Contribution of light and heavy vehicles to reducing energy demand and CO2 emissions by 2035 worldwide

Jean Luc BROSSARD R&D Managing Director PFA
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Consolidate the automotive and road transport industry players in France

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4 000 COMPANIES
400 000 JOBS

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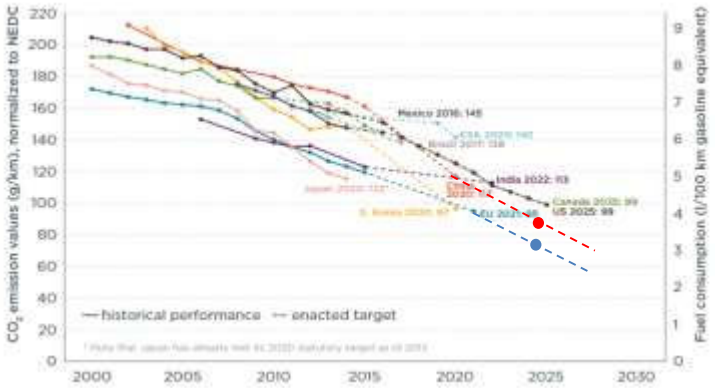
Context and Challenges of the evolution of the automotive market

Enjeux environnementaux CO2 à l'horizon 2025



Evolutions réglementaires

Consommations & rejets de particules

Crash test consumériste (Europe; USA; Chine;...)

EURO NCAP IIHS C-NCAP

Normes & homologations

*Différents **niveaux de prestations attendus** en fonction des marchés*

New uses, new technologies

A technological offensive to respond to environmental challenges and industrial diversity while maintaining competitiveness

Each year, the PFA communicates prospective MIX power trains (for the next 15 years), in collaboration with BD0-BIPE based on documented scenarios on techno-economic trends and defining the energy mix of new vehicles

BDO ADVISORY le BIPE

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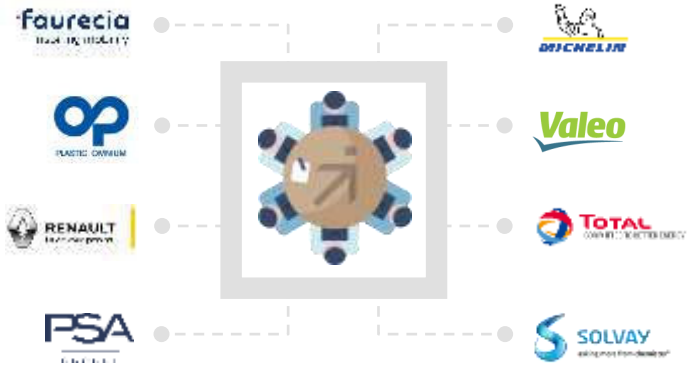
PFA – BIPE WORK in 2018

World Automotive Powertrain Outlook (WAPO) Since 2009



A syndicated study, with three workshops every year.

Gathering the main actors from the automotive value chain in France on the future of the light-vehicle market up to 2035 and the potential of new energy vehicles globally.

The results of the WAPO rely on a proprietary model to forecast the evolution of the powertrain of new vehicle sales.

Road transport contribution to CO_2 emissions reduction Since 2015

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Based on the WAPO model, le BIPE helps the working group PFA CRA2 in modelling the **energy consumption and CO2 emissions** of the road transportation globally up to 2035.

The objective is to build a shared vision among the members of the French Automotive (PFA).

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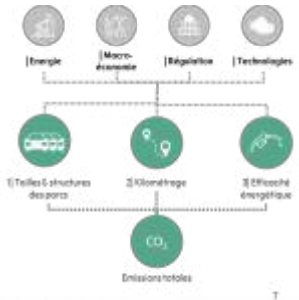
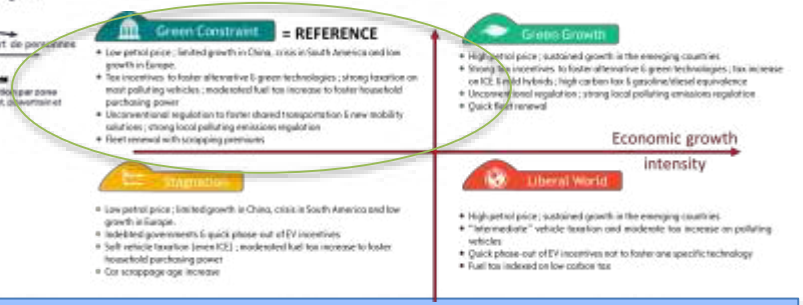
Panorama of sales by zone and vehicle type

A TCO approach



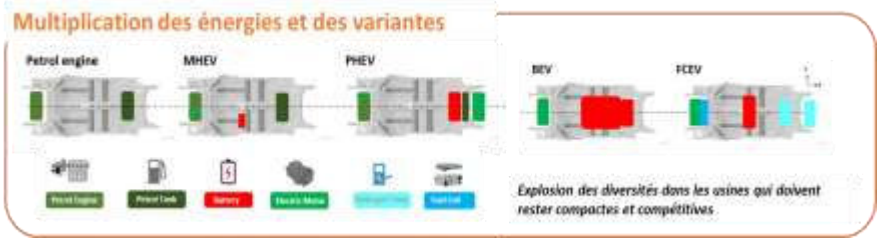
A global approach :country-based modeling

Differents scenarios



The BIPE uses a proprietary model based on demand arbitrage and supply-side effects, to anticipate the future powertrain mix and C02 contribution

Catégories	Valeur / commentaire
Cible CO_2	**Toutes les cibles d'émissions sont exprimées en WLTP**
Prix batterie	€/KWh -20% entre 2019 et 2025
	-50% en 2030
	- 60% en 2035 dans le scénario Green Constraint
Consommation ICE	Maximum 1,7%/an d'amélioration de l'efficacité des ICE
	À titre exemple: consommation minimale pour un segment essence ICE C_bas en France: 95g_{CO2}/km en WLPT
Réglementation et incincitations	Réglementation implémentée par pays



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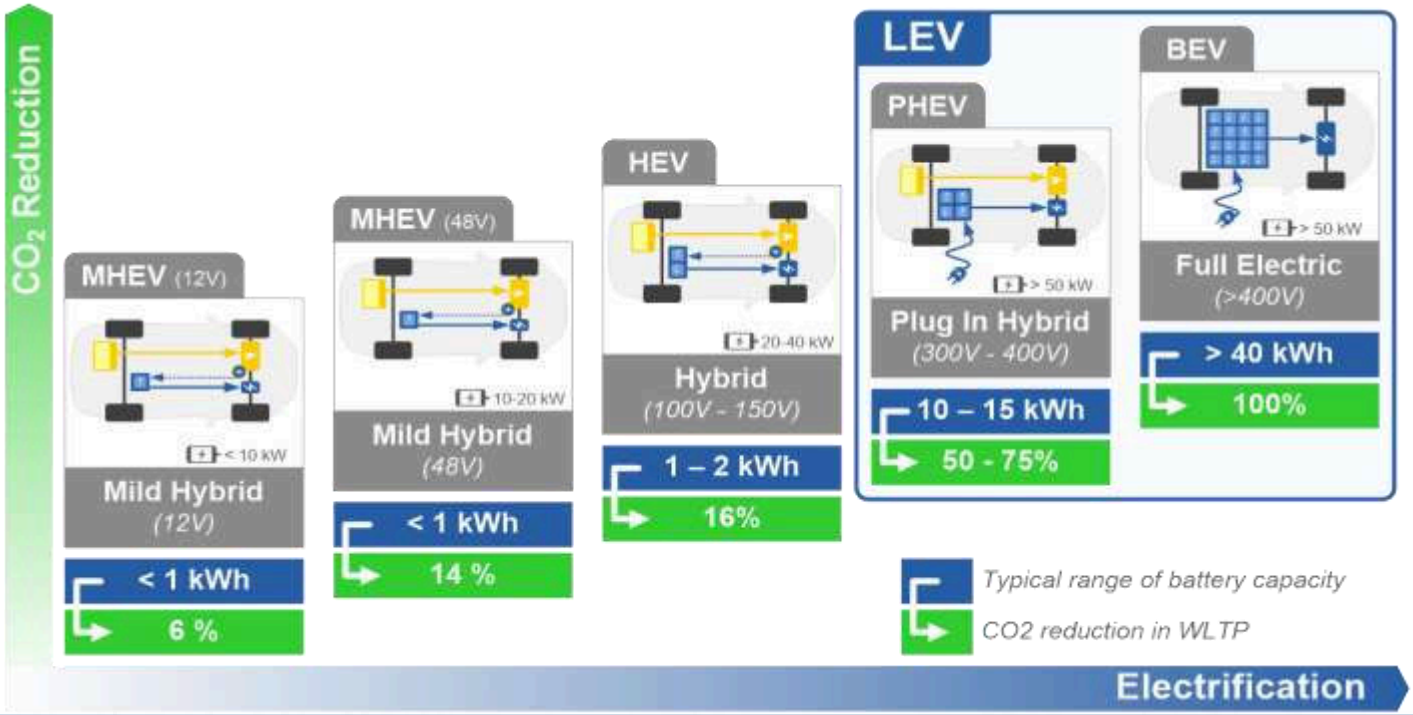
Different level of hybridization allow different fuel consumption gains



Source : DATA BIPE based on Groupe PSA format

Hybrid gains depend on the technology, the vehicles weight and power and the base powertrain (gasoline or diesel).
Values for PHEV are given for ICE driving phases.

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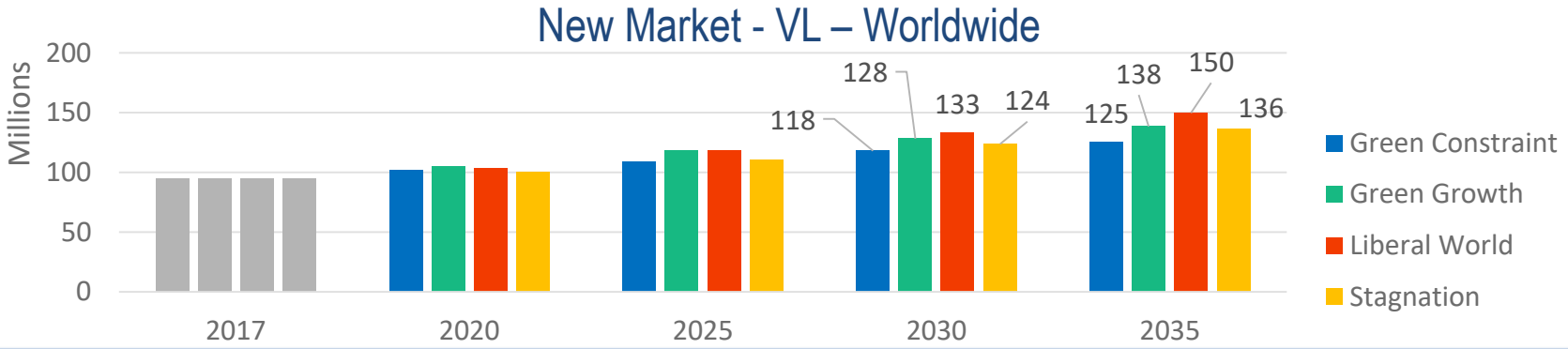
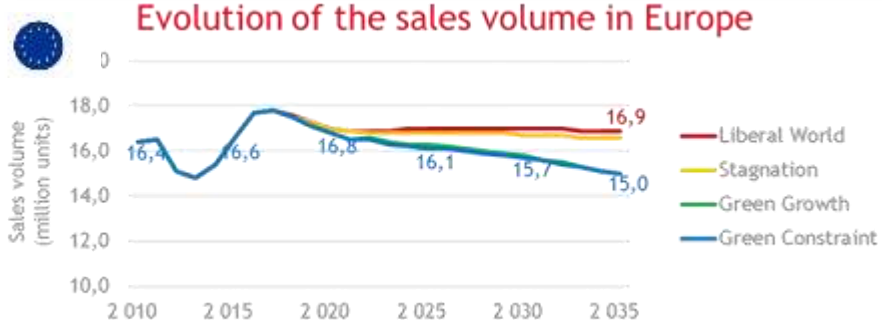
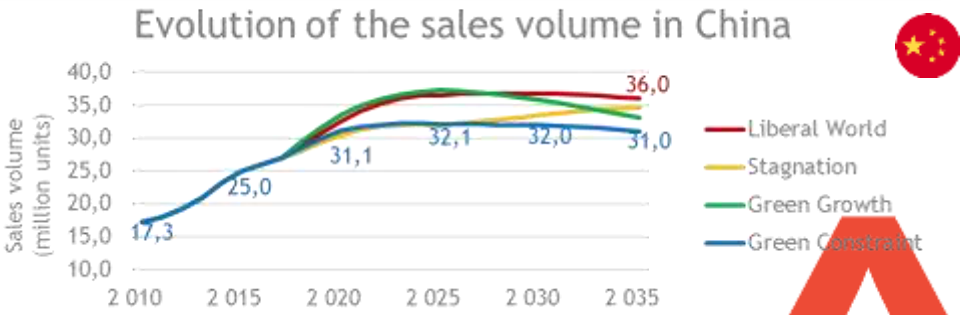
New Light vehicle sales increase from 30 to 55 million units in 2035 compared to 2017



Between 2017 and 2035, the new LV market sees an increase in sales of +25 million vehicles per year following the Green Constraint scenario. This increase in sales volumes is located in emerging countries (e.g. China, Africa





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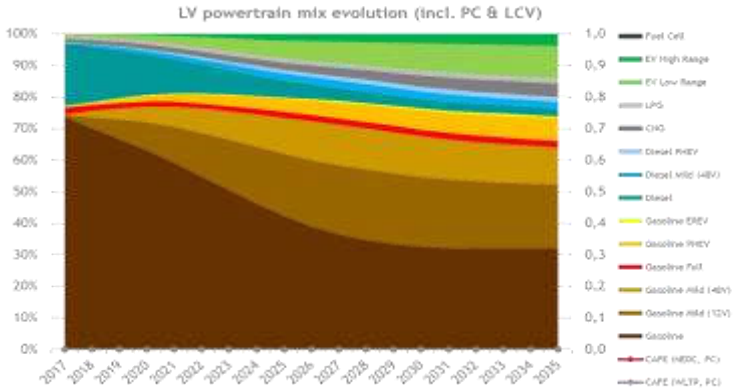
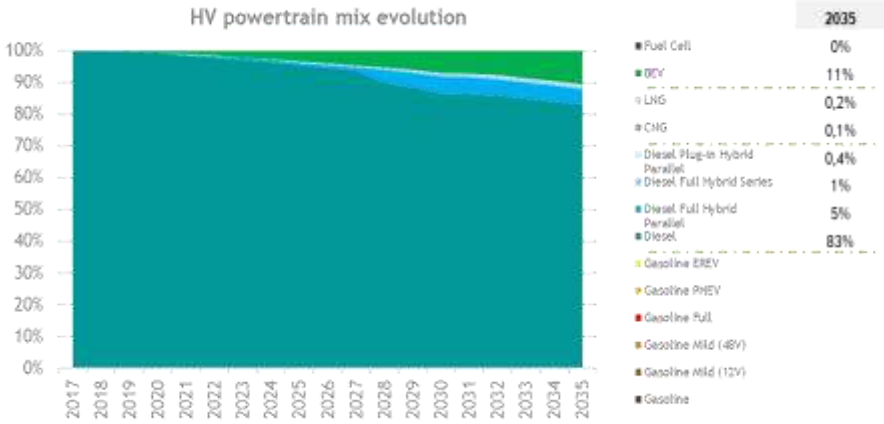
Standard ICE will remain the bulk of the worldwide market in the scenario Green Constraint

LV



BEV: 12%
PHEV: 9%
Gasoline: 69%
Diesel: 4%
Gas: 6%
Other: <1%

HV



Standard ICE will gradually be replaced by mild hybrids and alternative technologies to follow local regulation demand

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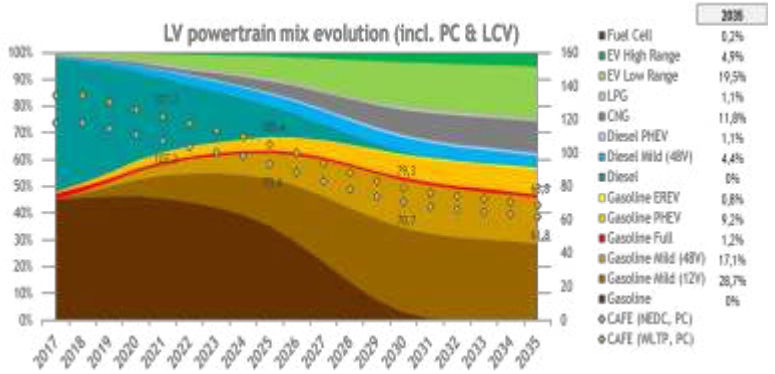
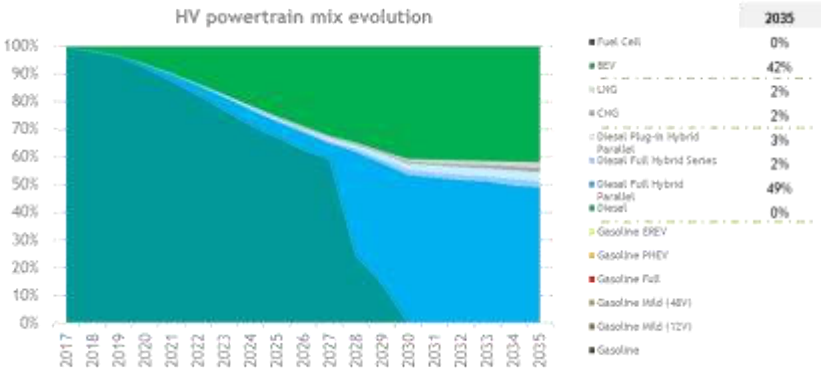
EV will be the dominant alternative technology
In the 2019 scenario Green Constraint

VL



BEV: 25%
PHEV: 10%
Gasoline: 48%
Diesel: 4%
Gas: 13%

VI



In Europe, the gradual halt in the sale of 100% thermal vehicles has boosted the shift from sales to alternative engines, especially 100% electric vehicles. Under the assumption that CNG will not be affected by this decision, they reach 12% of the market share of VL in 2035

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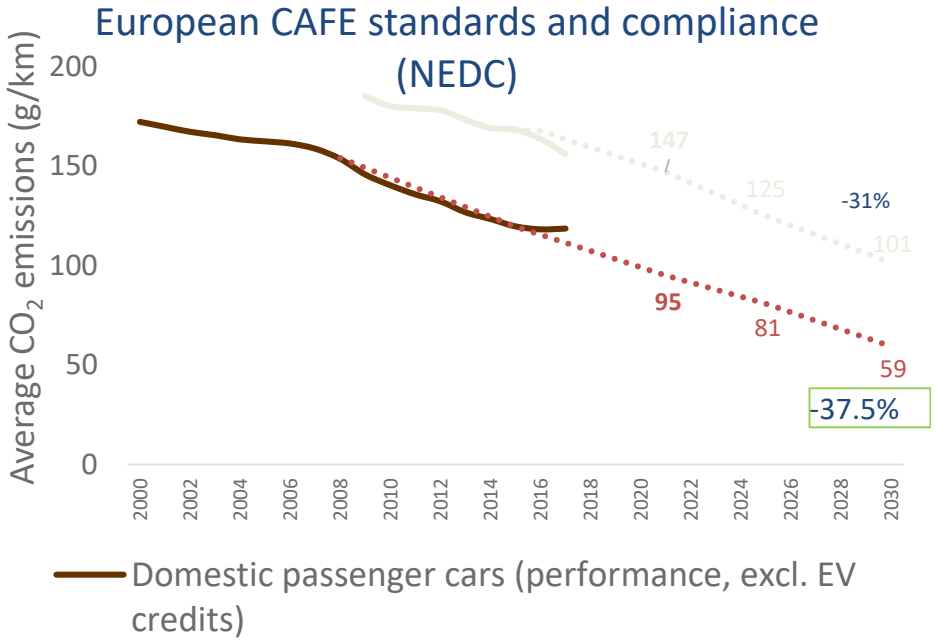
EC set ambitious goals for 2030

Stronger CAFE reduction target is set between 2021 and 2030 and intermediary 2025 target would be implemented



Passenger car flexibility mechanism :

EU will offer easier CAFE targets, to those who will sell enough (15% for 2025, 30% for 2030) zero-low-emission vehicles (<50g/km) in order to offset their overall fleet emissions.
These ZLEV objectives are not mandatory as in China and USA.

Heavy vehicles CO2 reduction targets :

Heavy vehicles in Europe will have to reduce their CO2 emissions by 30% in 2035 compared to 2019, with intermediary target of 15% of reduction in 2025

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ELECTRIC CAR : A SHARED CHOICE

Hyundai Kona EV

Kia Niro EV

Jaguar i-PACE

DS3
Crossback
E-Tense

Renault
New ZOE

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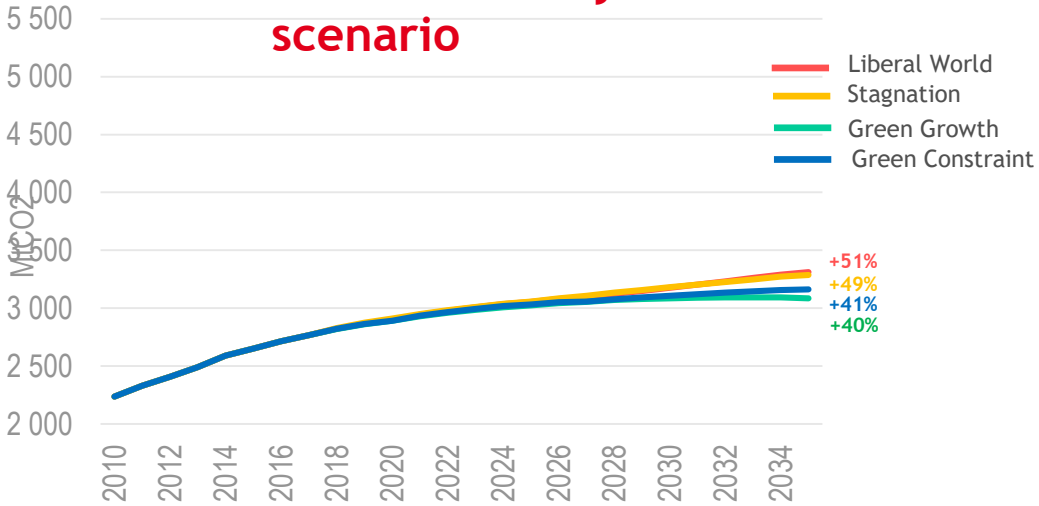
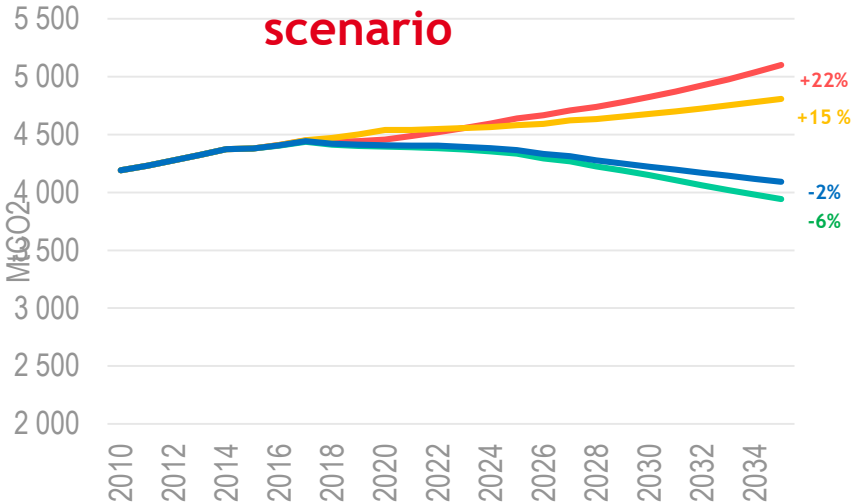
CO2 emission from HV will increase by 2035 while emissions from LV will decrease

CO2 emission of HV by scenario



CO2 emission of LV by scenario



- For the 4 scenarios there is a significant increase in CO2 emissions from heavy goods vehicles. For the central scenario, Green Constraint, these increase by 41% between 2010 and 2035 (and + 14% between 2017 and 2035).
- On the other hand, for the LV, for 2, of which Green Constraint, we observe a reduction of the emissions. They are -2% between 2010 and 2035, and -8% between 2017 and 2035 for the Green Constraint scenario

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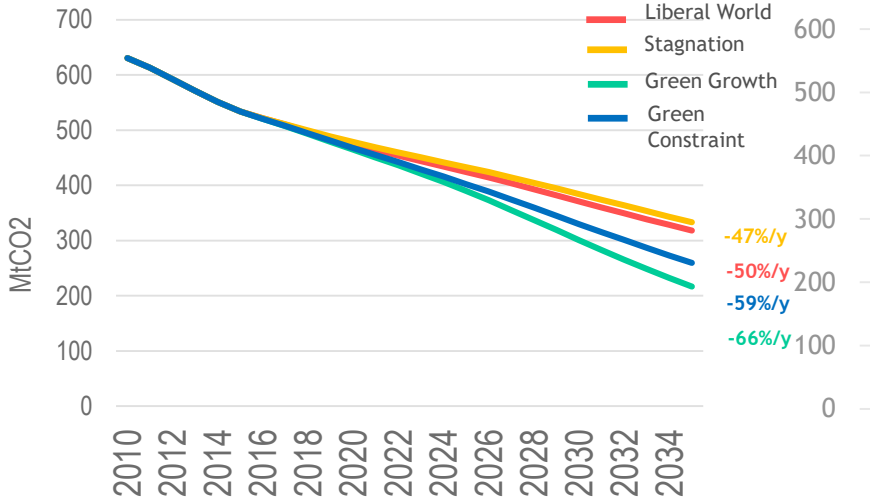
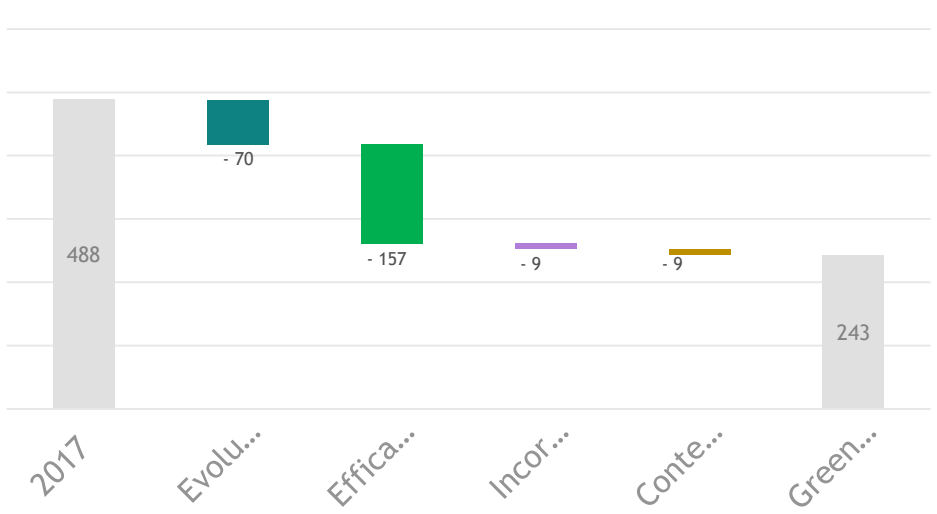
LV in Europe: Global emission are decreasing

CO2 emission by scenario



Contribution of the different drivers in Europe for the scenario Green Constraint



- Between 2017 and 2035, the emissions of LV decrease by two. The improvement of the energy efficiency of the thermal LV and the electrification of a part of the park contribute for 64% to this decrease (-157MtCO2).
- Two effects for the thermal vehicles: 1/ the reduction in the share of diesel in favor of gasoline, is unfavorable for European emissions; 2/ the improvement of the efficiency of thermal vehicles allows a significant drop emissions from the park.

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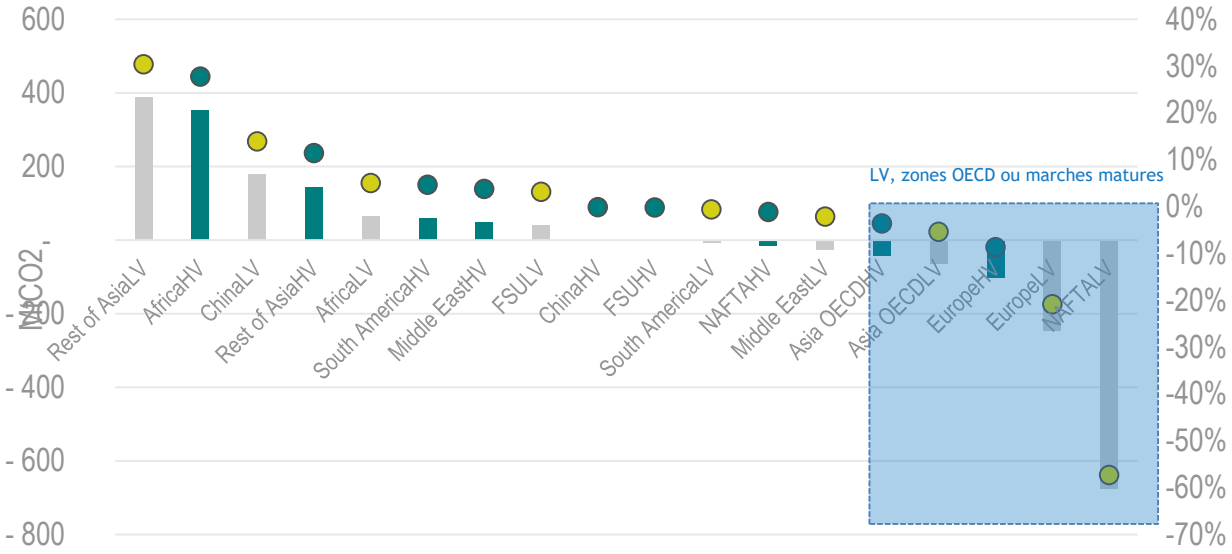
Between 2017 and 2035, CO2 emission of transport will increase by 94 MtCO2 : rise of HV

Evolution of CO2 emissions between 2017 and 2035, per area and segment, within the Green Constraint



- Balance LV:
  -349 Mt_{CO2} / 2035
- Balance HV:
  +443 Mt_{CO2} / 2035

- Europe and the NAFTA zone are the main contributors to the reduction of CO2 emissions observed for LVs.
- Improving energy efficiency is the main source of this reduction in emissions.

- On the other hand, for emerging or fast-growing markets (eg China, South America), the increase in LV fleet size is not fully offset by vehicle fuel consumption gains, and emissions are therefore rise.

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Conclusion

Synthesis of the results for the personal vehicles

1. **WORLD**: In **2030 and 2035** the total share of EV in sales of LV is estimated at, respectively, **17% and 21%**.

   EUROPE: In **2030 and 2035** the total share of EV in sales of LV is estimated at, respectively, **29% and 35%**.

2. A downward trend of CO2 emissions in the road transport sector at world level is permitted under green scenarios, firstly due to the **increase of electrification of light vehicles (LV)** and secondly due the expected **slow-down of growth of LV vehicles** in China. After 2023 these two effects combined enable the effect of the substantial increase of volumes of LV and HV at world level to be compensated.

3. **Electric technologies will be the main contributors to reduce CO2 emissions over the period 2020-2035**. These technologies have sufficiently high market shares only in scenarios in which incentive mechanisms are maintained or established over this period.

4. In 2035 the electrification of the motor vehicle sector, and the growth of other **alternative sources of energy** - biofuel, natural gas and hydrogen (in connection with zero-carbon energy production), the growth of **new mobility solutions** (car-sharing and ride-sharing), **measures to restrict access**, or gradual prohibition of sales of 100% ICE are much more effective at reducing CO2 emissions than toughening of emissions standards.

5. **Europe and North America account for 90% of reductions of CO2 emissions**. China, Africa and Asia outside the OECD (including India, in particular), for their part, account for more than 90% of rises in emissions.

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