



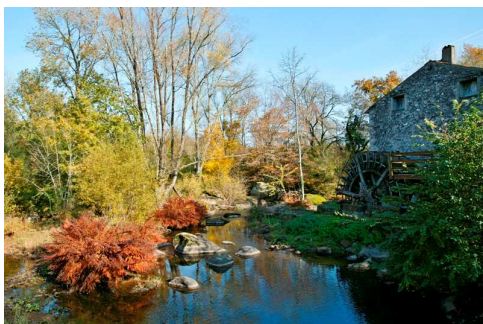
# Multiannual Energy Plan

## Executive summary

*"Empowering citizens, local authorities, businesses and the government to work together towards common goals"*

*Ségolène Royal .*

*Minister for the Environment, Energy and Marine Affairs, responsible for International Climate Relations*



**THE ENERGY TRANSITION** for the  
**GREEN GROWTH**

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## The Multiannual Energy Plan: a coherent action plan for the energy transition

- **What is the Multiannual Energy Plan (MEP)?**

The MEP sets out the government's strategic priorities in terms of energy policy, focused on meeting the objectives enshrined in the law on energy transition for green growth. For the first time, **all aspects** of energy policy (demand, renewable energies, security of supply, infrastructures, etc.) and **all forms of energy** are covered by the same strategy, reflecting the strong connections between the different dimensions of energy policy. Developing this more efficient and comprehensive approach to energy will help us to meet our objectives. In addition to this strategic role, the MEP also establishes quantitative objectives for the development of all forms of renewable energy, with strong support from the national government.

- **An essential tool for steering the energy transition**

In order to ensure the success of the energy transition, we need:

- 1°) **a legal framework with clear targets:** the law on energy transition for green growth, and all subsequent ministerial orders pertaining to its implementation;
- 2°) **a master plan** setting out priority actions, to be reviewed at regular intervals in order to adapt to evolving conditions and ensure that the strategy is clear and comprehensible to all citizens and economic stakeholders: this is the purpose of the multiannual energy plan;
- 3°) **plans and strategies which translate these priorities into operational objectives:** the strategy for clean mobility development, the strategy for biomass mobilisation, the strategic plan for employment and skills etc.

**The MEP and the national low-carbon strategy: in order to fight against climate change, the primary objective of the MEP is to reduce our consumption of imported fossil fuels.** The energy sector, along with other sectors of the economy, must help us to reach our ambitious target of reducing greenhouse gas emissions by 40% by 2030. The MEP is thus in line with the national low-carbon strategy.

- **France's ambition: to successfully make the transition to an energy system which is more efficient, less wasteful, more diverse and thus more resilient, protecting human health and the environment while guaranteeing access to energy.**

By setting clear priorities for action, and in particular by determining new targets for the development of renewable energies (electric, heat transfer, biogas, biofuels etc.), the MEP will:



- guarantee security of supply and reduce our dependence on imported fossil fuels;
- give a clear mid- to long-term view of our policy, thus encouraging investment and growth in the energy sector;
- contribute to job creation in the new sectors connected with the energy transition, and across the economy as a whole;
- protect human health and the environment, by fighting against climate change and improving air quality;
- promote social and territorial cohesion, ensuring that all citizens have access to energy at a price that does not weigh too heavily on their household budget.

In pursuing these objectives, the MEP is consistent with the national low-carbon strategy and its commitment to reducing greenhouse gas emissions. It also aims at diversifying our energy sources and further developing the use of renewable energy sources for electricity generation, heating and transportation.

This project clearly states France's commitment to building a European Energy-Union, and to meeting the targets enshrined in the Paris Agreement.

### • **The MEP: fruit of a broad consultation**

The multiannual energy plan has been in the works since March 2015, with contributions from a wide range of stakeholders:

- a steering committee, whose membership is comprised primarily of representatives of the organisations which make up the National Council for the Ecological Transition and the Advisory Energy Council. This committee was formed to manage the process of drafting the MEP as well as its principal objectives;
- 22 working sessions were held between late March and early June 2015, addressing all of the topics covered in the MEP. Over 800 people took part in these workshops, with over one hundred presentations and 70 written submissions;
- a further workshop was organised in December 2015 to discuss the strategy for clean mobility.

This MEP strategy also incorporates contributions from:

- the National Council for the Ecological Transition;
- the Advisory Energy Council;
- the Environmental Authority;
- the Experts committee on energy transition mentioned in Article L.145-1 of the Energy Code;
- the public, with over 5000 comments gathered during the open consultation process which ran from 15th September to 15th October 2016.

### • **A multiannual energy plan which makes allowances for technical and economical unknowns.**

In accordance with the law, this first ever multiannual energy plan is based on different "energy demand scenarios with reference to the different forms of energy consumption, incorporating multiple assumptions for demographic development, the economic situation, the





*balance of trade and advances in energy efficiency.*" In forecasting the development of renewable energies, the MEP takes into account the associated technical and economic uncertainties and gives high and low estimates based on the different assumptions used.

Two scenarios were defined:

- a reference scenario forecasting the evolution of energy demand that puts France on track to meet the objectives set down in law by 2030 for energy consumption, associated to a high development of renewables;
- an alternative scenario based on less favourable forecasts for energy demand, with renewable energies developing less rapidly than expected. This scenario makes allowances for the unknowns surrounding energy consumption. It illustrates the radical changes in energy consumption and production which would be required after 2023 in order to meet France's legal obligations by 2030, if the reference scenario cannot be matched.

### The MEP in numbers

Renewable energy for electricity	<b>Increasing the installed capacity by over 50% by 2023, in order to achieve installed capacity of between 71 and 78 GW</b>
Renewable energy for heating	<b>Increasing the production by over 50% to achieve output of 19Mtoe</b>
Bio-methane to be injected into the gas network	<b>8 TWh by 2023</b>
Total energy consumption	<b>Down by 12.3% in 2023 compared with 2012</b>
Primary consumption of fossil fuels	<b>Down by 22% in 2023 compared with 2012</b>
Primary consumption of coal	<b>Down by 37% in 2023 compared with 2012</b>
Primary consumption of oil products	<b>Down by 23% in 2023 compared with 2012</b>
Primary consumption of gas	<b>Down by 16% in 2023 compared with 2012</b>
Emissions of greenhouse gases from energy production	<b>294 MtCO<sub>2</sub> in 2018 (&lt; carbon budget of 299 MtCO<sub>2</sub>) 254 MtCO<sub>2</sub> in 2023 (&lt; carbon budget of 270 MtCO<sub>2</sub>)</b>
Economic growth	<b>GDP growth 1.1% greater than the baseline scenario in 2030</b>
Jobs	<b>Difference between the number of jobs created in the baseline scenario and in our forecast: c. 280,000 more jobs by 2030</b>
Gross disposable household income	<b>Increase in the gross disposable income of French households in the forecasting scenario calculated for the MEP: 13 billion Euros in 2018 and 32 billion Euros in 2023</b>

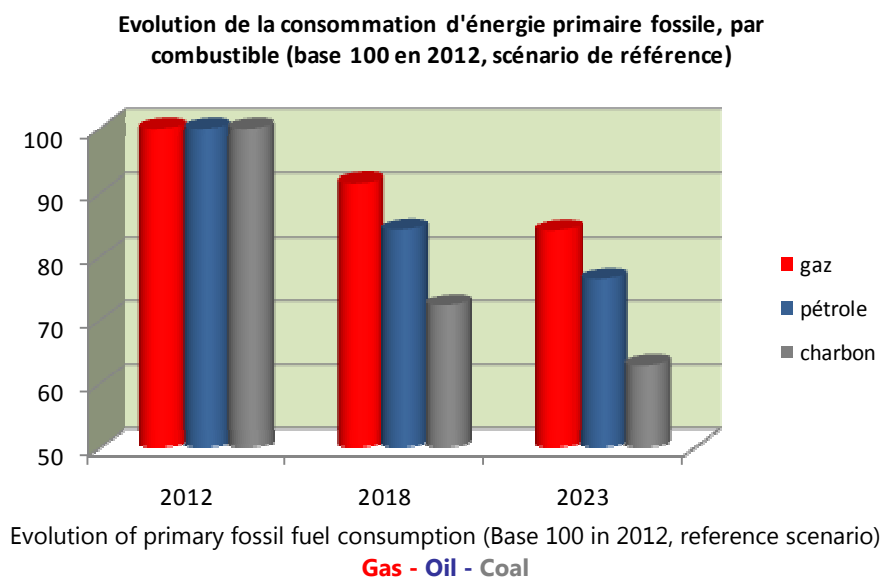


## Improving energy efficiency and reducing fossil fuel consumption

In order to account for uncertainties and guarantee a reliable energy supply for the whole of France, the multiannual energy plan is based on two energy demand scenarios, with different assumptions for demographic development, economic circumstances and energy efficiency. The reference scenario corresponds to the implementation of the energy transition law and the recommendations of the MEP, while the alternative incorporates the effects of less favourable external influences (demographic and economic growth, efforts to reduce demand), and as such is closer to the current trend.

### Evolution of primary fossil fuel consumption

- Primary consumption of energy from fossil fuels, which stood at 129.1Mtoe in 2012, is expected to decline in both scenarios:
  - in the reference scenario, consumption should fall by around 22% from its 2012 level by 2023.
  - in the alternative scenario, this reduction is closer to 11%.
- Extrapolating these trends to 2030, the reference scenario reaches the objectives set out in the energy transition law: a reduction of 30% on the levels recorded in 2012.

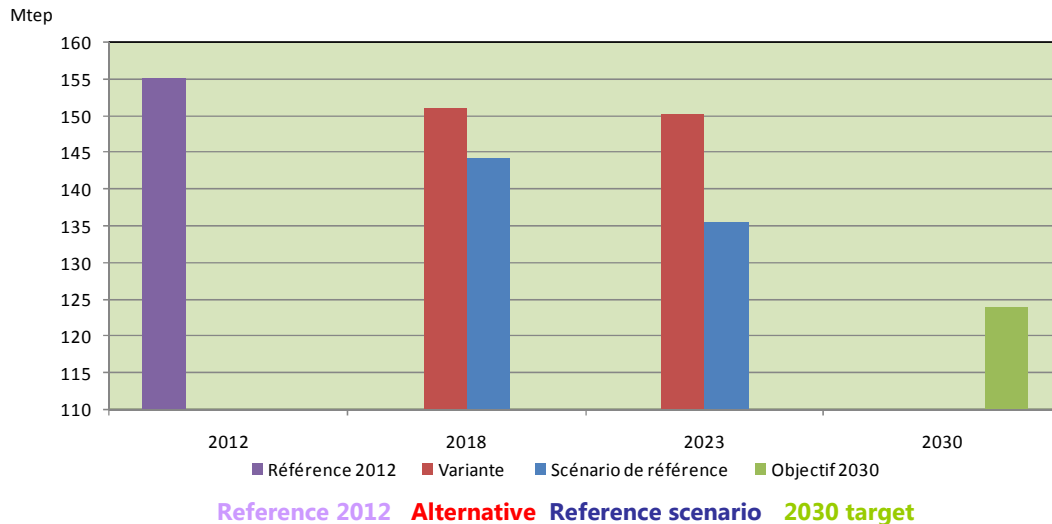


- Among these fossil fuels, primary consumption:
  - of **oil products** is expected to fall by 23% between 2012 and 2023 in the reference scenario (-9.5% in the alternative scenario);
  - of **gas** is predicted to fall by 16% in the reference scenario. (-9% in the alternative);
  - of **coal** should fall by 37% by 2023 as per the reference scenario (-30% in the alternative scenario), with the majority of remaining consumption corresponding to industrial use (particularly concentrated in the steel sector) and not energy generation.



### Evolution of final energy consumption

- Final energy consumption was 155.1Mtoe in 2012 (SOeS review, July 2014):
  - according to the reference scenario, consumption should be down by 12.6% on its 2012 level by 2023, corresponding to a year-on-year decline of 1.2%.
  - in the alternative scenario it should fall by 3.1%, or 0.3% per year.



- If we extend these projections beyond 2023, the reference scenario would meet our legal target of reducing final energy consumption by 20% by 2030.

### Evolution of final energy consumption by sector, in Mtoe and compared to 2012 levels

	2012	2018		2023	
		Reference scenario	Alternative	Reference scenario	Alternative
<b>Industry</b>	32.5	32.7	35	31.7	35.6
<b>Residential / Tertiary</b>	69.1	61.7	62.3	56.7	60
<b>Transport</b>	49	46	49.4	43.4	50.1
<b>Agriculture</b>	4.5	3.9	4.4	3.7	4.6
<b>Total</b>	155.1	144.3	151.1	135.5	150.3

- The reference scenario would allow us to meet our legal targets, but inverting the historical trend will require significant and sustained efforts.

### What will it take to reach these objectives?

In order to meet our legal targets by 2030, and invert the historical trend for increasing energy consumption, **we will need to implement ambitious short, medium and long-term actions across all sectors.**

Reducing our consumption of energy from fossil fuels will require **strong action on carbon pricing**, particularly in the current context of falling fossil fuel prices. Although this context may make energy-efficiency efforts less immediately attractive, it does allow us to introduce higher carbon pricing with a limited impact on consumers' energy bills.



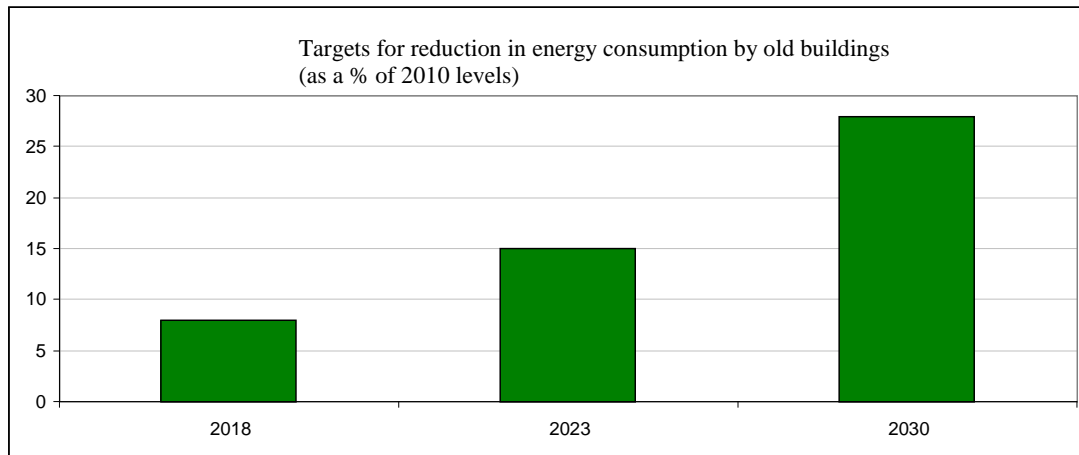
## Strategic orientations and actions to get energy demand under control

### General actions

- **Ramping up the Energy Efficiency Obligation Scheme (white certificates)**, targeting the areas identified as offering highest potential energy savings. By the end of 2016 we will have determined the targets and actions for Phase 4 (2018-2020) with enhanced objectives.
- Raising public awareness of energy-saving actions (more information on consumption; individual heating bills, resources for households renovation; energy efficiency audits; information campaigns).
- Backing an ambitious, effective European policy on **ecodesign ErP and energy labelling**.

### Construction

- **Stepping up campaigns of energy-efficient renovation** for homes and tertiary-sector buildings, cutting energy consumption by 28% by 2030 (from 2010 levels) with milestones of 8% by 2018 and 15% by 2023.



- Encouraging the renovation of existing **tertiary facilities** via enhanced regulatory requirements.

### Funding the energy transition

- Developing the existing ecosystem providing **funding for energy efficiency initiatives** (guarantees, third-party financing etc.).
- Allocating three billion Euros from the *Caisse des dépôts et consignations*, with €1.5 billion going to **fund the renovation of social housing** and a further €1.5 billion for the renovation of public buildings.

### Digital

- Developing the use of digital technologies and data to reduce energy consumption and bills (eg through smart metering and display of energy consumption).

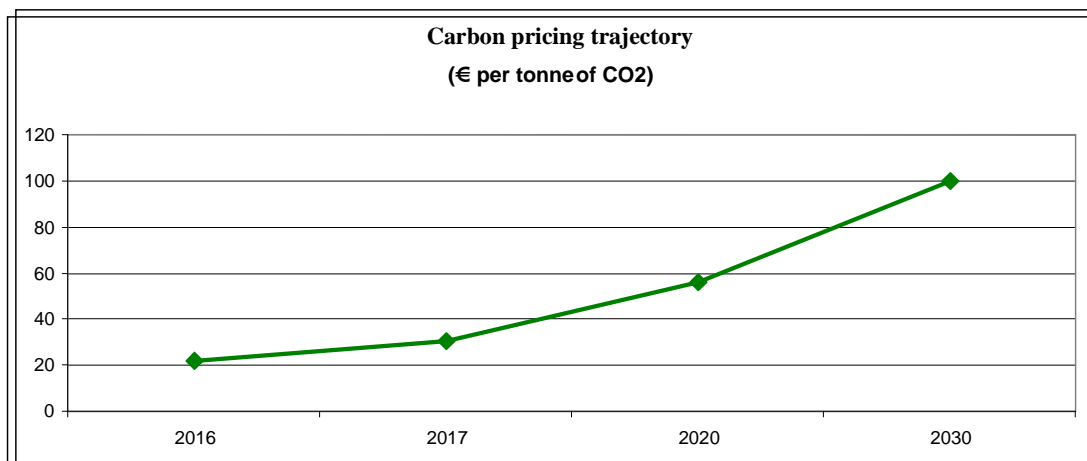




### Carbon pricing

The current situation is heavily influenced by the fall in fossil fuel prices, which makes energy efficiency actions appear less attractive in the short term. It is therefore crucial that we take strong action on carbon pricing, in order to meet our objectives for reducing fossil fuel consumption. The current low fuel prices mean that a higher price can be applied to carbon emissions without inflating consumers' energy bills.

- Implementing **the increase of the carbon component in our energy taxes**, to reach our target of €56 per tonne of CO<sub>2</sub> in 2020, starting at €22 on 1st January 2016 and increasing to €30.5 on 1st January 2017.



- Proposing a **carbon price corridor** at European level as part of the current reform of the EU-ETS carbon market.
- Forming an international coalition for carbon pricing.



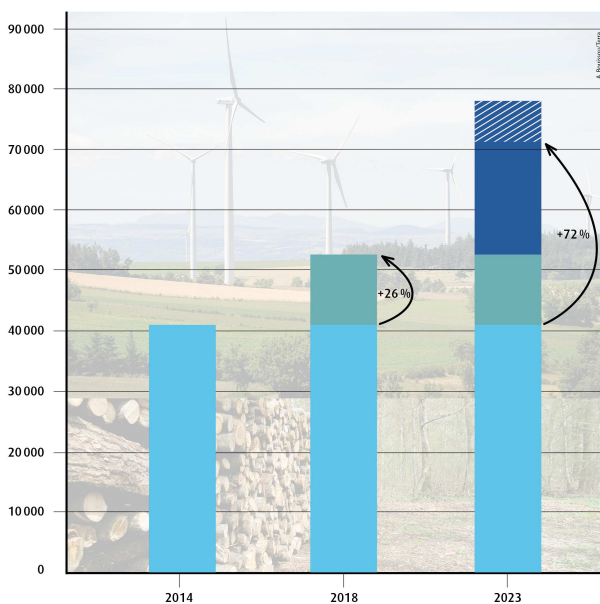
## Accelerating the development of renewable energies and recuperated energy

The law on energy transition for green growth sets out ambitious objectives for the development of renewable energies: **increasing the contribution of renewable energies to total final energy consumption, which stood at around 15% in 2014, to 23% by 2020 and 32% by 2030**. By 2030, renewable energy sources will account for 40% of total electricity generation, 38% of final heat consumption, 15% of final fuel consumption and 10% of gas consumption.

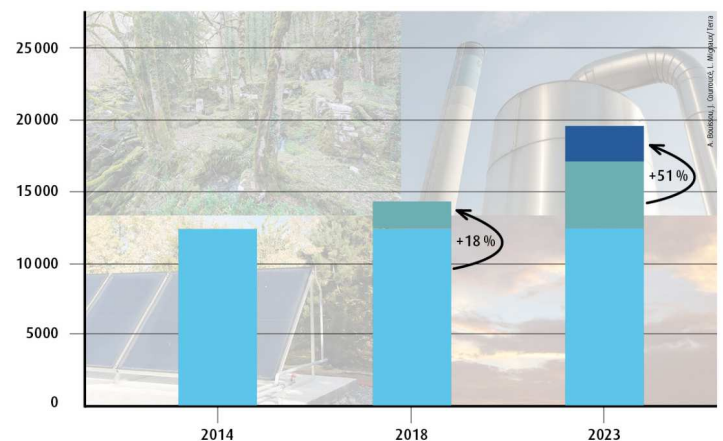
The MEP sets a new target for 2023 which will require a significant acceleration in the development of renewable energies, in order to put us on course to fulfil our legal commitments by 2030. The objectives contained in the MEP will allow us to:

- increase installed capacity for electricity generation from renewable energy sources by 70% on their 2014 level (41GW) to reach total capacity of between 71 and 78GW in 2023;
- to increase heat production from renewable energy sources by more than 50% from its 2014 level to reach 19 million tonnes of oil equivalent (toe) by 2023;
- to increase heating and cooling from waste heat and renewable energy sources injected in district heating and cooling networks to reach 1.9 to 2.3 Mtoe by 2023.

### Total Electricity from RES (capacity)



### Total Heat from RES (energy)



### What will it take to reach these objectives?

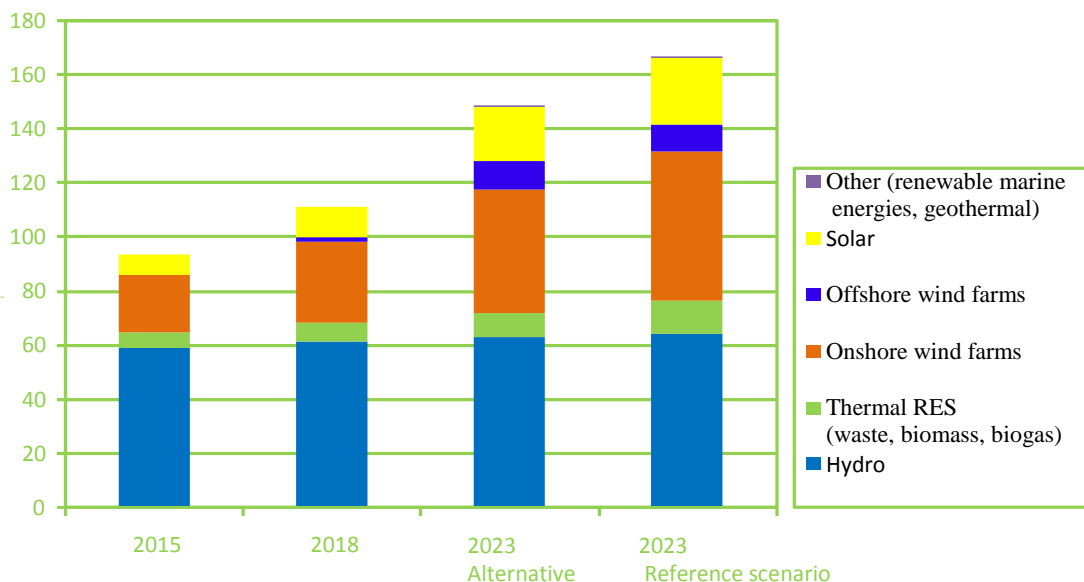
Meeting our renewable energy targets will require **strong commitment from all stakeholders** (businesses, elected bodies, citizens), along with effective support and funding mechanisms and innovations in organisation, starting with the simplification of administrative procedures.

The breakdown of our general objectives into specific targets for each type of renewable energy reflects the outcomes of the consultation process which took place in this multiannual energy plan, taking into account the necessary balance between several key dimensions:

- **the financial dimension:** renewable energies are backed by the French state, and as such it is important to focus on developing the most competitive sectors, or those with the potential to cut costs and become competitive in the near future, without neglecting sectors which have not yet reached maturity but are liable to make a greater contribution in the medium-term;
- **the economic dimension:** the purpose of publishing our targets and milestones is to give a clear view of the market to all economic stakeholders, as well as bolstering investment and growth in the renewable energy sector, creating jobs related to the energy transition and across the economy as a whole;
- **the environmental dimension:** the environmental impact of renewable energy facilities needs to be kept to a minimum;
- **the feasibility dimension:** projects need to be accepted and supported by local people and local authorities.

### Electricity from renewable energy sources

#### MEP targets for renewable energy output, by sector



When combined, these quantitative objectives should allow us to achieve a **total renewable electricity output of between 150 and 167 TWh per year by 2023**.



	2014	2018	2023	2023
			Alternative	Reference scenario
<b>Onshore wind</b>	9 300 MW	15 000 MW	21 800 MW	26 000 MW
<b>Solar</b>	5 300 MW	10 200 MW	18 200 MW	20 200 MW
<b>Hydroelectricity</b>	25 300 MW (62 TWh)	25 300 MW (61 TWh)	25 800 MW (63 TWh)	26 050 MW (64 TWh)
<b>Fixed offshore wind farms</b>		500 MW	3 000 MW (plus projects in development totalling between 500 and 6000 MW, subject to consultation on suitable zones, feedback and results of pilots, and subject to price conditions)	
<b>Marine energies (floating wind farms, tidal etc.)</b>			100 MW (plus projects in development totalling between 200 and 2000 MW, subject to feedback from pilots and price conditions)	
<b>Wood</b>	357	540 MW	790 MW	1 040 MW
<b>Methanisation</b>	85 MW	137 MW	237 MW	300 MW
<b>Geothermal electricity generation</b>		8 MW	53 MW	
<b>Waste, biogas and gas from water treatment</b>	~1200 MW	~1350 MW	~1500 MW	
<b>TOTAL</b>	41 GW	52 GW	71 GW	78 GW

### General priorities

- **Accelerating** project development **while doing more to take environmental considerations, local feasibility studies and usage conflicts into account.**
- **Continuing the policy of administrative simplification** already in place, in order to bring down development lead times and reduce costs.
- Supporting the development of **funding** by local citizens and by local authorities.
- **Introducing a clear programme and regular timetable** for calls for tenders.

### Calendar of calls for tenders involving renewable energy generation:





Calendrier prévisionnel	2016				2017				2018				2019	
	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2
Solaire (sol)		Lancement AO tri-annuel		Échéance 1 (500 MW)		Échéance 2 (500 MW)		Échéance 3 (500 MW)		Échéance 4 (500 MW)		Échéance 5 (500 MW)		Échéance 6 (500 MW)
Solaire (bâtimts)		Lancement AO tri-annuel		Échéance 1 (150 MW)	Échéance 2 (150 MW)	Échéance 3 (150 MW)		Échéance 4 (150 MW)	Échéance 5 (150 MW)	Échéance 6 (150 MW)		Échéance 7 (150 MW)	Échéance 8 (150 MW)	Échéance 9 (150 MW)
Biomasse	Lancement AO tri-annuel		Échéance 1 (50 à 100 MW)			Échéance 2 (50 à 100 MW)					Échéance 3 (50 à 100 MW)			
Méthanisation	Lancement AO tri-annuel		Échéance 1 (10 MW)			Échéance 2 (10 MW)					Échéance 3 (10 MW)			
Eolien en mer posé		Lancement d'un appel d'offre et des études techniques mutualisées												
Petite Hydro-électricité		Lancement AO1		Échéance AO1	Attribution AO1		Lancement AO2 éventuel		Échéance AO2		Attribution AO2			
Hydrolien			Lancement AO1										Lancement AO 2	
Eolien flottant			Lancement AO1											

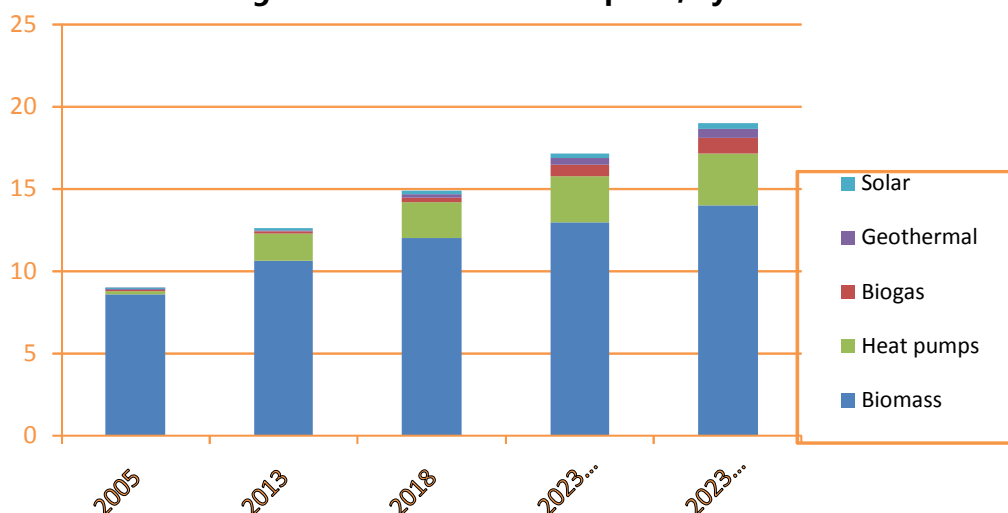
### Actions by sector

- **Maintaining the flexibility of the hydroelectric sector**, which is essential to ensure the flexibility of the power grid in general, and facilitating the integration of increased renewable energy capacities.
- **Launching regular tender processes to support micro and small-scale hydroelectric projects.**
- **Consolidating the financial support scheme for onshore wind by the end of 2016.**
- Accelerating the development of **solar photovoltaic, particularly** towards more competitive solutions such as **ground-level solar panels, while ensuring that the locations chosen for solar facilities respect natural areas and farmland.**
- **Launching a tender process for self-consumption projects** open to energy users in the industrial, tertiary and agricultural sectors. All renewable technologies will be eligible (solar, small-scale hydro, mills, etc.).
- Limiting the use of food crops for **methanization** in order to avoid potential conflicts arising from the use of agricultural land previously reserved for food production.
- Working to **equip as many incinerators, water treatment plants and landfill sites as possible with energy recuperation technologies** (where it is not possible to inject biogas into the network or recover the heat generated).
- **Improving the call for tender procedure for offshore wind farms**, in order to drive down costs and speed up project delivery before new calls for tender can be launched.
- **Strengthening consultation processes and taking into account environmental issues, local opinion and potential conflicts relating to offshore wind farms**, identifying suitable zones upstream of calls for tender and ensuring that projects are firmly rooted in the regional economy.



## Gross final consumption of energy from renewable sources for heating and cooling

### MEP targets for final RES consumption, by sector



Ktoe	ktep	2014	2018	2023	2023
				bas	haut
Biomass	<b>Biomasse</b>	10 700	12 000	13 000	14 000
Heat pumps	<b>Pompes à chaleur</b>	1 600	2 200	2 800	3 200
Solar thermal	<b>Solaire thermique</b>	150	180	270	400
Biogas	<b>Biogaz</b>	100	300	700	900
Geothermal	<b>Géothermie</b>	100	200	400	550
	<b>TOTAL</b>		<b>14 880</b>	<b>17 170</b>	<b>19 050</b>
Quantity of district heating and cooling delivered from waste heat and renewable energy sources	<b>Energie renouvelable et de récupération livrée par les réseaux</b>		1 350	1 900	2 300

### General priorities

- Boosting the Heat Fund in order to reach the targets outlined for 2018 and 2023, and expand the programme to waste heat and cold.
- **Increasing by 50% the rate of development of renewable heat generation** with more biomass plants, heat pumps and methanization. This will require a concerted effort to mobilise more biomass in a sustainable way.
- **Making better use of biomass resources** without sacrificing the sustainable management of forestry resources and agricultural land, with respect for sustainability criteria with regard to imports, and in synergy with the national biomass strategy and the National Forestry and Wood Programme.

### Actions by sector

- **Rapidly replacing open fireplaces** in private homes with systems which are more energy-efficient and generate less air pollution.



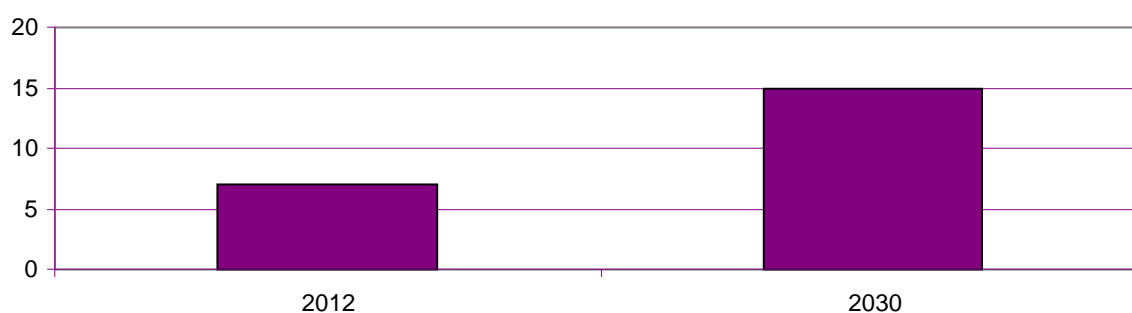
- **Promoting the development of new biomass plants** for collective, tertiary, agricultural and industrial use.
- **Expanding the available range of woodburners**
- **Supporting the projects selected by the 'Dynamic Bois' calls for expressions of interest (CEI)**, focusing on mobilizing biomass resources. The 43 projects selected by this CEI will share funding of M€55 with the aim of using 3 million tonnes of extra wood resources and boosting plantation density on 40,000 hectares of forestry land.
- Implementing the projects selected in the **Air-Wood Fund** call for tender launched by Ademe in 2015.
- **Promoting the installation of heat pumps** in collective residences and tertiary-sector facilities.

### Renewable gas resources

- Achieving **annual production capacity of 8 TWh from biomethane by 2023**, with calls for tender if necessary.
- Promoting the **injection** of biomethane into the gas network.
- **Supporting the development of biogas for vehicles**, with targets of 0.7 TWh for 2018 and 2 TWh for 2023, with biogas thus accounting for 20% of natural gas consumption by vehicles in 2023, complementing the development of electric vehicles and hybrids.

### Oil products

#### Renewable Fuels (% of total)



- **Prioritising the development of advanced biofuels** while protecting existing investments.
- Setting new **objectives for the incorporation of advanced biofuels**: 1.6% by 2018 and 3.4% by 2023 for petrols, and 1% by 2018 and 2.3% by 2023 for diesel, if the necessary conditions are met.
- Publishing a ministerial order with a **list of conventional and advanced biofuels** along with the double-counting rules.
- **Authorising the use of ED95**, composed of 95% ethanol and intended for use in heavy vehicles in captive fleets.



## Maintaining a high level of security of supply, with respect for our environmental obligations

Security of supply can be defined as the **capacity of energy systems to satisfy - continuously and at reasonable cost - the predicted demands of the market.** Guaranteeing a secure energy supply can come from reducing demand, as well as focusing our efforts on the national and local production of renewable energies and the diversification of our energy supply. Maintaining a high level of energy security is a priority for all citizens and for our economy, making it one of the major challenges of the energy transition.

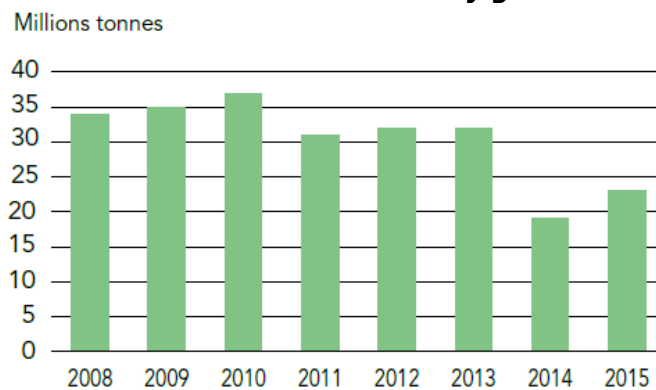
### Ambitions and actions

#### Electricity

Ensuring the security of the electricity supply aims at avoiding power shortages, such as localised power cuts or more generalised black-outs. In France, the biggest threat to the security of the electricity supply is the peak consumption during winter. French electricity consumption is highly dependent on the temperature, on account of a high proportion of electric heating.

Ensuring security of electricity supply while reducing greenhouse gas emissions from electricity generation is one of the objectives of the MEP.

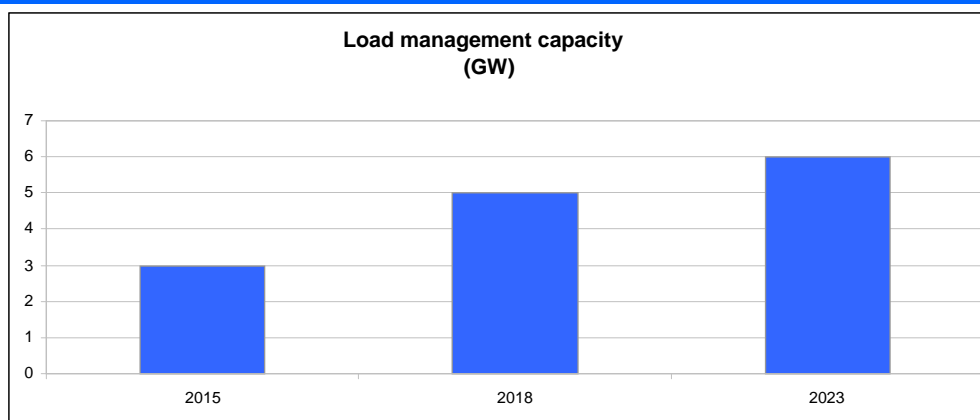
#### Evolution of CO<sub>2</sub> emissions from electricity generation since 2008



- **Limiting the increase of peak** electricity consumption.
- Maintaining the **reliability standard** for the power system (loss of load expectation of three hours) at its current level until 2018, and commissioning studies to assess its level after 2018.
- Prioritising **demand-side management** instead of building new generation capacities, aiming at 5GW by 2018 and 6GW by 2023 for all forms of demand-side management.







- **Refusing to authorise any new coal-fired power stations** unless they are equipped with carbon capture, storage or conversion systems.
- In accordance with Article L. 311-5-3 of the Energy Code, **restricting the operating hours of new fossil fuel-fired power stations** emitting greenhouse gases, in order to meet emission performance standards.
- **Preparing the closure of all coal-fired power units within the timeframe of this MEP (2023)**, resulting inter alia from carbon pricing
- In accordance with the cap of 63.2 GW of nuclear capacities, **issuing ministerial orders withdrawing the authorisation to operate of the two reactors of the Fessenheim nuclear power plant.**
- **Maintaining the current policy of processing and recycling nuclear waste.**
- Continuing with our efforts to **development the essential interconnections** identified in the ten-year network development plan of the transmission system operator RTE, and continuing to seek out new opportunities for interconnections with neighbouring countries when they are economically justified by the benefits involved for French and European energy users.
- Introducing peak **pricing** into network tariffs, offering further incentives to bring down consumption at peak times and encouraging the development of load management.
- Launching, in January 2017, the **capacity mechanism** in order to make energy suppliers responsible for guaranteeing the security of the electricity supply, and ensuring the availability of sufficient production and load management resources to secure the electricity supply in the medium term.
- Supporting the initiatives included in the **Brittany Electric Pact**, in terms of energy demand management, renewable energy sources development and security of supply.

### Gas

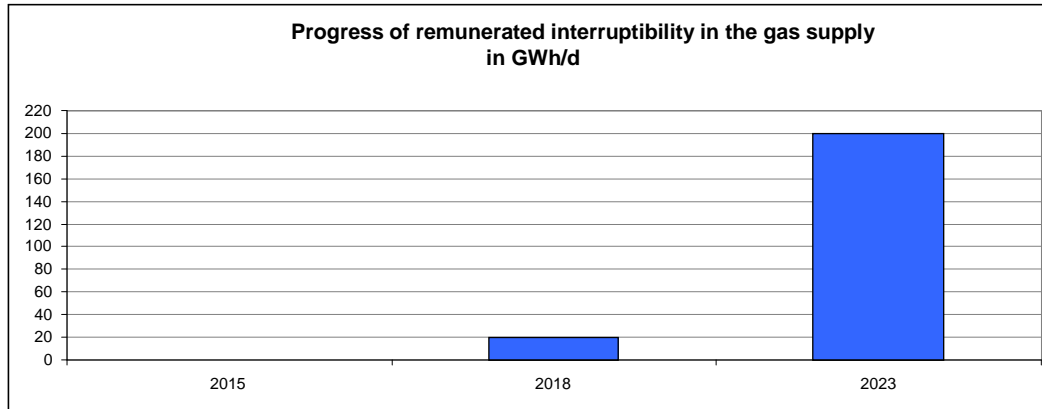
Security of gas supply means maintaining a constant flow of gas, in spite of the various risks to which the gas system is exposed. In France there are two major sources of uncertainty liable to affect the security of the gas supply: temperature variation (a large proportion of the gas consumed in France is used for heating purposes) and problems with supply (as a result of technical problems with infrastructure or geopolitical tension).

- **Maintaining the existing reliability standard for the national gas system**, which is more ambitious than the standards imposed in neighbouring countries, until 2018 and then commissioning studies to determine the optimal level post-2018.
- **Ensuring the underground gas storage reservoirs** necessary to ensure security of



supply are sufficiently stocked.

- **Developing a scheme rewarding the capacity of consumers to interrupt** their gas supply, to reach 200 GWh/d by 2023.
- Strengthening **cooperation between the gas and electricity system operators**, to face more efficiently the risks to the electricity supply, should the gas network come under pressure.



### Oil products

Energy security means ensuring a steady supply of oil products at a competitive price. This raises a range of problems which exist on a number of different timescales:

- in the long term, the depletion of fossil fuel resources and the need to combat climate change make diversifying the energy supply, reducing energy consumption and tackling our dependency on oil products absolute priorities;
- in the medium term, investments need to be made at the right time in order to satisfy demand for oil products;
- in the short term, the security of supply corresponds to our capacity to deal with a temporary disruption in the supply of oil products, which may be brought about by technical or political reasons.

- **Preserving refinery capacities**, particularly by adjusting the balance of fuel consumption (less diesel, more petrol).
- Ensuring that **strategic fuel stocks** are effectively distributed throughout the country to minimise the risk of a shortage in the event of a crisis.
- Identifying the **weak points in the oil supply chain** based on the crisis of May 2016.
- Preserving the **nation-wide distribution of oil depots** and monitoring the distribution of petrol stations across the country.
- **Aligning diesel prices with petrol prices**, as per the measures announced in the budget.
- **In the context of the energy transition and efforts to reduce primary consumption of fossil fuels, exploration and exploitation of hydrocarbon fuel resources in mainland France is not a priority of the MEP.**



## Preparing for tomorrow's flexible and low-carbon energy system, and developing infrastructure accordingly

Preparing for the future of our energy system means:

- coordinating the diversification of the energy sector and reducing our dependence on any given energy source, for electricity (target of reducing nuclear power to 50% of total supply by 2025), heat generation and fuel;
- supporting the decentralisation of production, which requires to make networks smarter and more flexible through balanced development of energy networks, storage and transformation, demand-side management, local energy production, smart grids and self-production;
- paving the way for greater interaction between the electricity, gas and heat networks ('power to gas' and 'power to heat') at different levels, optimising costs and operations.

The ambitions and actions enshrined in the MEP allow planning ahead for the development of smart grids, self-consumption and storage, in order to accompany the energy transition in our regions.

### Ambitions and actions

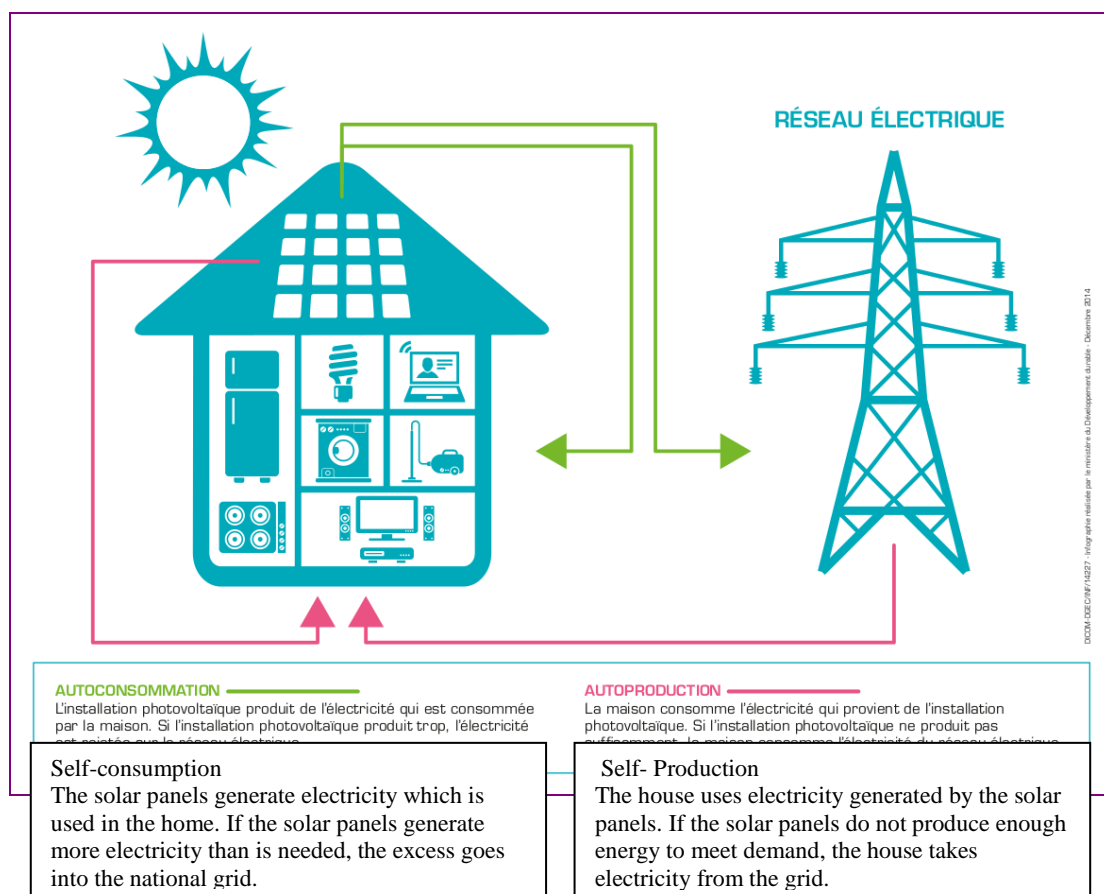
#### Electricity

Ensuring the security of the electricity supply requires enough flexibility to deal with short-term fluctuations in supply and demand. The rise of intermittent renewable energy sources will increase such rapid fluctuations in supply and demand.

- By the MEP's next revision, defining in greater detail the flexibility needs of the power system for 2023 and 2030, identifying the most technically and economically-viable ways to boost flexibility.
- Contributing to the development of renewables by reviewing **regional plans for connection of RES capacities to the grid** (S3RENr), when they reach saturation.
- Establishing a 'Committee for the Public Electricity Distribution System' (CSDPE)
- Developing **smart grids** and supporting the transition from test phase to industrial deployment, based on feedback from tests currently in progress, and ensuring that the experimental initiatives mentioned in the text of the law are put in place by 2018.
- Implementing the "Electricity smart grids" projects, boosting the momentum built up by existing pilot schemes.



- **Supporting the development of storage by considering necessary changes to regulations and network tariffs** for such systems, particularly to ensure that they can be installed in a manner conducive to the safety and security of the energy system and the persons involved.
- Launching, by 2023, **new storage facilities in the form of pump-storage hydro plants**, with a view to adding 1 to 2 GW of additional capacity by 2030.
- In 2016, awarding official accreditation to large-scale hydrogen pilot projects as part of the **'Territoires Hydrogène' call for projects**.
- Implementing the **call for tenders launched in 2016 focusing on energy self-production / self-consumption**, and applying the governmental order establishing a legal and regulatory framework to develop it.



- Based on the evolution of electricity generation and exports, the development of renewable energies, the decisions of the nuclear safety authority (ASN) and the priority of ensuring the security of the supply, **taking decisions within the timeframe of the second MEP on whether to close or extend the operation of certain nuclear reactors beyond their fourth ten-yearly inspection**.
- Implementing a new national strategy for the management of radioactive materials and





waste (PNGMDR).

### Gas

France's gas infrastructure currently includes around 37,500km of transport pipelines, 195,000km of distribution network, 4 methane terminals and 12 natural gas storage sites.

- Completing the Val de Saône and Gascogne-Midi projects by 2018 in order to complete France's gas market.
- Looking by 2018 into the possibility of developing new gas interconnections, particularly with Spain. This will include a cost-benefit analysis, based on a fair cross-border division of the costs involved and the potential benefits and acceptability of potential projects.
- **Ensuring that the ban on fracking is upheld**, and continuing to block all exploration and exploitation of shale gas resources.
- **Seeking greater transparency from gas suppliers on the origin of their natural gas**, and in particular the proportion of imported shale gas in order to allow clients to accurately calculate their environmental footprint and fulfil their reporting obligations.

### District Heating and cooling

District Heating and cooling networks are essential in helping us to meet our renewable energy and waste heat objectives, as they allow us to capitalise on the massive reserves of energy contained in biomass, geothermal sources, heat recovered from waste incinerators and waste heat from industrial activities.

- Promoting the **widespread densification of existing networks** and the creation of new heating and cooling networks, in order to increase fivefold the amount of renewable and recycled energy reaching the grid by 2030 (doubling it by 2023).
- Adapting the **Heat Fund** to reflect the reality of the network, with reimbursable advances and an expansion of efforts to recycle industrial heat.

### General actions

- Implementing a **local governance for the energy networks** to develop an integrated regional approach (SRCAE and SRADDET, multi-energy strategies, guidelines).
- Regularly updating technical and economic studies to identify opportunities for synergy between energy vectors and their uses in the medium-to-long-term.
- Developing skills and preparing for the necessary professional conversions via the skills and jobs plan included in the law on the energy transition and green growth.
- Setting up a system to analyse the whole value chain of the energy transition in the different energy sectors, with a particular focus on the balance of trade and consequences for employment.
- Publishing a **national energy research strategy**.



## Promoting clean mobility

The law on the energy transition for green growth includes plans for a **strategy for clean mobility development**, attached to the multiannual energy plan.

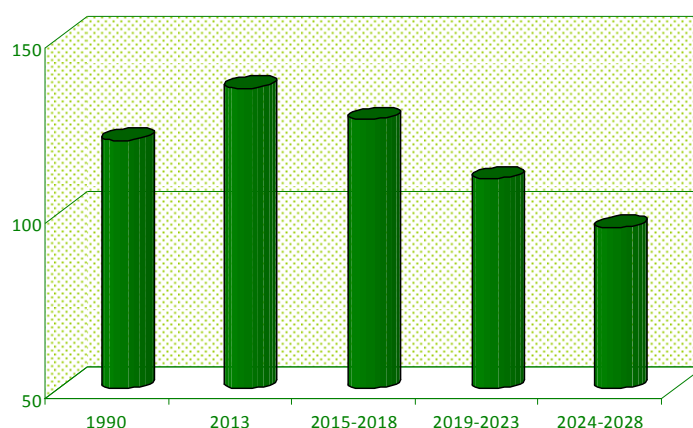
This strategy:

- reviews the current state of clean transport;
- sets out the main reasons to take action now for more sustainable and cleaner transport solutions;
- reiterates the principles of the energy transition, and particularly the priority areas of action in the transport sector, drawn from the national low-carbon strategy.
- includes guidelines and initiatives to develop clean mobility.

### Evolution of greenhouse gas emissions from the transport sector, with an approximate breakdown as per the carbon budgets

- Emissions of greenhouse gases from the transport sector increased by 12.3% between 1990 and 2013. **We need to reverse this trend**, ensuring that the transport sector contributes to achieving the overall target of slashing emissions to a quarter of their 1990 level by 2050.

### **Evolution of greenhouse gas emissions from the transport sector, with an approximate breakdown as per the carbon budgets (in Mt of CO<sub>2</sub>eq)**



### Evolution of energy consumption in the transport sector

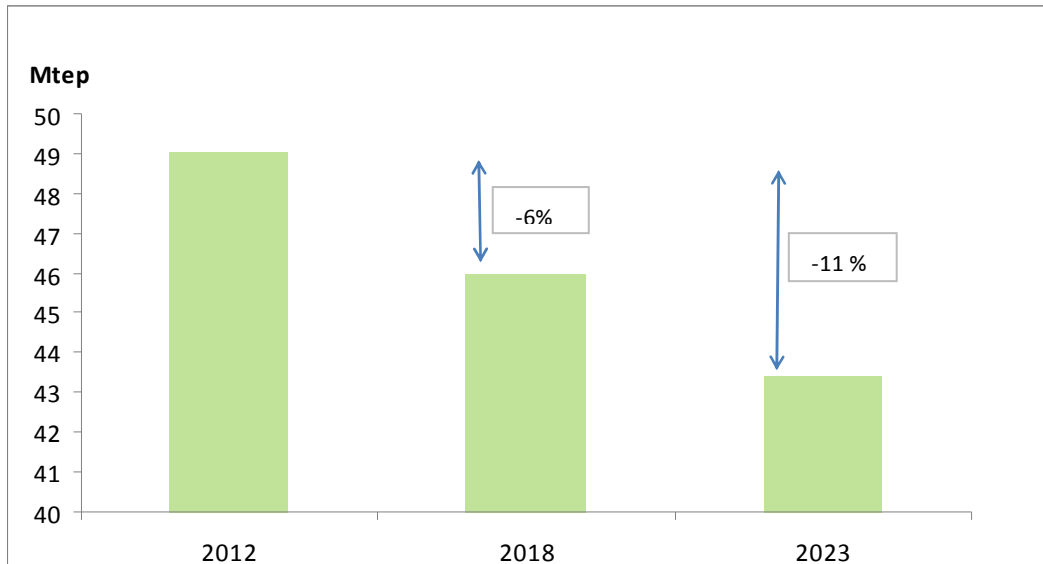
**Transport is the second biggest source of energy consumption**, accounting for 33% of France's final energy consumption behind the construction sector and ahead of industry. In 2012 the transport sector consumed 49.06Mtoe, of which 45.24Mtoe came from oil products, 1.07Mtoe from electricity, 2.66Mtoe from renewable sources and 90,000toe from gas.

In the reference scenario, consumption should fall by around 11.5% from its 2012 level by

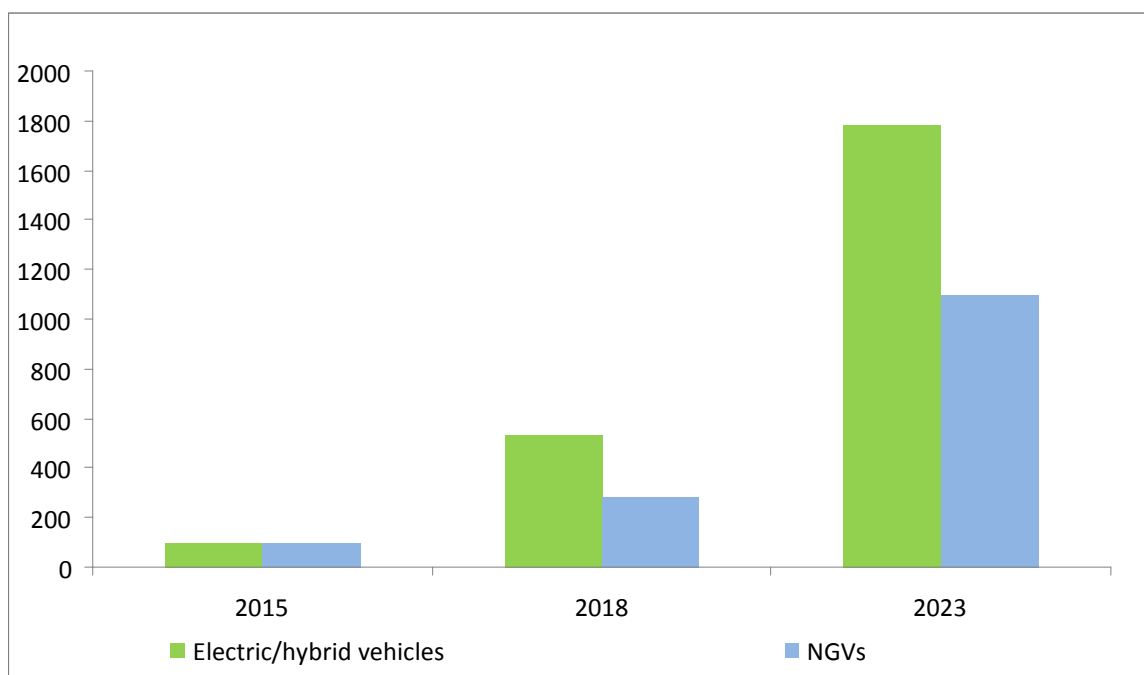


2023. In the alternative scenario, the transport sector's energy consumption would be 2% greater in 2023 than it was in 2012.

### Evolution of final energy consumption in the transport sector based on the reference scenario (in Mtoe)



### Evolution of electricity and gas consumption by vehicles (Base 100 in 2015)



### What actions must be taken to reach these objectives?

Developing clean mobility requires to take action on six key points:

- Keeping the demand for transport under control;



- Developing vehicles with low emissions of pollutants and greenhouse gases;
- Developing the market for alternative fuels and rolling out the necessary infrastructure;
- Optimising existing vehicles and networks;
- Encouraging the shift towards low-emission modes of transportation;
- Developing collaborative transportation.

### Ambitions and actions in favour of clean mobility

- **Encouraging behavioural changes** which reduce energy consumption and greenhouse gas emissions from transportation, particularly through the target of **10% teleworking by 2030**.
- Putting **2.4 million electric and hybrid vehicles** on the road by 2023.
- Converting **3% of HGVs to biogas** by 2023.
- Setting new **objectives for the incorporation of advanced biofuels: 1.6% by 2018 and 3.4% by 2023 for petrols, and 1% by 2018 and 2.3% by 2023 for diesel**, if the necessary conditions are met.
- Increasing the average fill rate for vehicles transporting goods.
- Aiming to shift 20% of freight haulage off the roads and onto other forms of transportation by 2030.
- **Increasing the proportion of short journeys made on foot or by bicycle** to 12.5% by 2030.
- **Expanding car-sharing facilities and digital services putting drivers and passengers in touch, increasing the average occupancy rate of private vehicles** to 1.8 or 2 people/vehicle by 2030.
- Taking into account clean mobility development priorities when reviewing existing planning documents and strategies.
- Launching strategic initiatives which take into account clean mobility development priorities in the following areas: developing car-sharing facilities, developing **energy-positive roads**, developing intelligent transport systems, **testing and developing autonomous vehicles**, particularly for public transport.





## Taking account of the economic and social dimensions of the energy transition, and working with local government

The multiannual energy plan includes an economic, social and environmental impact assessment, which demonstrates the benefits for the French economy of implementing this strategy rather than following the current trend.

The MEP also includes specific initiatives designed to support those most affected by the evolution of the energy sector, including actions to protect the purchasing power of consumers living in energy poverty and support the competitiveness of businesses, particularly those participating in international competition, as well as identifying the professional skills required by the energy sector.

### The socioeconomic impact of the energy transition

Our impact study reveals the MEP's positive effect on the economy:

- a **+1.1pt boost to GDP growth between now and 2030**;
- around **280,000 extra jobs created by 2030**;
- **an increase in gross disposable household income** equivalent to 13 billion Euros by 2018 and 32 billion by 2023;
- an 0.7% increase in industrial value added.

Net job creation is clearly positive, but the impact of the transition will vary from sector to sector. Certain sectors will see strong growth (renewable energies, energy-efficient renovation), while others will shrink. These changes will require adaptation strategies combining forward planning with mechanisms to safeguard the professional future of workers. We need to identify changes in the economy, provide long-term support and equip ourselves with the necessary tools for effective governance. As stated in the law on energy transition for green growth, the government will work "*hand-in-hand with labour unions, employers' unions and regional authorities to produce a strategic plan for employment and skills, incorporating the objectives set out in the multiannual energy programme.*"

Energy prices are a crucial consideration. This is particularly true for households living in energy poverty and businesses which are energy-intensive, particularly those dealing with international competition, but it is also a matter of concern for all consumers.

### Ambitions and actions

#### Analysing the impact of the energy transition

- Setting up a system to analyse the whole value chain of the energy transition in the different energy sectors, with a particular focus on the balance of trade and consequences for employment, incorporating a more detailed analysis of this industrial impact into the next MEP.
- Conducting a comparative analysis of the macroeconomic impact of the MEP based on



various macroeconomic models.

- Refining the evaluation of the maximum financial support from public resources, with regard to the new support schemes being implemented.
- Preparing the skills and jobs plan mentioned in the law on the energy transition for green growth.

### Combating energy poverty

- **Introducing the “energy cheque” system**, with a pilot scheme in 4 *départements* in 2016.
- Setting up a new system of **energy-saving certificates for households living in energy poverty**: target of 150 TWh (cumulated and present value) savings by end of 2017, equivalent to 1 billion Euros allocated by energy providers to developing energy efficiency in poorer households.

### Protecting the competitiveness of businesses

- Supporting the **competitiveness of French industry** by promoting the flexibility of industrial facilities and varying the network tariffs for energy-intensive industrial sites.

### Local support for the energy transition

For the energy transition to succeed, it needs local support at all levels. The law on energy transition for green growth includes various measures to promote local initiatives, and a number of actions have already been launched with the aim of fostering a dynamic, collective approach. One good example is the 'Energy-Positive Territories for Green Growth' initiative.

### Ambitions and actions

- Awarding '**Positive-Energy Territories for Green Growth**' status to 500 local authorities in France, allocating 250 million Euros from the Energy Transition Fund.
- Implementing **local climate-air-energy plans** and **regional strategies for climate, air quality and energy (SRCAE)**.
- **Opening up access to gas and electricity network operators' data** to public bodies, helping **local authorities to improve their energy planning**.
- **Encouraging the involvement of local partners in renewable energy production**, backing local funding projects in response to calls for tender.
- **Monitoring the regional implications of the MEP**, with reference to the SRCAE review which will be conducted in preparation for the next MEP, and the revision of the SRCAE.

