Low Carbon Technologies

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Focus on Electric Vehicles

ADEME

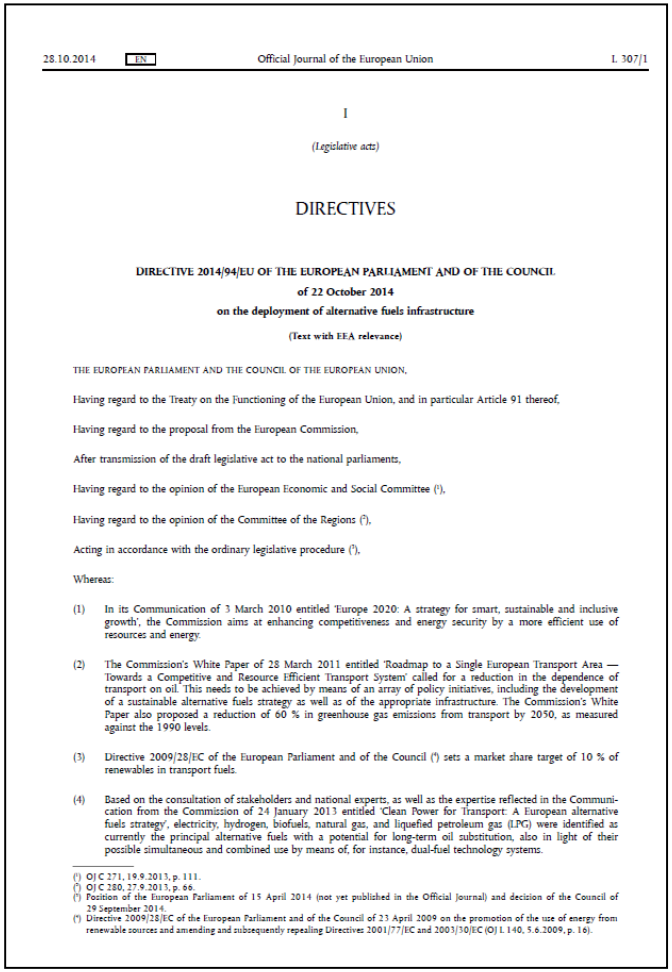
Agence de l'Environnement et de la Maîtrise de l'Energie

6 mars 2018

ADEME - French Agency for Environment and Energy Management

European context

- **Roadmap for the deployment of infrastructure for alternative fuels**
  - ***EU-Directive for the deployment of alternative fuels infrastructure requires both countries to develop national policy frameworks for the market development of alternative fuels and their infrastructure (CNG and LNG)***
  - ***National policy frameworks shall include EU-coherent targets for the deployment of infrastructure and shall be presented by end-2016***
  - ***Exchange information between business stakeholders and ministries with regard to the implementation options of the directive for different EU country***



28.10.2014 EN Official Journal of the European Union L 307/1

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(Legislative acts)

DIRECTIVES

DIRECTIVE 2014/94/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 22 October 2014
on the deployment of alternative fuels infrastructure
(Text with EEA relevance)

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty on the Functioning of the European Union, and in particular Article 91 thereof,

Having regard to the proposal from the European Commission,

After transmission of the draft legislative act to the national parliaments,

Having regard to the opinion of the European Economic and Social Committee (1),

Having regard to the opinion of the Committee of the Regions (2),

Acting in accordance with the ordinary legislative procedure (3),

Whereas:

(1) In its Communication of 3 March 2010 entitled 'Europe 2020: A strategy for smart, sustainable and inclusive growth', the Commission aims at enhancing competitiveness and energy security by a more efficient use of resources and energy.

(2) The Commission's White Paper of 28 March 2011 entitled 'Roadmap to a Single European Transport Area — Towards a Competitive and Resource Efficient Transport System' called for a reduction in the dependence of transport on oil. This needs to be achieved by means of an array of policy initiatives, including the development of a sustainable alternative fuels strategy as well as of the appropriate infrastructure. The Commission's White Paper also proposed a reduction of 60 % in greenhouse gas emissions from transport by 2050, as measured against the 1990 levels.

(3) Directive 2009/28/EC of the European Parliament and of the Council (4) sets a market share target of 10 % of renewables in transport fuels.

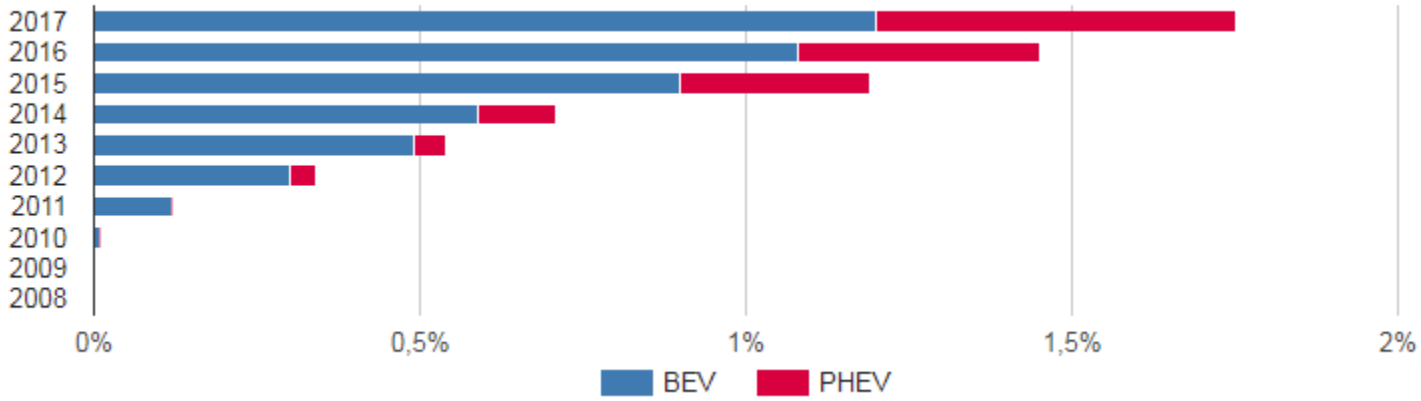
(4) Based on the consultation of stakeholders and national experts, as well as the expertise reflected in the Communication from the Commission of 24 January 2013 entitled 'Clean Power for Transport: A European alternative fuels strategy', electricity, hydrogen, biofuels, natural gas, and liquefied petroleum gas (LPG) were identified as currently the principal alternative fuels with a potential for long-term oil substitution, also in light of their possible simultaneous and combined use by means of, for instance, dual-fuel technology systems.

(1) OJ C 271, 19.9.2013, p. 111.
(2) OJ C 280, 27.9.2013, p. 66.
(3) Position of the European Parliament of 15 April 2014 (not yet published in the Official Journal) and decision of the Council of 29 September 2014.
(4) Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (OJ L 140, 5.6.2009, p. 16).

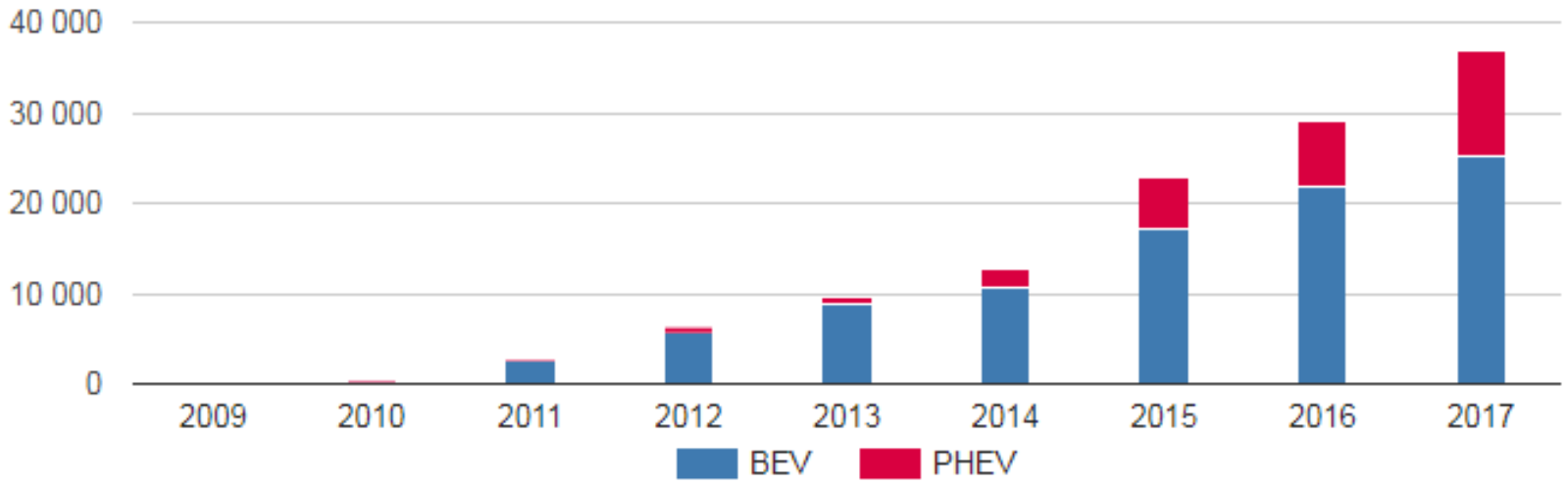
National context

Title:	**Total land area (km2):**
France	551.500 km2
Capital:	**Passenger cars:**
Paris	32.244.000
Population:	**Highway (km):**
67.063.000	11.392 km
Gross Domestic Product (in billion EUR) :	**Gross Domestic Product Capita (in EUR):**
€ 2.828,41	€ 42.175

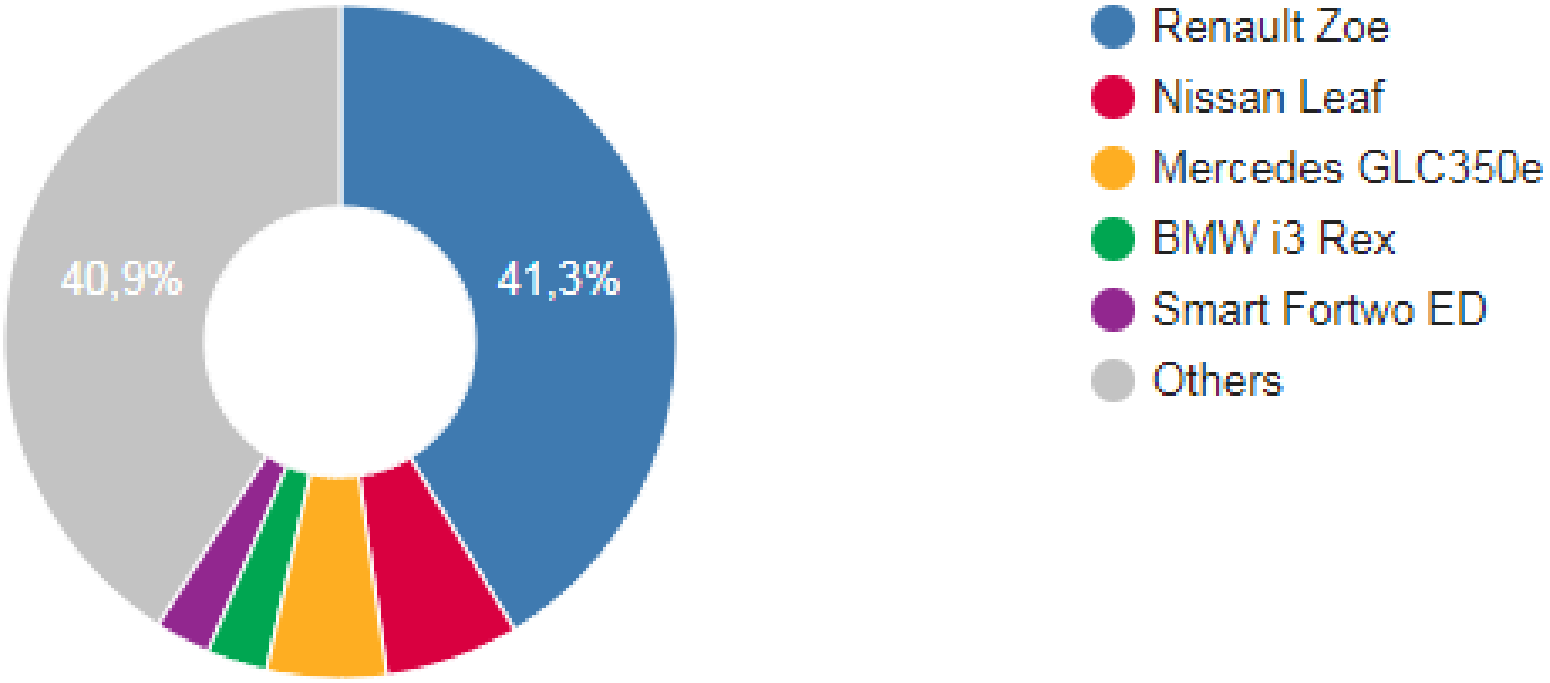
PEV (M1) Market Share in France



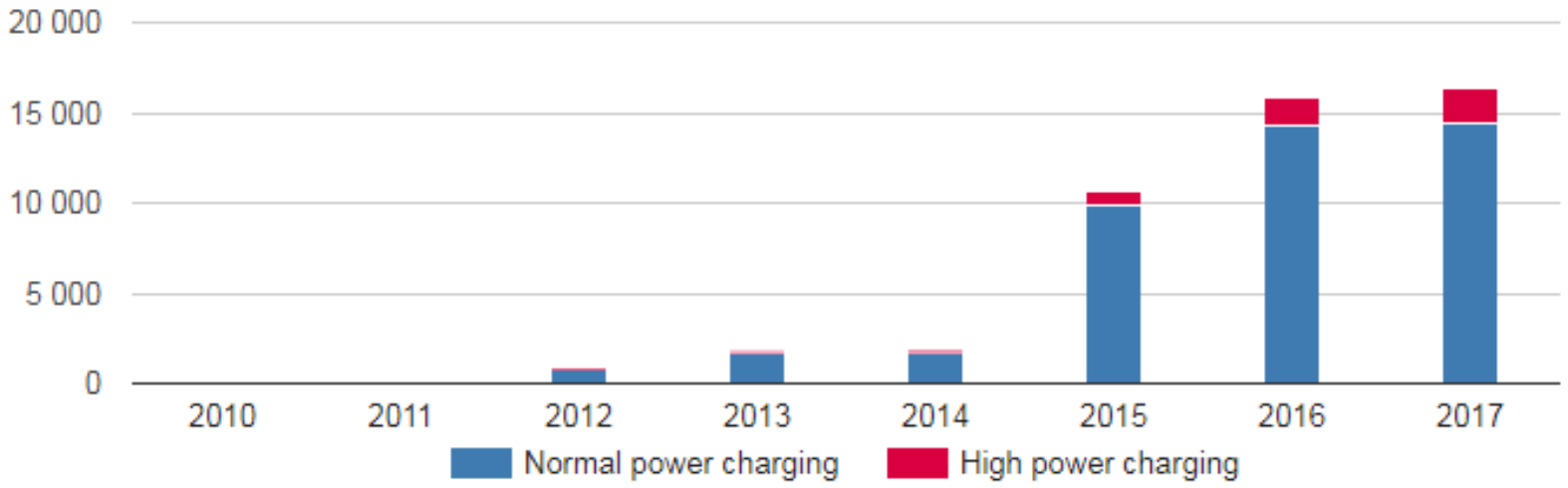
PEV (M1) New Registrations in France



Top 5 bestselling PEV models (M1) in France



Number of publicly accessible charging positions in France



Incentives in France

Incentive category	Description
Purchase Subsidies	Electric and hybrid electric vehicles emitting 20 g/km or less of CO 2 benefit from a premium of € 6,000 under a bonus-malus scheme. For vehicles emitting between 21 and 60 g/km, the premium is € 1.000. Diesel Scrappage Scheme: Switching a 11 year or more diesel for a new BEV grants an extra 4.000€ (Or 2.500€ in case it is a PHEV). The "L" category (Quadricycles, Motorbikes, Scooters...) also has a purchase subsidy (Lead battery vehicles excluded), with €250 per kWh , with a limit of € 1.000 or 27% of purchase pri
Registration Tax Benefits	Road Tax Exemption / Reduction
Ownership Tax Benefits	Road Tax Exemption / Reduction
Company Tax Benefits	Electric vehicles are exempt from the company car tax. Hybrid vehicles emitting less than 110 g/km are exempt during the first two years after registration.
Local Incentives	Local subsidies

ADEME approach

- **Setting-up a national plan for alternative fuels infrastructure deployment requires to think long-term**

  - *ADEME drew up a long-term scenario entitled "ADEME Energy Transition Scenarios 2030-2050*
  - *ADEME doesn't predict a specific alternative energy vector to intensify significantly before 2030*

  - *2050 Vision:*
    - Total mobility stays the same ; freight transport increases but individual mobility reduces by 20% ; mainly due to an increase of people working from home, urbanization and a transport infrastructure which allows optimization of mobility needs
    - Paradigm change in regards to individual mobility : the use of transport infrastructure takes over vehicle possession ; Significant market penetration of mobility services and shift towards public transport and active modes ; Number of vehicles reduces accordingly

➔ Energy consumption in the transportation sector drops from 44mtoe to 15mtoe in 2050

➔ Oil independence becomes possible by using a mix biogas/CNG for ICE vehicles, electricity for PHEV and EV and second generation biofuels

2030 – Transportation

- Paradigm: constant individual mobility and modal split
- Freight: a 20% increase in transported mass (tkm)

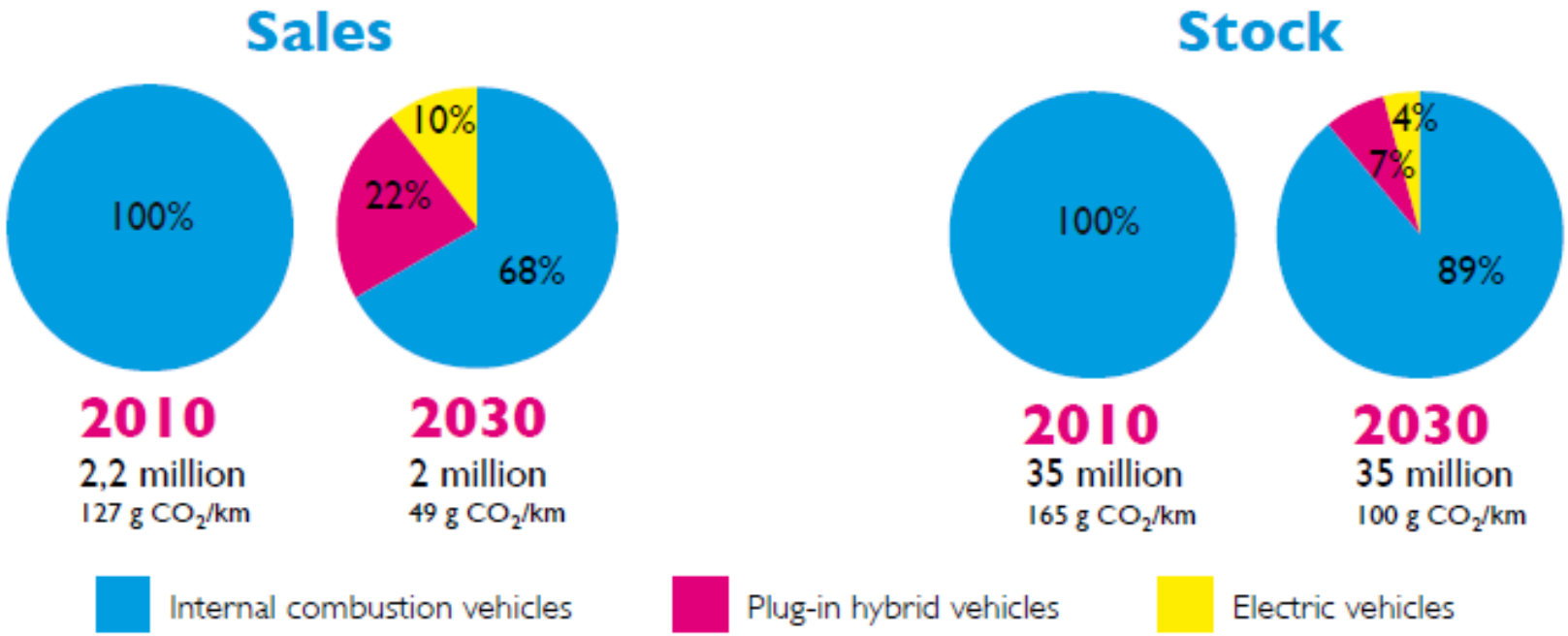
Traveller flows	Urban	Local	Long distance
	2010 / 2030	2010 / 2030	2010 / 2030
Private vehicles	76% / 54%	84% / 61%	68% / 55%
Commercial vehicules	0% / 10%	0% / 10%	0% / 5%
Public transport (bus, coach)	6% / 10%	7% / 10%	8% / 10%
Public transport (rail)	8% / 10%	7% / 10%	24% / 30%
Bicycle	4% / 10%	1% / 6%	0% / 0%
Powered two-wheelers (service)	0% / 2%	0% / 1%	0% / 0%
Powered two-wheelers	6% / 4%	1% / 2%	0% / 0%

Mobility and traffic	2010	2030
Traffic (billions of vehicles*km)	450	450
Overall mobility (billions of travellers *km)	711	790

FLOWS AND TRAFFIC IN 2010 AND 2030

2030 – Transportation

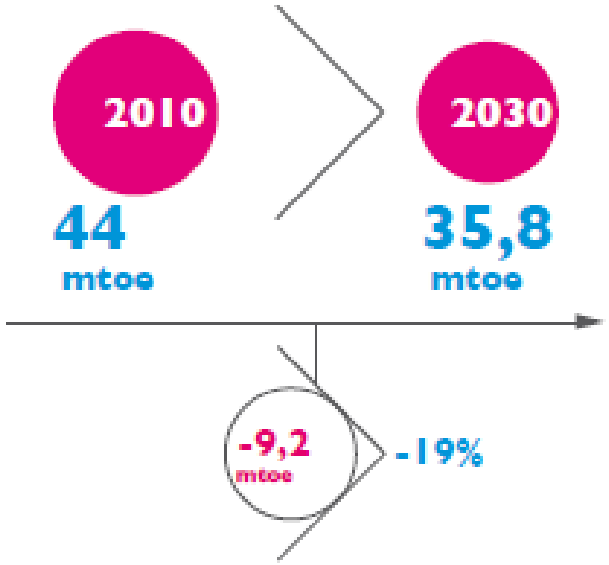
- Passenger transportation: emergence of mobility services (account for 10% of intra-city passenger flows)
- Results in terms of sales and stock :



SALES AND FLEETS OF VEHICLES

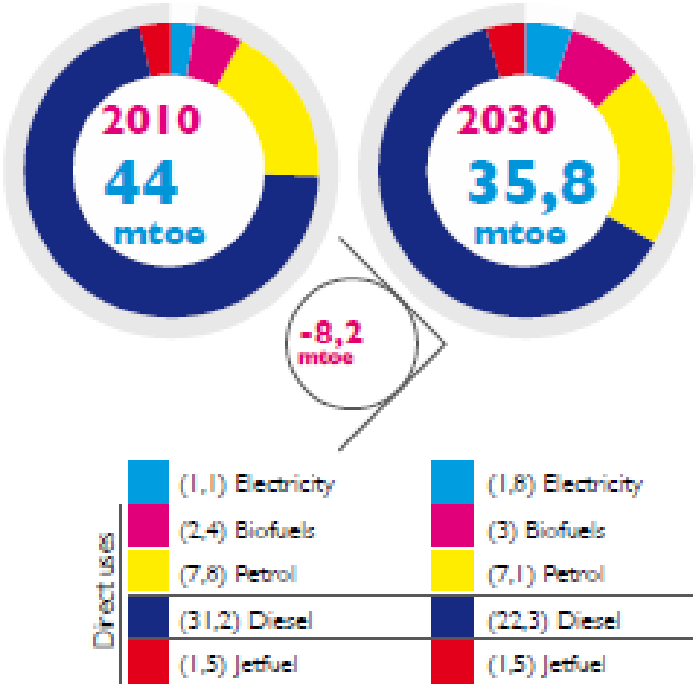
2030 – Transportation - Results

Final energy consumption



ENERGY CONSUMPTION IN THE TRANSPORTATION SECTOR (FINAL MTOE) FROM 2010-2030

Type of energy



ENERGY BALANCE FOR THE TRANSPORTATION AND MOBILITY SECTOR (EXCLUDING INTERNATIONAL AIR TRANSPORTATION) PER VECTOR

2050 – Transportation

2010 2050

2010 / 2050	Urban	Regional	Long distance
Private vehicles	76 % 20 %	84% 39%	68% 30%
Commercial vehicles	0 % 30%	0% 20%	0% 15%
Public transport (bus, coach)	6% 13%	7% 12%	8% 15%
Public transport (rail)	8% 12%	7% 12%	24% 40%
Bicycle	4% 15%	1% 7%	0% 0%
Powered two-wheelers (service)	0% 4%	0% 3%	0% 0%
Powered two-wheelers	6% 6%	1% 7%	0% 0%

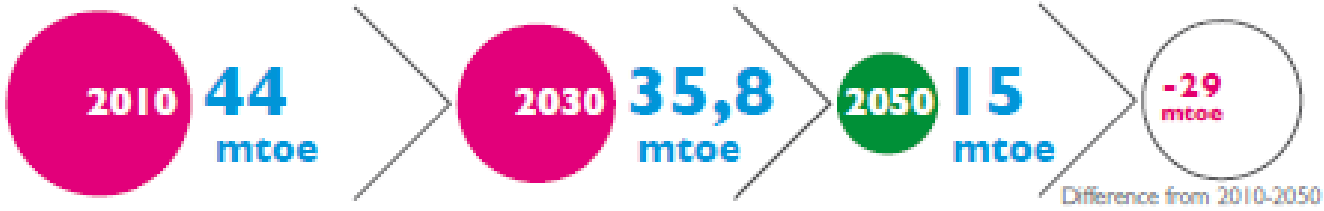
TRAVELLER FLOWS IN 2050

Vehicles (including PVs and LCVs)	2050 sales	2050 stock
Internal combustion vehicles	34%	34%
Plug-in hybrid vehicles	38%	38%
Electric vehicles	28 %	28%
Total	**1,2 million**	**22 million**

VEHICLE SALES AND STOCK IN 2050

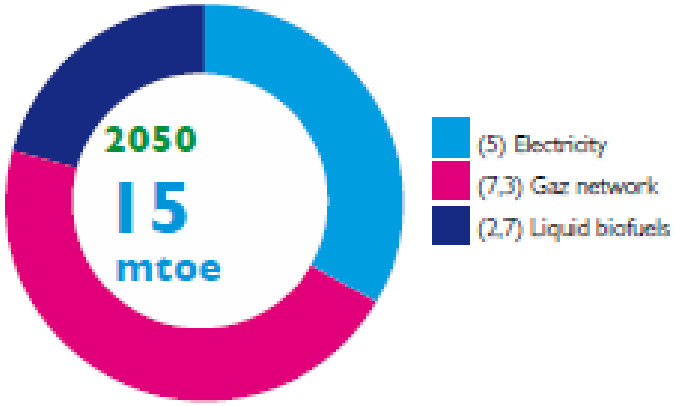
2050 – Transportation

Energy consumption in the transportation sector



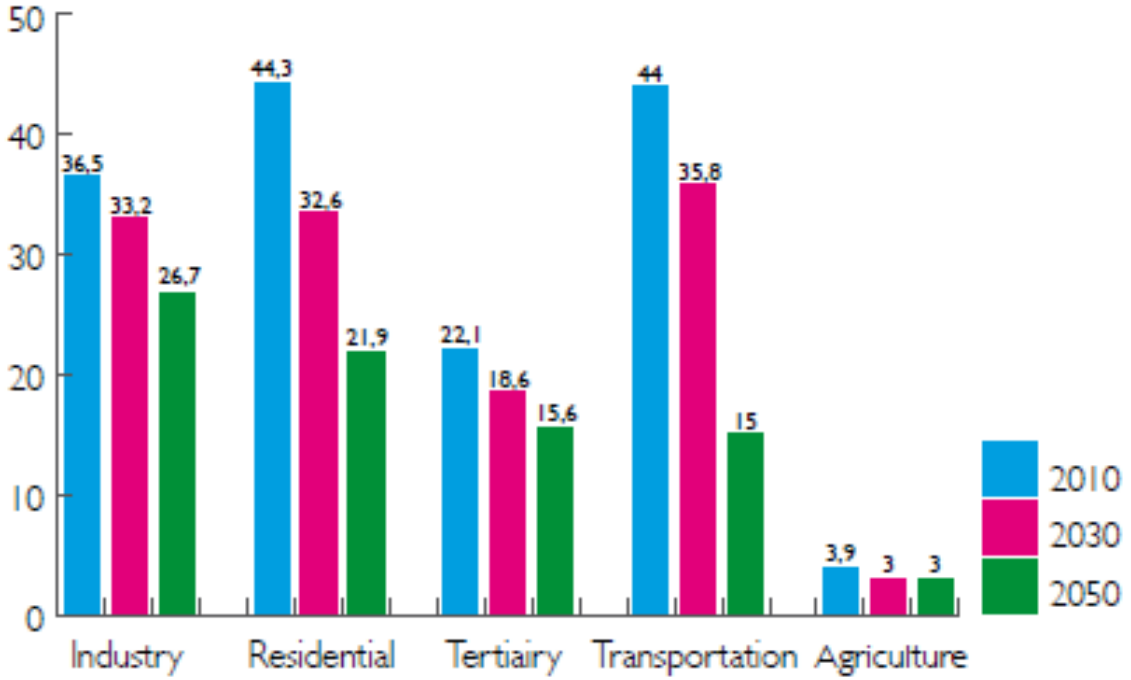
ENERGY CONSUMPTION IN THE TRANSPORTATION SECTOR IN 2010, 2030 AND 2050 (FINAL MTOE)

Assuming that internal combustion vehicles are powered by natural gas, there will be the following energy mix in the transportation sector:



ENERGY CONSUMPTION IN TRANSPORTATION IN 2050, PER VECTOR

2050 – Energy consumption

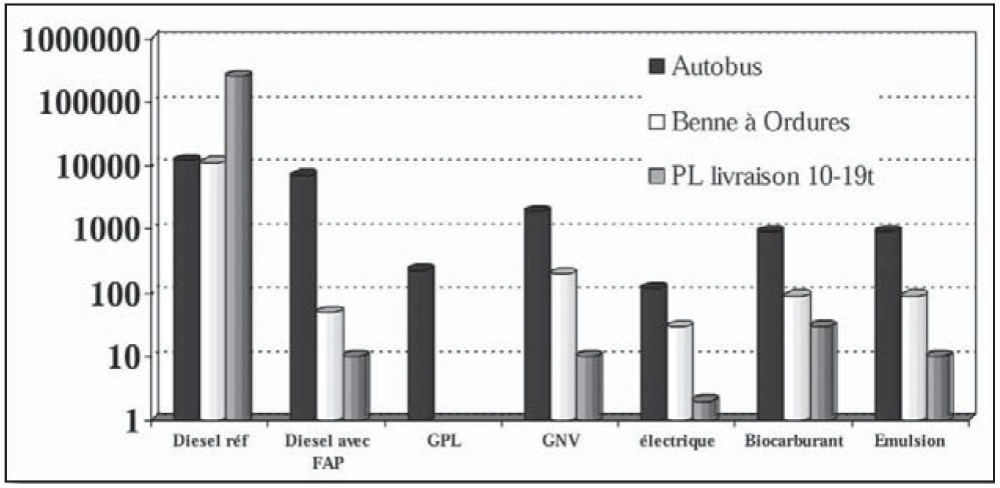


ENERGY CONSUMPTION IN 2050 PER SECTOR (MTOE)

ADEME approach

- **Setting-up a national plan for alternative fuels infrastructure deployment requires to think by usage**

  - ***Buses, garbage trucks, Heavy-Duty Vehicles, Light-Duty Vehicles, Passenger vehicles value criteria as price, CO2/km, durability,… differently***



Ref : Plassat, Quelles marges de progrès pour les technologies actuelles de véhicules légers et lourds

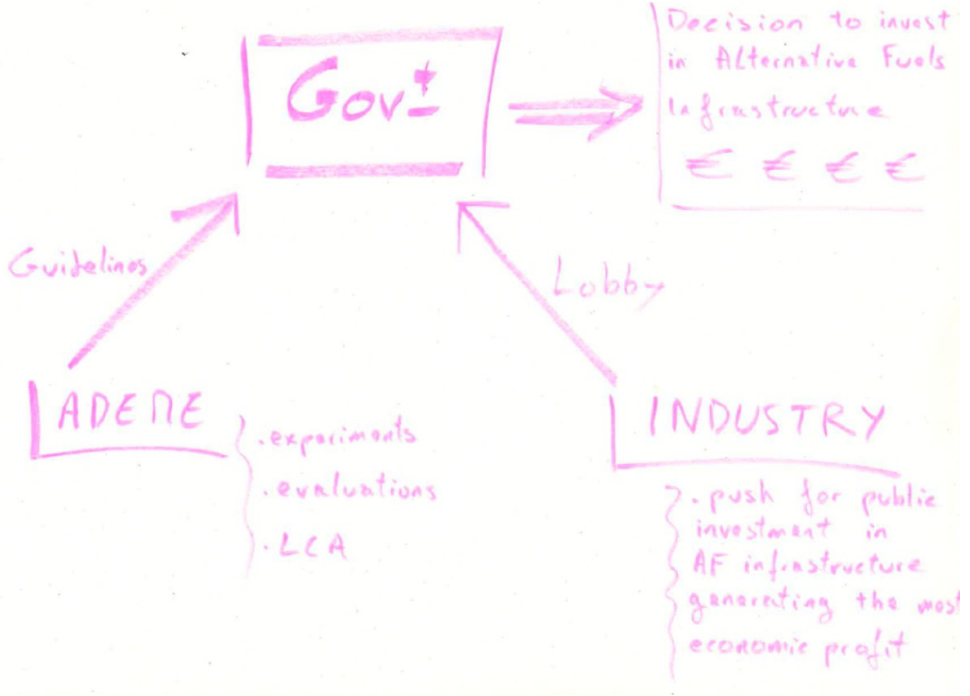
  - ***The more a vehicle is used in a competitive sector, the less technology solutions are proposed***

➔ **Diversification of energy mix for the transportation sector depends of usage**

ADEME role

- ADEME role in encouraging energy mix diversification in the transportation sector consists in launching experiments and evaluations in order to provide guidelines

- ADEME role doesn't include acting on regulations and incentives to impose its vision to industry



EV and IRVE: A SPECIFIC CASE

- **The French Government leads a strategy aimed at fostering a domestic electric vehicle market through the automotive industry support plan. In the plan, the French government makes special efforts to achieve this goal**

- **ADEME's actions in favour of IRVE deployment**

  - ***Charging infrastructure is supported with multi-million € in funding through the national Investment for the Future program. Large-scale charging infrastructure deployment projects are supported by the ADEME-managed call for charging infrastructure deployment projects***

EV and IRVE: A SPECIFIC CASE

- **ADEME's actions in favour of IRVE deployment**
  - *To strengthen efforts in the development of a charging infrastructure, EV Infrastructure deployment plans are now integrated into one of the 34 plans announced by French President Hollande in his 10-year industrial policy to increase French competitiveness*
  - *These plans aim to unite economic and industrial stakeholders around a common goal and improve the effectiveness of the tools implemented by the government*
  - *Prefect Francis Vuibert heads the plan to develop charging stations*
  - *ADEME is actively involved in this plan, specifically in a working group aiming at developping charging infrastructure national plan in response to EC Directive*

ADEME OPINION

- **Advantages of EV lies in**
  - *Energy diversification capacity*
  - *Ability to reduce greenhouse gas emissions*
  - *Ability to improve air quality in cities – through zero exhaust gas emissions*

- **Business models need to be found to achieve :**
  - *Intensive usage and a significant rate of substitution of internal combustion vehicles*
  - *These models will emerge from systemic innovations that take account of all stakeholders in the sector.*

- **The potential of the sector as a full ecosystem is considerable**
  - *However, the challenges are complex, particularly because they concern a variety of industries with different markets and regulatory environments*

- **Engaging electromobility requires the interoperability of EVs with local communication infrastructures and smart grids.**