors.

- *Provide support for the scientific community involved in climate change adaptation research*

In the adaptation field, research is addressing a very broad range of scientific and technological issues, from the development of climate scenarios themselves to the study of the multiple consequences of global warming and the solutions to be implemented in order to adapt to it. Although adaptation by occupational sectors must be accompanied by and draw on social dialogue, it also requires the mobilisation of human sciences researchers in

order to address the social dimension and the reduction of inequalities in decision-making processes. This burgeoning scientific community must be supported, particularly in:

- **the pursuit of the task of formulating climate projections set down within the framework of the PNACC in line with changes in global models and with an emphasis on regionalisation.**
- **the demand for scientific calculation and the development of new calculation codes**, allowing not only for better results at the global level, and for a reduction in uncertainty, but also for the anticipation of the effects of climate change on a relevant scale for impacts, particularly in geographically complex regions which are often very vulnerable (mountainous areas, coastal areas), and for the creation of small-scale climate models that incorporate the complete water cycle, coastal ocean, atmosphere, etc. Currently climate models, even regional models, have a resolution of some ten kilometres at best;
- **The ESEC takes the view that exactly the same effort should be invested in impact models as has been recommended for climate models.** The issue of adaptation also requires the establishment of a kind of «impacts community»;
- **the development of climate services, which should enable the vulnerability of economic activities, the environment and society to climate change to be understood, and to provide tools to undertake adaptation measures.** This will require ongoing interaction between specialists in a variety of disciplines and with actors within the various social fields and economic sectors to provide the necessary responses as regards adaptation. Its social dimension, its impact on all aspects of occupational activity (and particularly its effect on employment) will need to be studied and taken into account;
- **the stepping up of work on extreme phenomena, as the most marked form that climate change will take will be unprecedented climatic situations.** Fully understanding the determining factors for adaptation, and anticipating and preventing crises will require an improved understanding of these extreme events and direct or indirect amplifying mechanisms, and the cataloguing of unprecedented situations needing to be planned for, together with their impacts. It will also require a better understanding of societal and ecosystem vulnerabilities to these situations. Here again, the work will need to include a highly interdisciplinary component. This component is currently in a very undeveloped state;
- **the pursuit of basic and applied inter-disciplinary research on adaptation and the underlying issues raised by it, both in terms of integrated climate-impact modelling and issues of a socio-economic and cultural nature.** The Management and Impacts of Climate Change (GICC) Programme is virtually at a standstill and the Climate-Environment-Society Consortium (GIS Climat) is coming to an end. No other programmes of any great scope currently carry out this research at the national level. In the absence of budget credits, the ESEC suggests that an «adaptation foundation», with communities and industrial companies as members, could serve as a framework for identifying scientific issues and providing financial assistance for this research work.

□ *Develop basic research on the effects of global warming on ecosystems: a research priority*

The PNACC's «biodiversity» approach is based on the objectives set out in the 2011-2020 National Biodiversity Strategy (SNB), the actions of which seek to conserve or restore the potential that nature has to adapt. The research and experimentation approach is based on the National Research and Innovation Strategy (SNRI) which sets out priorities with the goal of meeting scientific, technological and societal challenges. As regards the 2009/2012 core priorities (the next national research strategy, which includes environmental challenges, should be finalised in the second half of 2014), two of these concern climate change adaptation: environmental emergency and eco-technology; health, food and biotechnology. In recent years, there has been a strong impetus towards making research a vector for growth and competitiveness. Applied science permeates European research programmes and those of the National Research Agency (ANR) within France. Without denying the value of this work and of optimising the use of its results, the ESEC does not wish to see this given priority over basic research. Indeed, vital questions concerning the response of land ecosystems to increased drought, changing rainfall patterns and all currently occurring and foreseeable climate changes are yet to be explored, as do those concerning biodiversity as an adaptation factor. **Our assembly therefore asks that basic research projects be maintained or developed as a counterpoint to efforts invested in applied research**, which is based on knowledge developed upstream.

The ESEC, which in a recent report and opinion on ocean governance^{xxiv} highlighted the major importance of oceans for the future of humanity, particularly due to the role that they play in major climate change, recommends the stepping up of research on the effects of warming on ocean masses and the biodiversity that they contain. Such an understanding, which includes initial states, sea/coastal zone interfaces and adaptation measures to be envisaged, is vital for a country such as France which possesses the second largest maritime zone in the world (eleven million square kilometres), with a coastline in excess of 18,000 km (5,853 km for mainland France), with a significant portion of the population living in coastal zones and an economy that relies in part on the sea (fisheries, aquaculture, tourism, etc.).

Within the framework of the PNACC, only one action has been implemented in the field of fisheries and aquaculture: an epidemiological monitoring platform, accompanied by a more targeted action on the «*development of Guyanese prawn stocks in the context of climate change*». In the mid-term review of the national programme, it was stated that «*taking into account the sensitivity of this sector to climate change, a number of consolidating approaches could be envisaged in subsequent versions of the PNACC*». **The ESEC is supportive of this idea, but takes the view that the research effort must be comprehensive and structured around three core areas:**

- **increases in water temperature and acidity and their consequences on currents and ecosystems;**
- **regional measures, particularly in the islands, and their long-term monitoring;**
- **at a more tangible level, implications of these changes for the professionals concerned.**

As regards the first core area, **our assembly would like the thematic programming of the ANR to include a programme on the acidification/climate change dyad and insists on the need for improved measurement of the impact of ocean acidification**

and temperature increase on marine ecosystems and organisms. In this regard, the ESEC would like oceanographic centres and institutes working on forecasting of the physico-chemical profile of oceans to extend their work to include biological aspects, as some of these have already begun to do.

The available data mainly comes from laboratory experiments with a very short time frame that does not enable the adaptation capacity of organisms or the resistance or resilience of certain ecosystems to be evaluated. Under these conditions it is difficult to project how such factors will play out over time. A great deal of basic research therefore needs to be conducted and **ANR programmes must not diminish these types of projects in favour of applied research work and ecosystems services.** The scope of the studies must also be broadened - very few concern fish, for example - with sector-specific consolidation to remove uncertainties created by sometimes divergent results. **Since this issue is a priority for many overseas territories, the ESEC also recommends conducting research on the resilience of coral systems.**

As regards the second core area, **our assembly would like research to be pursued that will improve knowledge on:**

- **the resilience or resistance of certain ecosystems at the local level, in order to obtain better projections for the development of these systems through the use of modelling tools;**
- **changes to reef and mangrove areas, particularly in the overseas territories;**
- **the transformation of coastal zones and the habitats that these constitute for a large portion of marine fauna.**

Regarding implications for professionals, our assembly would emphasise that the physical characteristics of the atmosphere and the oceans affect the phenology, abundance and geographical distribution of species. Changes to their distribution are also accompanied by the appearance of invasive species. The entire food chain is impacted by these changes, as is ecosystem productivity.

In order for shellfish farmers, fishermen and aquaculture farmers on the one hand, and tourism actors on the other hand, to be able to adapt their activities to the new conditions under which these must be carried out, **research must also be conducted on the nature of causes of changes in biodiversity, in line with environmental characteristics and climate change, particularly in the most sensitive zones, and in the assessment of their cost. In all these areas, the ESEC encourages the strengthening of interactions between overseas and mainland scientific research teams.**

□ Clarify the consequences of climate change in an urban environment

We have known since the 19th century that there is such a thing as an urban micro-climate, known as an urban heat island (UHI), a sort of urban dome beneath which temperatures are significantly higher than in the surrounding areas. There are a number of variables involved in this complex phenomenon that interact and sometimes combine: geographical location, topography, land use, reflection coefficient, air circulation, human activities, etc. In turn, heat islands play a role in a number of meteorological phenomena which influence humidity levels, frost, rainfall patterns, etc. Overall, the effect of climate change on heat islands worsens the impacts of each phenomenon. This primarily results in higher local levels of warming. In France, heat waves from August 2003, which led to

an estimated 60% increase in fatalities (134% in the Ile-de-France region) in relation to expected deaths, resulted in higher numbers of deaths in urban environments.

The ESEC takes the view that UHI must now be analysed in terms of public health risks and priorities for urban populations. Therefore, **our assembly considers that approaches to vulnerabilities such as population ageing, urban respiratory diseases and pollen allergies must be combined with urban planning choices on the one hand, and technical standards for equipment and buildings on the other hand.** Significant variations in climate factors (temperature, rainfall, atmospheric composition, etc.) may indeed, in extreme cases, have consequences that give rise to safety risks for users and services, and for inhabitants. **In order to accurately measure risks and increase the safety of persons and assets and assess adaptation options (changes to land allocation, re-vegetation, etc.), the ESEC specifically calls for knowledge integration in this field.**

□ *Increase research on adaptation to new health risks*

Among the risks engendered by global warming, those impacting human health must be addressed to greater extent than they are at the current time. Accordingly, **the ESEC recommends the aggregation of scientific knowledge at the various relevant territorial levels, in order to identify the extent of endemic and epidemic areas, and bacterial, viral and parasitic diseases, including those involving both wild and domestic fauna, and dietary risks. Regional health observatories may be mobilised in order to do so.**

Our assembly asks that health-environmental research be given greater priority through clear policy decisions and the corresponding budgetary resources. These decisions must be reflected in the priorities of the ANR.

The balance between the positive and negative effects of warming will vary from one region to the next, and measures to be taken in terms of care and public prevention and health infrastructure development /adaptation will need to be adapted to local situations

The ESEC takes the view, however, that within these overall developments, particular attention needs to be given to changes in the spatial distribution of infectious disease vectors that are currently designated as tropical or sub-tropical. Some of these already pose a threat in the overseas communities (leishmaniosis, malaria mycotoxins, etc.), and even in mainland France. An outbreak of leishmaniosis detected in the Jura department in 2012 attests to the migration of tropical or subtropical flies (sand flies), vectors for the disease, to a region with a climate that has until now been inhospitable to them. In Greece, autochthonous malaria has been re-emerging for a number of years. Other examples may also be cited.

The relationship between new climate conditions, the animal migrations that these bring about and, together with these, the emergence or re-emergence of vector-borne infectious diseases must be the subject of research, monitoring, predictions and anticipation in the interests of effective prevention. **The ESEC would like this research to focus on upstream approaches (understanding of both biological and ecological basic mechanisms) and also applications for operational transfer into regional risk plans.**

The study of fixation conditions for pathogen complexes (given area, pathogen, reservoir host, mode of transmission, susceptible individuals) and the risks of «new» vector-borne diseases and their effects on non-immune populations must be made a public health priority. The quality of anticipatory and monitoring measures for emerging vector-borne diseases depends on this.

□ *Integrate global warming scenarios using a multi-disciplinary approach*

The ESEC recommends integrating extreme hypotheses for climate scenarios (+ 4°C to 5°C average temperature by 2100 compared with the average temperature of the 20th century) in prospective studies which adaptation policies should draw on. **The effects of global warming on this scale on environments and sectors will indeed differ significantly from those that societies will have to confront if the international commitment to keeping warming below 2°C at the end of the century is honoured.**

Adapting to climate change consists not only in identifying solutions to benefit from unprecedented situations or to guard against their adverse effects. It also involves preparing to be adaptable, i.e. developing the ability to respond to a new environmental context in a collective and suitable manner and anticipating the most likely changes. **The ESEC also considers, therefore, that there is a need to espouse the idea of a future that is significantly different from the present and factor this parameter into all studies of production sectors (agriculture, construction and public works, industry, insurance, etc.), conditions governing the exercise of occupations, professional practices and the anticipatory management of jobs and skills at all levels.**

integrate adaptation into the future economy

The impacts of global warming will be felt not only in the agricultural sector, but also in many other sectors of the economy. Tourism is often cited, regarding both mountain and beach: it is not without development potential, but this requires sector professionals to incorporate climate change into their thinking and to anticipate the necessary changes. The fisheries sector is particularly vulnerable, taking into account constraints already weighing on resources and those that will be brought to bear by temperature increases and acidification. Finally, other sectors not covered by this referral will also be affected, such as the energy sector: an increase in demand and restrictions is to be expected during hot periods and a decrease in cold periods. The effects on hydraulic, solar and wind energy are still inadequately quantified. Modes of transport will also be affected both by adaptation and by climate change prevention policies.

The PNACC provided for the completion of a prospective study to identify French industrial sectors sensitive to climate change, and the potential opportunities, between now and 2030-2050. This study, which was judged by the report to be *«highly innovative within the French context, as the time frame (2030-2050) goes beyond the time frames ordinarily used for strategic reflection»* was not carried out and has now been deferred. Studies of this type have been successfully carried out, for example in the United Kingdom, where they have revealed both vulnerable and very resilient sectors, as well as others for which opportunities exist. **The ESEC calls upon public and private actors to join forces, in order to execute, in the second part of the PNACC, the planned prospective study on the risks and opportunities for French industry. It must be launched without delay.**

By the same token, the ESEC asks that socio-economic and environmental studies be conducted on the consequences for occupations, jobs and qualifications rendered more vulnerable or which on the contrary will undergo development. These studies could be accompanied, where applicable, by basic research on consumer behaviours, for example in the field of tourism where anticipating these changes will be a decisive factor. The carrying out of such sector- and region-specific research, linked to professional environments, ought to be a requirement in the adaptation

components of regional plans or PCET as a climate resilience criterion. This research and development effort must enable businesses to propose the most cost-effective technical adaptation solutions, whilst encouraging those operational innovations most conducive to development on both the national and the export markets.

Voting

Voting on the full text of the draft opinion

No. voters	163
Votes in favour	161
Abstentions	2

The ESEC adopted.

Votes in favour: 161

<i>Agriculture Group</i>	Mr Barrau, Mr Bastian, Ms Beliard, Mr Cochonneau, Ms Dutoit, Ms Lambert, Mr Pelhate, Mr Pinta, Mr Roustan, Ms Serres, Ms Sinay.
<i>Craft Industry Group</i>	Ms Amoros, Mr Bressy, Ms Foucher, Ms Gaultier, Mr Le Lann, Mr Martin, Ms Sassano.
<i>Associations Group</i>	Mr Allier, Ms Arnoult-Brill, Mr Da Costa, Ms Jond, Mr Leclercq, Ms Prado, Mr Roirant.
<i>CFDT Group</i>	Mr Blanc, Ms Boutrand, Ms Briand, Mr Duchemin, Mr Le Clézio, Mr Legrain, Ms Nathan, Mr Nau, Ms Nicolle, Ms Pichenot, Ms Prévost, Mr Quarez.
<i>CFE-CGC Group</i>	Mr Artero, Ms Couturier, Ms Couvert, Mr Dos Santos, Mr Lamy.
<i>CFTC Group</i>	Mr Coquillion, Ms Courtoux, Mr Louis, Ms Parle, Ms Simon.
<i>CGT Group</i>	Ms Cailletaud, Ms Crosemarie, Mr Delmas, Mr Durand, Ms Farache, Ms Geng, Ms Hacquemand.
<i>CGT-FO Group</i>	Ms Baltazar, Mr Bellanca, Mr Hotte, Ms Millan, Mr Nedzynski, Mr Peres, Ms Perrot, Mr Veyrier.
<i>Cooperation Group</i>	Mr Argueyrolles, Ms de L'Estoile, Ms Rafael, Ms Roudil, Mr Verdier.
<i>Enterprise Group</i>	Ms Bel, Mr Bernasconi, Ms Coisne-Roquette, Ms Dubrac, Ms Duhamel, Ms Frisch, Mr Gailly, Ms Ingelaere, Mr Jamet, Mr Lebrun, Mr Lejeune, Mr Marcon, Mr Mariotti, Mr Mongereau, Mr Placet, Mr Pottier, Ms Prévot-Madère, Mr Roger-Vasselín, Ms Roy, Mr Schilansky, Ms Tissot-Colle, Ms Vilain.
<i>Environment and Nature Group</i>	Mr Bonduelle, Mr Bougrain Dubourg, Ms Denier-Pasquier, Ms Ducroux, Mr Genest, Mr Genty, Mr Guerin, Ms de Thiersant, Ms Laplante, Ms Mesquida, Ms Vincent-Sweet, Mr Virlouvet.
<i>Mutual Group</i>	Mr Andreck, Mr Davant, Ms Vion.
<i>Student Bodies and Youth Movements Group</i>	Mr Djebara, Mr Dulin, Ms Guichet, Ms Trelou-Kane.
<i>Overseas Group</i>	Mr Arnell, Mr Grignon, Mr Janky, Mr Lédée, Mr Omarjee, Ms Romouli-Zouhair.

<i>Qualified Leading Figures Group</i>	Mr Aschieri, Mr Bailly, Ms Ballaloud, Mr Baudin, Ms Brishoual, Ms Brunet, Ms Cayet, Ms Chabaud, Mr Corne, Ms Dussaussois, Ms El Okki, Mr Etienne, Ms Fontenoy, Mr Fremont, Mr Geveaux, Ms Gibault, Ms Grard, Ms Graz, Ms Hezard, Mr Hochart, Mr Jouzel, Ms de Kerviler, Mr Khalfa, Mr Kirsch, Ms Levaux, Ms de Menthon, Ms Meyer, Mr Obadia, Ms Ricard, Mr Richard, Mr de Russé, Mr Soubie, Mr Terzian, Mr Urieta.
<i>Liberal Professions Group</i>	Mr Capdeville, Mr Gordon-Krief, Mr Noël, Ms Riquier-Sauvage.
<i>UNAF Group</i>	Ms Basset, Mr Damien, Mr Farriol, Mr Fondard, Ms Koné, Ms L'Hour, Ms Therry, Mr de Viguerie.
<i>UNSA Group</i>	Ms Dupuis.

Abstentions: 2

<i>Qualified Leading Figures Group</i>	Mr Lucas, Ms du Roscoät.
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Annexes

Annex 1 : Composition of the Section for Environment

✓ **President:** Anne-Marie DUCROUX

✓ **Vice-presidents:** Patricia RICARD et Catherine TISSOT-COLLE

☐ **Agriculture Group**

✓ Marie-Thérèse BONNEAU

✓ Claude COCHONNEAU

✓ Claude ROUSTAN *administratively attached to the group*

☐ **Craft Industry Group**

✓ Alain GRISET

☐ **CFDT Trade Union Group**

✓ Marc BLANC

✓ Yves LEGRAIN

☐ **CFE-CGC Trade Union Group**

✓ Gabriel ARTERO

☐ **CFTC Trade Union Group**

✓ Marie-Josèphe PARLE

☐ **CGT Trade Union Group**

✓ Pierrette CROSEMARIE

✓ Marie-Claire CAILLETAUD

☐ **CGT-FO Trade Union Group**

✓ Anne BALTAZAR

☐ **Cooperation Group**

✓ Denis VERDIER

☐ **Enterprise Group**

✓ Martie-Christine COISNE-ROQUETTE

✓ Catherine TISSOT-COLLE

Environment and Nature Group

- ✓ Jacques BEALL
- ✓ Antoine BONDUELLE
- ✓ Allain BOUGRAIN DUBOURG
- ✓ Anne-Marie DUCROUX
- ✓ Gaël VIRLOUVET

Mutual Group

- ✓ Pascale VION

Student Bodies and Youth Movements Group

- ✓ Antoine DULIN

Overseas Group

- ✓ Patrick GALENON

Qualified Individuals Group

- ✓ Bernard BAUDIN *administratively attached to the group*
- ✓ Catherine CHABAUD
- ✓ Maud FONTENOY
- ✓ Jean JOUZEL
- ✓ Dominique MEYER
- ✓ Patricia RICARD

UNAF Group

- ✓ Alain FERETTI

Associates Group

- ✓ Daniel BOY
- ✓ Michel DEBOUT
- ✓ Agnès MICHELOT
- ✓ Sylvianne VILLAUDIERE

Annex 2: list of persons heard and met

For information purposes, the section heard from the following persons:

- ✓ **M. Nicolas Bériot**
Secretary-General of the National Observatory on the Effects of Global Warming (ONERC), Minister for Ecology, Sustainable Development and Energy (MEDDE);
- ✓ **M. Laurent Bopp**
Researcher at the Laboratory for Climate and Environmental Sciences;
- ✓ **M. Louardi Boughedada**
Vice-President of the Dunkirk Urban Community, President of the Aa Delta Water Commission;
- ✓ **M. Daniel Boy**
Research Director at Sciences Po (CEVIPOF);
- ✓ **M. Martial Chevreuil**
Innovation and Development Director - EGIS Group;
- ✓ **M. Christian de Perthuis**
Professor at Paris-Dauphine University, «Climate Economics» Chair;
- ✓ **M. Olivier Degos**
Deputy Managing Director of the Agriculture, Sustainable Development and Tourism Division - Aquitaine Regional Council;
- ✓ **M. André Dorso**
Former Managing Director of Services - Local Authority of Mayotte;
- ✓ **Dr Alain Grimfeld**
President, Prevention and Precaution Committee, General Commission on Sustainable Development;
- ✓ **M. Bertrand Hervieu**
Vice-President of the General Council for Agriculture, Food and Rural Areas, at the Ministry for Agriculture, Agrifood and Forestry;
- ✓ **Mme Emmanuelle Latouche**
Climate Unit Director at the Centre for Sustainable Development Resources (CERDD) for the Nord-Pas-de-Calais region;
- ✓ **M. Franck Lecocq**
Director of the International Research Centre for the Environment and Development (CIRED);
- ✓ **M. Hervé Le Treut**
Member of the French Academy of Sciences, Director of the Pierre-Simon Laplace Institute;
- ✓ **M. Frédéric Levraut**
Head of Climate Change Programmes at the Poitou-Charentes Chamber of Agriculture;

- ✓ **M. Sylvain Mondon**
ONERC Mission Head;
- ✓ **Mme Claude Nahon**
Director of Sustainable Development, EDF Group;
- ✓ **M. Emmanuel Soulias**
CSE Director, MACIF Group, President of the Sustainable Development Commission and the French Insurance Association (AFA);
- ✓ **M. Jean-François Soussana**
«Environment» Scientific Director for the INRA.

Furthermore, the rapporteurs heard the following named individuals privately:

- ✓ **M. Gilles Bœuf**
Biologist, President of the National Natural History Museum (MNHN);
- ✓ **M. Philippe Dubois**
Ornithologist, Head of Ecological Studies and Research at the LPO;
- ✓ **M. Antoine Flahault**
Professor of Medicine (Health/Climate Change);
- ✓ **M. Yann Françoise**
Director of Green Spaces and the Environment at the City of Paris, Paris Climate Plan Project Head;
- ✓ **M. Hervé Le Boulter**
Director of the National Conservatory for Forest Biodiversity;
- ✓ **Mme Michèle Rousseau**
Director of the Seine-Normandy Water Authority;
- ✓ **M. Jean-Marc Valet**
Director of the National Botanical Conservatory in Bailleul.

We would like to extend our thanks to all of the above-named individuals for their contribution to the preparation of this document..

Annex 3: Glossary

Anthropic - of human origin; caused by humans. The adjective «anthropic» is accordingly used to designate a landscape, soil or relief that was essentially formed as a result of human intervention.

Time scale - an unequivocal events classification system. The chosen time frame may vary to a considerable extent. As regards climate change, the IPCC draws a distinction between climate forecasts and climate projections. Climate forecasts are the result of an attempt to estimate actual changes in climate in the future (using seasonal, year-on-year or long-term time frames, for example), and are generally speaking probabilistic. Climate forecasts are based on climate models and respond to a number of different greenhouse gas emissions scenarios, based on hypotheses concerning future socio-economic and technological changes.

Ecosystem - a system within which cyclic exchanges of materials and energy occur, due to interactions between the different organisms present (biocenosis) and their environment (biotope). An ecosystem is essentially characterised by relationships of a bio-physico-chemical nature. These are aquatic ecosystems, mountain ecosystems, etc.

Endemism this is the natural presence of a biological group exclusively within a demarcated geographical region. The Encyclopaedia Universalis specifies that «*the dimensions of the areas of endemic systematic units is often a function of their importance within the systemic hierarchy: a family will generally occupy a very extensive area, whereas a species, sub-species or variety will occupy an extremely restricted area, which may be limited to just one mountain massif, or to an island with a small surface area.*» The concept of endemism can be used for all categories of living things. Its level is one of the indicators and factors used to assess biodiversity.

Radiative forcing - An increase in the level of carbon dioxide and other greenhouse gasses (GHG) is the principle cause of climate change. However, other factors also affect the earth's energy balance, such as changes to cloud and soil colour, aircraft contrails or the depositing of soot on ice. Some of these forcing actions suggest the need for combined adaptation and mitigation, such as the use of light coloured surfaces on parking lots and roofs in cities threatened by «urban heat islands». All of these non-atmospheric actions may be approximated in terms of GHG emissions.

Geo-engineering - is a term used to designate scientific and industrial projects designed to modify the climate and the terrestrial energy balance to combat global warming. The methods used vary widely: limiting of solar radiation through the deployment of space mirrors, cooling of the atmosphere by the production of aerosols on a massive scale, creation of carbon sinks, fertilisation of the ocean to promote plankton development... Cost feasibility, knowledge of the actual effects and the potential secondary effects of these processes, monitoring of the latter, the benefit of symptomatic rather than curative action... many questions are still to be answered concerning this concept which divides the scientific community.

Certain impacts and risks - These impacts are addressed by the IPCC in the second section of its report. Some of these have been accurately described by scientists, particularly those associated with slow changes. For example, ocean acidification is closely correlated with the increase in carbon dioxide levels. Even in this case, however, the consequences are not fully understood in terms of fish stock environments, partly due to insufficient studies, and partly because the consequences will occur as a cascade within food chains alongside other disturbances in the environments of living organisms.

Uncertainty - There remains a very high level of uncertainty regarding the formulation of an adaptation strategy, which has a number of origins. Firstly, the global climate change scenario - for example +2°C in 2111 compared with the pre-industrial situation recommended by the international community. There is uncertainty as to whether or not international efforts will be successful, combined with the imperfect nature of models based on a networking which is by definition imperfect. It is also impossible to fully determine how the earth will respond to changes of anthropic origin.

[[Note 1. Reference to a warming scenario varies between sources as a comparison is made either to current temperatures or to pre-industrial temperatures, i.e. a difference of 0.6°C (SPM WG1, 2013)

A further uncertainty is that average warming will involve significant geographic variations, first and foremost between maritime and continental zones. The warming of the latter will be several degrees higher. As for major cities, urban effects suggests up to +10°C higher in city centres compared with current heat waves!

In certain cases, temperature analogies can provide an indication as to the future climate, for example, «the climate of Bordeaux in Le Havre» if warming is less than 3°C. However, although this indication may work for temperature, significant uncertainty regarding the behaviour of water and rainfall considerably limits the validity of this concept. In Paris and on the Atlantic seaboard, for example, warming could in fact result in a reduction in sunshine hours. The geographical and local nature of changes was very much emphasised by the scientists heard.

Other impacts are expressed in the form of the higher probability of a known risk, such as the increased severity of a possible event, or of new risks, for example the appearance of a disease vector or allergenic pollen not previously known to exist in France. Likewise, the risk of forest fires is not linear.

The collective interest - Adaptation is defined at the level of the living area, the region, and, less frequently, the continent. Accordingly, there is no need to wait for a global agreement for a decision to be taken at the appropriate level to construct a seawall or a floodplain. Economists speak of a «microeconomic» problem. This is entirely different for climate change mitigation, which is a global concern dominated by the «free-riding» issue, whereby each country only wishes to act if it knows that the other countries will do the same. This explains which international negotiations remain vital for mitigation despite their considerable difficulty.

However, adaptation is figuring increasingly in discussions. Adaptation is increasingly required in the form of solidarity with the most vulnerable countries, which now place this at the heart of their demands. Indeed, the IPCC has shown that the most vulnerable countries see their development countered and even cancelled out by climate change.

It is also interesting to note that projects financed under adaptation in vulnerable countries, for example through the «adaptation fund» financed by the development mechanism of the Kyoto Protocol itself, consist first and foremost in planning and preparing plans, organisations and public services.

The limits to adaptation - Adaptation policies will incur increasing costs, in relation to increased risks and certain harm when temperatures increase or sea levels rise. However, there exists a limit that is very closely linked to geography at which harm is not merely a cost but can go as far as physical disappearance. This is the case if an island is submerged or fresh water has disappeared, or when plants can no longer survive droughts or extreme temperatures [IPCC AR5 WGII ch.19 p.52].

Conversely, there are no limits to mitigation. Scientists suggest not only achieving, in the long term, zero or very low emissions for countries or economic sectors, but also capturing greenhouse gases in the atmosphere in the more distant future if collective action proves insufficient to stabilise the climate [IPCC AR5 WGIII TS].

Maladaptation - the opposite of «no regrets», uncertainty regarding the impacts of climate change, and also failing to accurately assess the interests of territories or of their inhabitants, can result in the wrong policy decisions. This risk applies all the more to sectors for which the impact initially appears to be positive: certain cultures gain from rising temperatures, but this gain is then eradicated when temperatures rise still further. It can also be costly to «miss the target» through over-sized or under-sized infrastructure to provide protection from flooding or heat waves. This maladjusted expenditure can lead, for example, to flooding risks in the downstream catchments of a river. On the coast, a protective seawall can result in beaches disappearing over several kilometres.

Adaptation measuring - For mitigation, the measurement of actions, or of success or failure, is universal as it can be expressed in tonnes of CO₂ emitted or avoided [note]. This universal measure is the default for adaptation. It involves the incorporation of risks avoided, in terms of material and human harm, and also an estimate of the degree of readiness for changes, the vulnerability of the economy, environment or agriculture, and resilience to increased risk in the future. This adaptation, made more complex by uncertainty regarding possible futures, is based on indicators that are still unstable and lacking in consensus.

Phenology - refers to the position within the year and the duration of the phases of the life cycle in relation to seasonal climate variations. These periodic phenomena apply therefore to living things, although the term is also used to designate variations in natural phenomena such as glaciers over the course of the year in relation to the season and to climate conditions. Flowering, fructification, the arrival of migrating birds, the appearance of butterflies... are these all examples of phenological stages.

Phenology is a climate marker, but also a key element in the adaptation of living things to climate variations.

Phenophase - refers to the development of certain living things which occurs at a particular period in the year, in connection with all living organisms that are sufficiently close in terms of their living areas, ecological behaviour and cycle to share the same environment for a given period of time.

Trophic network - designates all of the food chains interlinked within an ecosystem, through which energy and materials circulates. A living organism may belong to several food chains and several trophic levels.

Trophic networks are affected by global changes, including climate disruption.

Resilience - The term resilience is another term used to designate the ability to resist future shocks that are not yet fully identified. For example, natural environments will be more or less resilient if they are in good health and conversely will be vulnerable if they have been weakened by other attacks. Citizens will be resilient to disruption if they have reliable social structures to assist them, and conversely, they will have difficulty adapting if they are isolated. Another example is that enterprises will be vulnerable if they have complex logistics

chains and are dependent on other continents, as was revealed by the crisis in the IT industry following flooding of a plant manufacturing hard drives in Thailand. Finally, communities will develop their resilience through plans for the future that are open to opportunities, and will develop their knowledge of future risks.

Forestry station - According to the national institute for geographical and forest information, a forest station is «an expanse of terrain of variable surface area (from a few m² to several tens of hectares), that is homogeneous in its physical and biological conditions: mesoclimate, topography, geomorphology, soil, floral composition and structure of spontaneous vegetation.» The Institute specifies that «a forestry station is designated for the specific silviculture of a given variety, the productivity of which is expected to fall within known limits» and that «forest station classification consists in identifying and studying these types, which, since 1976, have for the most part been collectively catalogued.»

No regret strategies - win-win policies and strategies exist that are referred to as «no regrets» strategies, which are still advantageous for a region, country or group of countries even if the rest of the world were not to take action, or if the targeted risk were to fail to materialise. In certain cases, adaptation actions are combined on a «no regrets» basis with mitigation, such as when the planting of hedges protects a territory against soil erosion and flooding whilst providing the community with low emission fuel and employment.

Vulnerability - The vulnerable nature of a country or region requires a triple combination. On the one hand, the risk of events such as a storm or a heat wave, and on the other the possible harm which will depend on the presence of humans, natural environments or economic installations, all combined with whether or not the society is prepared for this risk. Preparation includes specific techniques, alert systems, protection equipment or shelters, but also collective and individual organisational factors, and enduring, well-funded institutions. Two examples serve to illustrate this combination: in Bangladesh, the combination of a sheltering system and, most importantly, an early warning alert organised at every level is considerably reducing the number of cyclone victims. And in Flanders, drainage regulations for owners and enduring funding institutions have made it possible, for the last 850 years, to exploit the rich maritime plains that lie below sea level [IPCC AR5 WGII ch.19 pg.37, coastal protection].

Zoonoses - Zoonoses are infectious or parasitic diseases transmissible from animals to humans (anthropozoonoses), or from humans to animals (zooanthroponoses) under natural conditions. They are caused by a variety of biological agents: microscopic fungi, parasites, bacteria, viruses or prions. Some of these are also occupational diseases. Occupations involving direct contact with animals are directly concerned: trading of livestock or pets, or animals for breeding, slaughter, processing, customs, zoos, forestry work, environmental occupations (collection and processing of wastewater and waste, embankment, river and canal maintenance), etc.

The simultaneity of the recent increase in cases of several zoonoses and climate change (warming, altered rainfall patterns and extreme climate events, etc.) provide grounds to suspect that the two phenomena may be linked. The migration or vector species is among the factors likely to play a role in expanding the endemic areas of these diseases.

Annex 4: table of acronyms

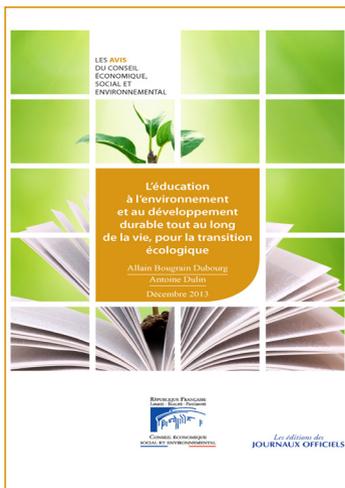
ADEME	Agence de l'environnement et de la maîtrise de l'énergie - Agency for the Environment and Energy Management
ANR	Agence nationale de la recherche - National Research Agency
BTP	Bâtiment et travaux publics - Construction and Public Works
CDC Climat	Caisse des dépôts et consignations climat, recherche - Deposit and Consignment Office Climate Research Subsidiary
CERDD	Centre régional de ressource du développement durable - Sustainable Development Regional Resource Centre
CGAAER	Conseil général de l'alimentation, de l'agriculture et des espaces ruraux - General Council for Agriculture, Food and Rural Areas
CGET	Commissariat général à l'égalité des territoires - General Commissariat for Territorial Equality
CHSCt	Comité d'hygiène, de sécurité et des conditions de travail - Health, Safety and Working Conditions Committee
CNTE	Conseil national de la transition énergétique - National Council for Energy Transition
CPP	Comité de la prévention et de la précaution - Prevention and Precaution Committee
DATAR	Délégation interministérielle à l'aménagement du territoire et à l'attractivité régionale - Interministerial Delegation for Development and Regional Appeal
DGEC	Direction générale de l'énergie et du climat - Directorate General for Energy and Climate
DICRIM	Dossier d'informations communales des risques majeurs - Major risk information document for municipalities
EAFRD	European Agriculture Fund for Rural Development
EMFF	European Maritime and Fisheries Fund
ERDF	European Regional Development Fund
FPRNM	Fonds de prévention des risques naturels majeurs - Major National Risks Prevention Fund
EFESE	évaluation des fonctions écologiques et des services écosystémiques - Evaluation of Ecosystems and Ecosystem Services
ESEC	European Economic and Social Council
ESF	European Social Fund
EU	European Union
GHG	Greenhouse Gas
GICC	Gestion et impacts du changement climatique - Management and Impacts of Climate Change
GIS Climat	Groupement d'intérêt scientifique climat-environnement-société - Climate-Environment-Society Scientific Interest Grouping
UHI	Urban Heat Island
IGN	Institut national de l'information géographique et forestière - National Geographic and Forestry Institute

INRA	Institut national de la recherche agronomique - National Institute for Agronomic Research
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
LFI	Loi de finances initiale - Initial Budget Act
MEDDE	Ministère de l'écologie, du développement durable et de l'énergie - Ministry for Ecology, Sustainable Development and Energy
ONEMA	Office national de l'eau et des milieux aquatiques - National Office for Water and Aquatic Environments
ONERC	Observatoire national sur les effets du réchauffement climatique - National Observatory on the Effects of Global Warming
ORSEC	Organisation de la réponse de sécurité civile - Civil Security Response Organisation
PAC	Politique agricole commune - Common Agricultural Policy
PCAET	Plan climat-air-énergie territorial - Territorial Climate Air- Energy Plan
PCET	Plan climat énergie territorial - Territorial Climate-Energy Plan
PCS	Plan communal de sauvegarde - Communal Response Plan
PLU	Plan local d'urbanisme - Local Urban Planning Code
PNACC	Plan national d'adaptation au changement climatique - National Climate Change Adaptation Plan
PPRN	Plans de prévention des risques naturels - Natural Hazard Prevention Plans
PRSP	Plan régional de santé publique - Regional Public Health Plan
PtDD	Projet territorial de développement durable - Territorial Sustainable Development Programme
SAGE	Schéma d'aménagement et de gestion des eaux - Plan for Development and Water Management
SCOT	Schéma de cohérence territoriale - Territorial Coherence Programme
SDAGE	Schéma directeur d'aménagement et de gestion des eaux - Programme for Development and Water Management
SNB	Stratégie nationale pour la biodiversité - National Biodiversity Strategy
SNRI	Stratégie nationale pour la recherche et l'innovation - National Research and Innovation Strategy
SRCAE	Schéma régional du climat de l'air et de l'énergie - Regional Climate, Air, Energy Programme
SRCE	Schéma régional de cohérence écologique - Regional Ecological Coherence Programme
UNFCCC	UN Framework Convention on Climate Change
ZAC	Joint Development Zone

Annex 5: List of End Notes

- I Common nouns and certain italicised expressions are explained in the glossary.
- II IPCC AR5 WGII (2014), article 5, chapter 19.
- III IPCC AR5 WGII (2014), article 5; chapter 19, section 6.1, 3, page 4.
- IV IPCC AR5 WGII (2014) chapter 19, section 6.3, page 39 44-45
- V IPCC AR5 WGII (2014), chapter 19, section 7.4.
- VI *Climate change Adaptation, Background report to the IA, part I problem definition, policy context and assessment of policy options.*
- VII Communication from the Commission; *An EU Strategy on adaptation to climate change*; 16 April 2013, COM (2013) 216 final
- VIII Communication from the Commission; *An EU Strategy on adaptation to climate change*; 16 April 2013, COM (2013) 216 final.
- IX Mr Perthuis, Mr Hallegate, Mr Lecocq; *Économie de l'adaptation au changement climatique (The Economics of Climate Change Adaptation)*; CEDD, February 2010.
- X In this opinion, the term «climate projection» corresponds to models created using a range of emission scenarios. The term scenario is also used in a broader sense that includes the concept of environmental and societal impacts
- XI Gaël Virlouvet; *Financing Environmental and Energy Transition*, Opinion of the Economic, Social and Environmental Council, Les éditions des Journaux officiels, September 2013.
- XII *Évaluation du coût des impacts du changement climatique et de l'adaptation en France (Assessing the Cost of Climate Change Impacts and Adaptation in France)*, Ministry for Ecology, Energy, Sustainable Development and Sea Ministry for Health and Sports, Inter-ministerial Delegation for Land-use Planning and Competitiveness of the Territories, Ministry for Food, Agriculture and Fisheries, September 2009.
- XIII Prevention and Precaution Committee; *Adaptation aux changements climatiques, acceptabilité des gouvernants et risque (Climate Change Adaptation, Acceptability of Governance and Risk)*, Ministry for Ecology, Sustainable Development and Energy, February 2013.
- XIV ONERC; *Les outre-mer face au défi du changement climatique (Response of the Overseas Territories to the Challenge of Climate Change)*; Report to the Prime Ministry and Parliament, Documentation française 2012.
- XV Jacqueline André-Cormier; *L'offre de santé dans les collectivités ultramarines (The Healthcare Offer in the Overseas Collectivities)*, Opinion and Report of the Economic, Social and Environmental Council, Les éditions des Journaux officiels, July 2009.
- XVI Florence Denier-Pasquier; *La gestion et l'usage de l'eau en agriculture (Water Management and Usage in Agriculture)*; Opinion of the Economic, Social and Environmental Council, Les éditions des Journaux officiels, April 2013.
- XVII Marie de l'Estoile; *Adding Value to French Forestry*; Opinion and Report of the Economic, Social and Environmental Council, Les éditions des Journaux officiels, October 2012.
- XVIII Mr Gaspard Dumollard and Ms Alexia Lesueur; *Drawing Up a National Climate Change Adaptation Policy: Feedback from Five European Case Studies*; Climate Report No. 27, March 2011.
- XIX French Civil Security Modernisation Act of 13 August 2004, article 1.

- XX François Giannocaro; *Le maire face à la crise: garantir le caractère opérationnel du PCS; chiffres du ministère de l'intérieur (The Mayor dealing with a crisis: guaranteeing the operational nature of the PCS; figures from the Interior Ministry)*; revue des collectivités territoriales, édition Lamy, March 2013 No. 88.
- XXI Eloi Laurent (Director); *Vers l'égalité des territoires, dynamiques, mesures, politiques (Towards territorial equality, dynamics, measures, policies)*. Ministry for territorial equality and housing, La documentation française, 2013.
- XXII Paul de Viguier; *Reducing regional inequalities: which national policy for regional management?*; Opinion and Report of the Economic, Social and Environmental Council, Les éditions des Journaux officiels, December 2013.
- XXIII Jacqueline Doneddu; *What functions and what organisation for the State in the territories?*; Opinion and Report of the Economic, Social and Environmental Council, Les éditions des Journaux officiels, November 2011.
- XXIV Catherine Chabaud; *Which means and which governance for sustainable management of the oceans?*; Opinion and Report of the Economic, Social and Environmental Council, Les éditions des Journaux officiels, July 2013.



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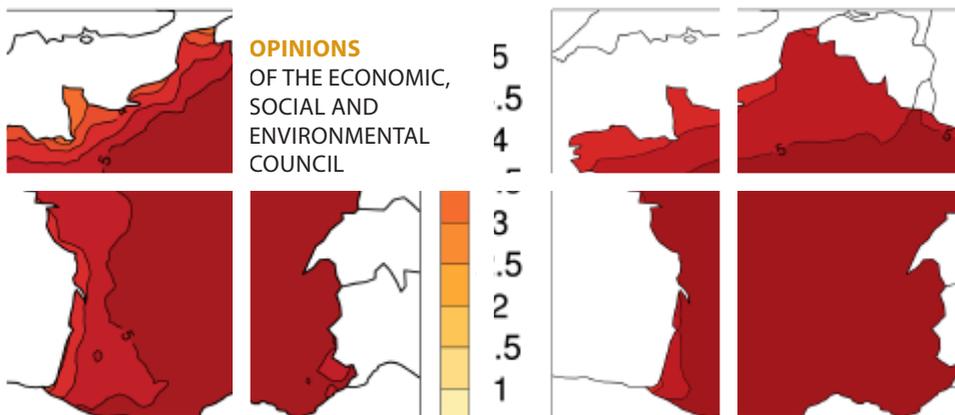
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Serial No.: 411140013-000514 – Legal registration: May 2014

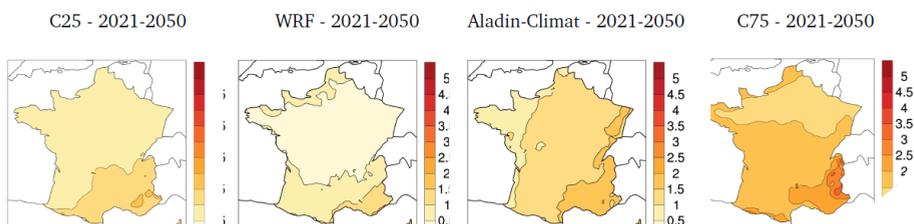
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No. 41114-0013 price: €12.90

ISSN 0767-4538 ISBN 978-2-11-120952-7



Distributed by the Direction
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