

Electrification to decarbonize the transport sector

Main results of the recent study by
CE Delft, ICF and Ecologic

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▶ Brief overview of the study

- Commissioned by DG CLIMA
- Carried out by CE Delft (lead), ICF and Ecologic
- Objectives and scope:
 - Status and expectations of electric vehicles (EVs)
 - Impacts of market uptake of EVs
 - Up to 2030, focus on passenger cars, EU-27
- Deliverables (www.cedelft.eu):
 - 5 background reports
 - Summary report

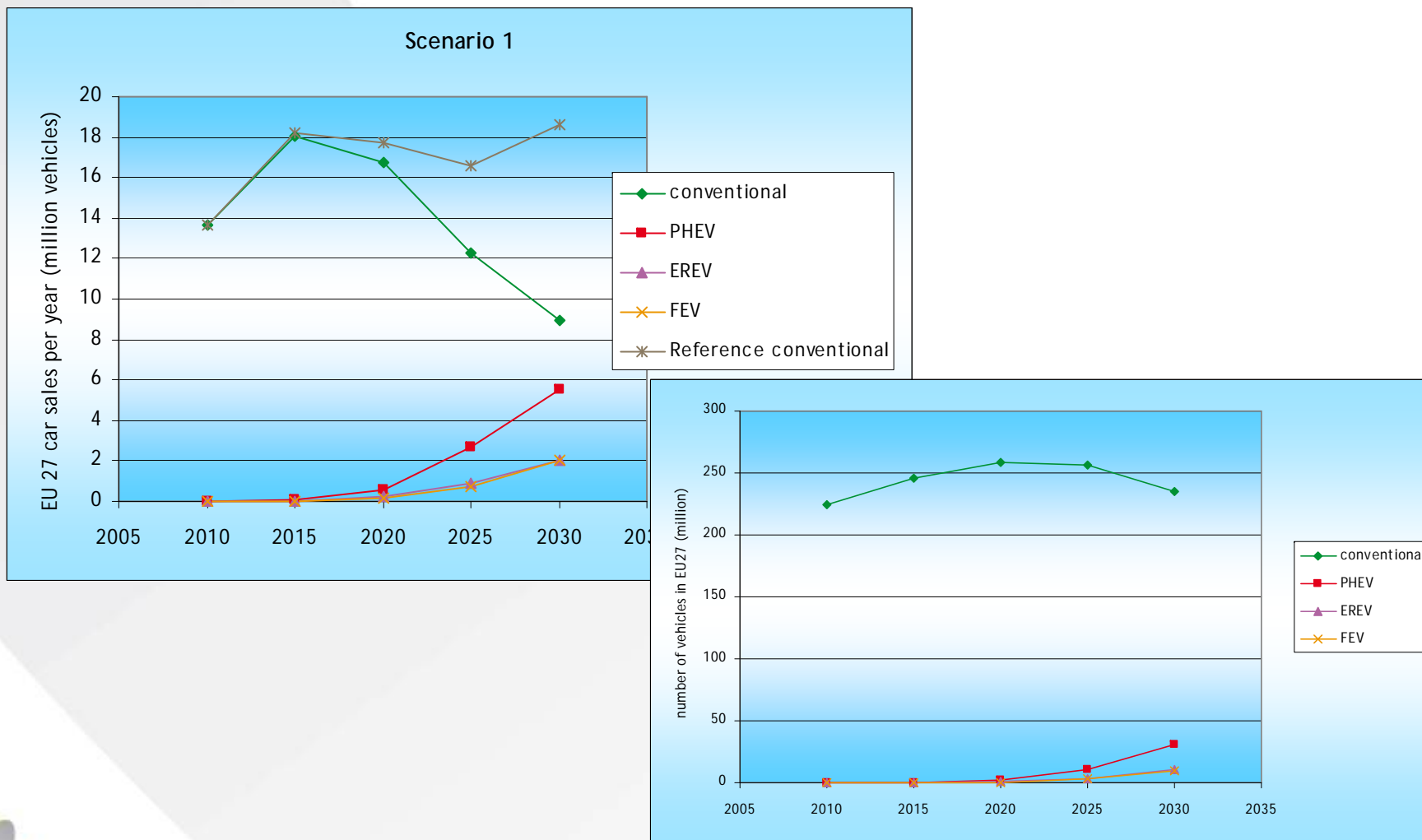
▶ Electric vehicles: scenario and impact analysis

- Four vehicle types
 - Internal Combustion Engine Vehicle (ICE)
 - Full Electric Vehicles (FEV)
 - Plug-in hybrid electric vehicles (PHEV)
 - Extended range electric vehicle (EREV)
- Four consumer types
- Three EV scenarios designed to cover the playing field
 - Uncertainties still very large
- Results: costs, market uptake, impacts on emissions and government revenues, etc.

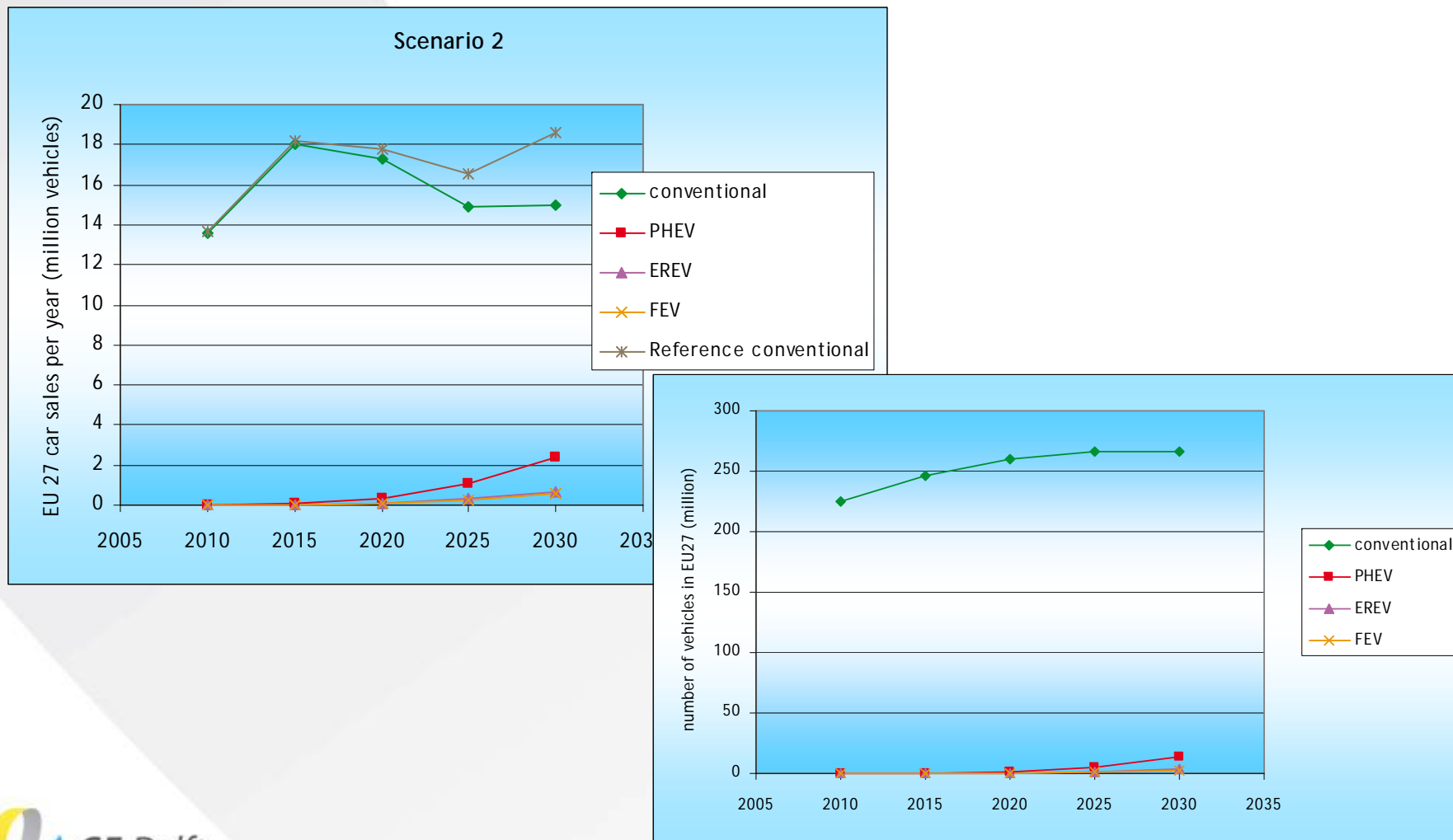
▶ Scenarios

- Scenario 1: Most realistic
 - Input parameters based on current best estimates.
 - Only 'innovators' interested while costs are high.
 - Production capacity, # of charging points increase over time.
- Scenario 2: ICE breakthrough
 - Optimistic estimates for costs and fuel efficiency of ICEs.
 - Battery costs reduce less fast than in scenario 1.
 - Consumer interest and charging possibilities remain limited.
- Scenario 3: EV breakthrough
 - Rapid decrease of battery cost, from 2015 onwards.
 - EVs become competitive and electric ranges increase.
 - Growth restricted by production capacity, consumer scepticism, grid bottlenecks etc.

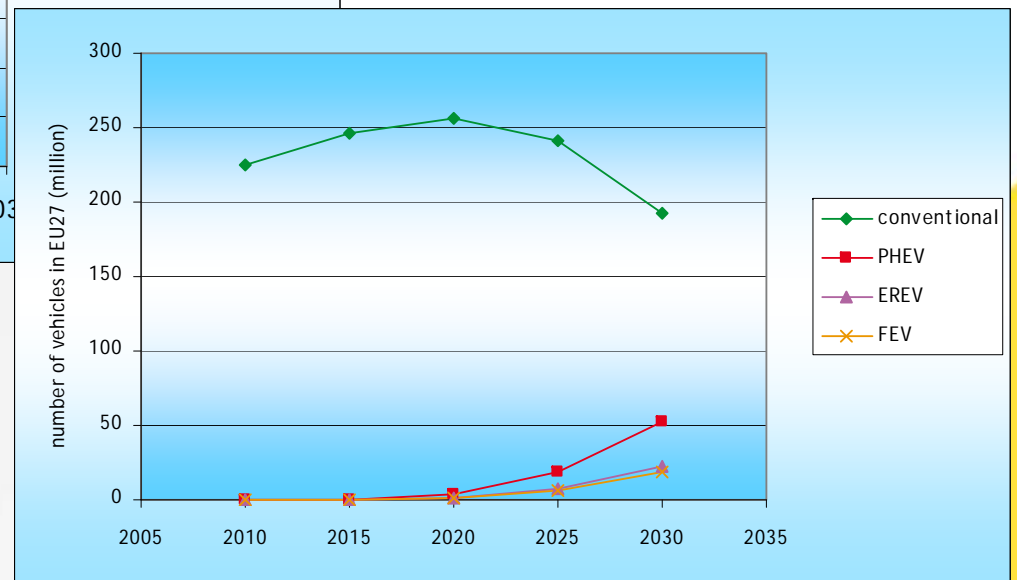
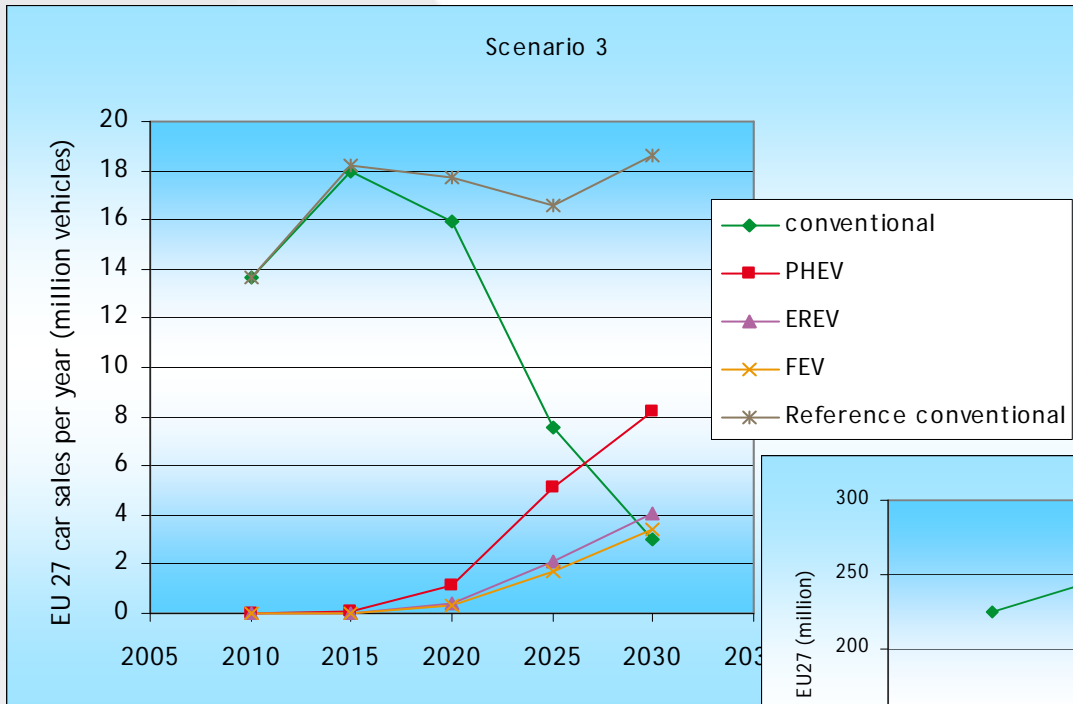
► Scenario 1: most realistic estimates



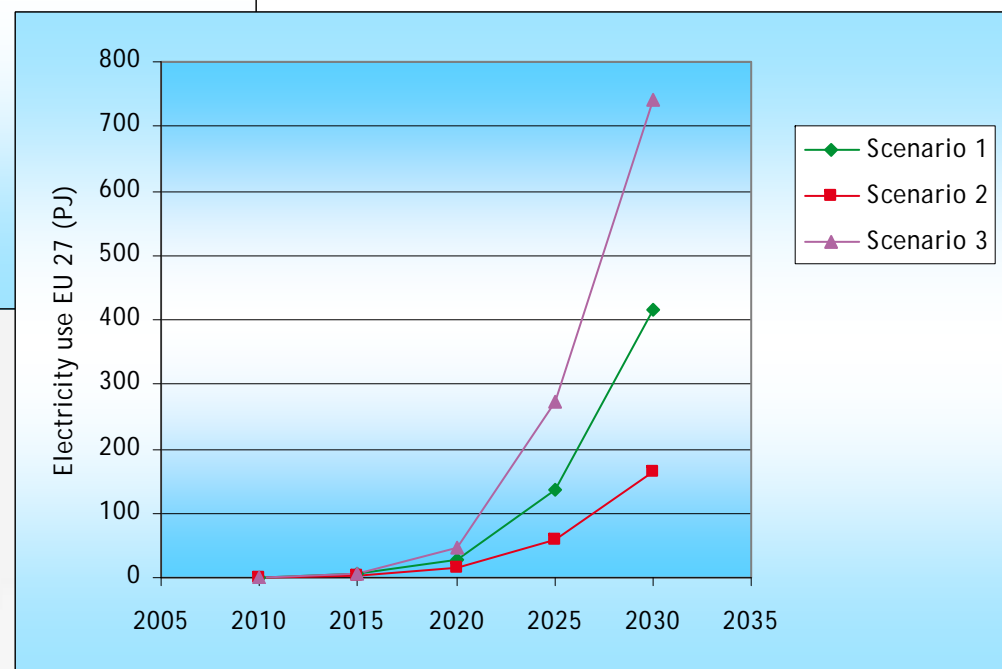
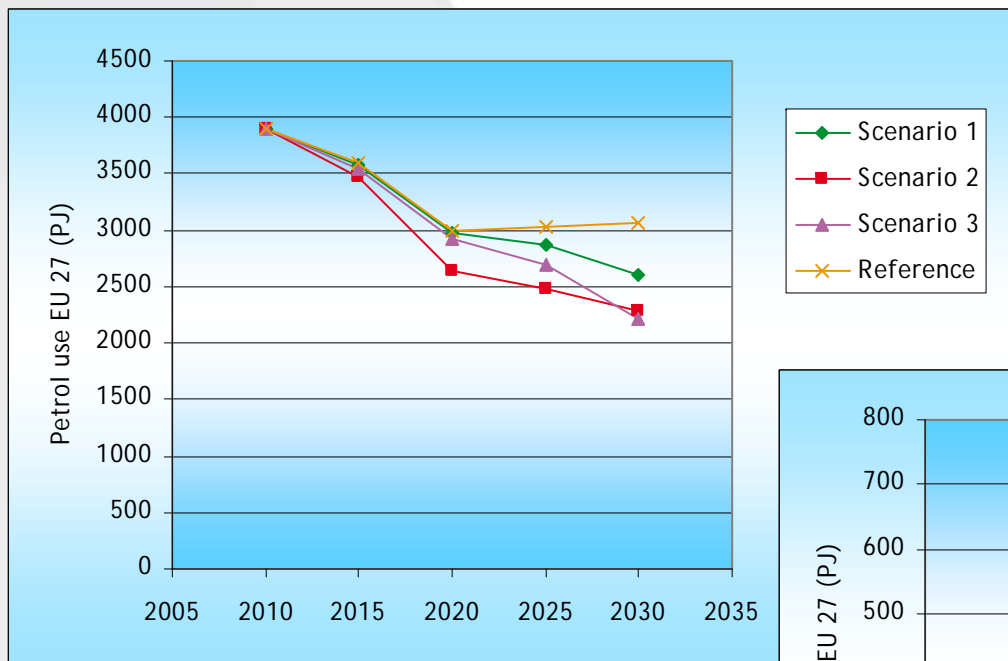
► Scenario 2: ICE breakthrough



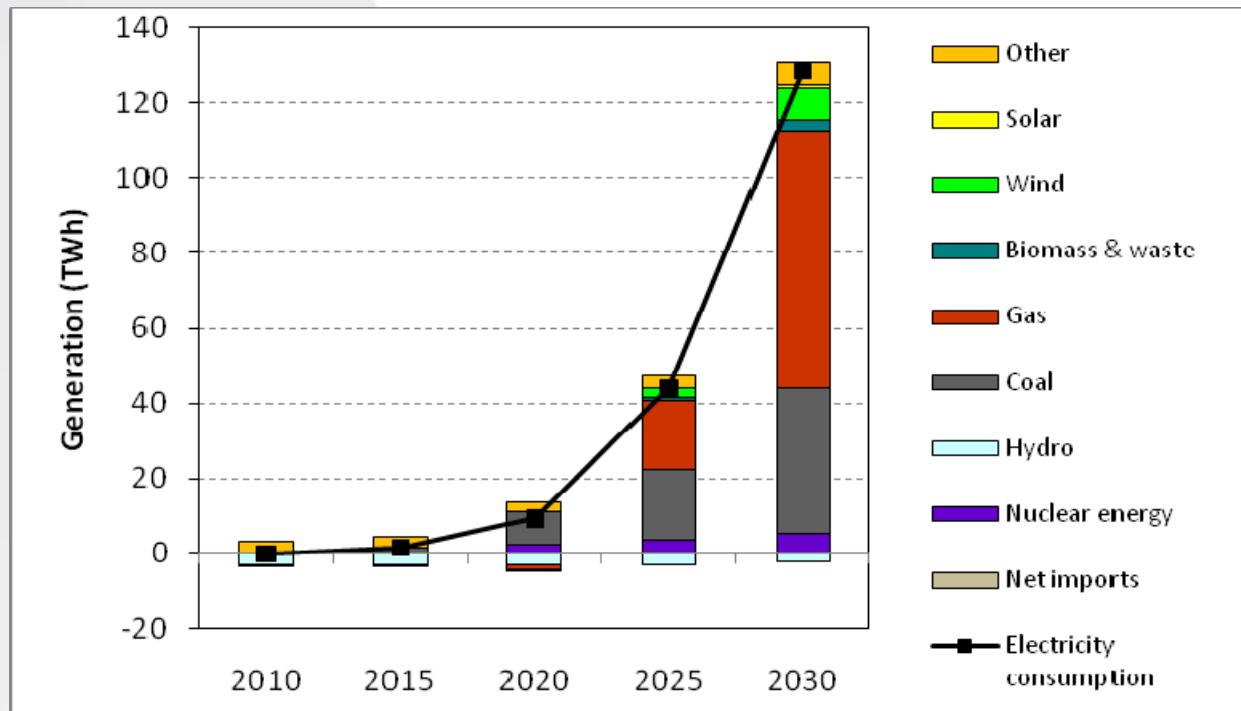
▶ Scenario 3: EV breakthrough



► Impact on fuel and electricity demand

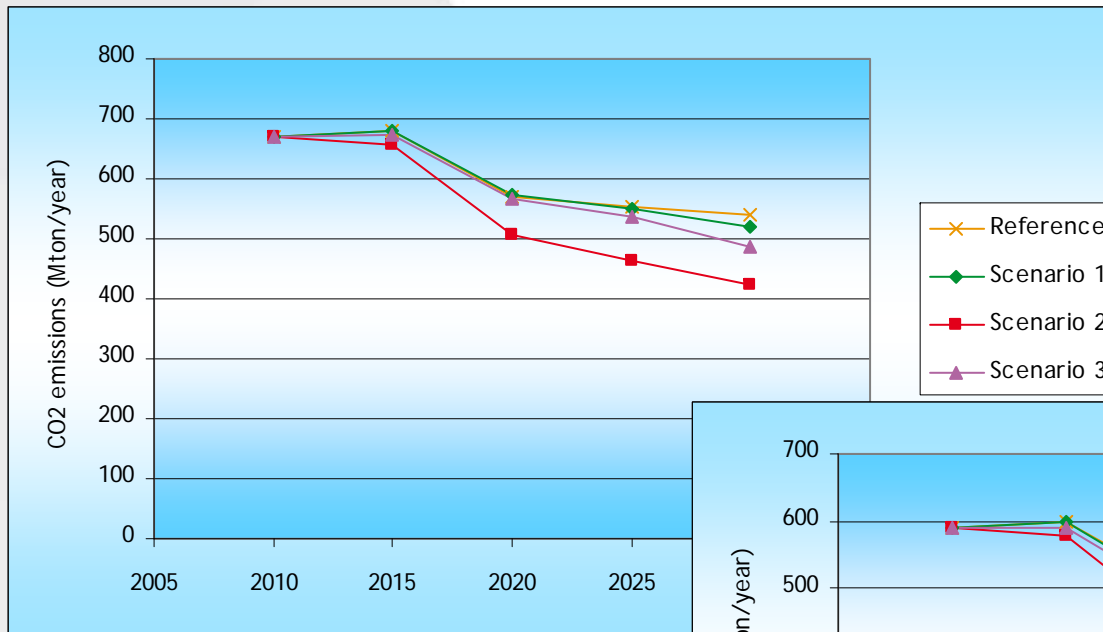


- Impact on electricity production:
Net changes in electricity production mix - scenario 1



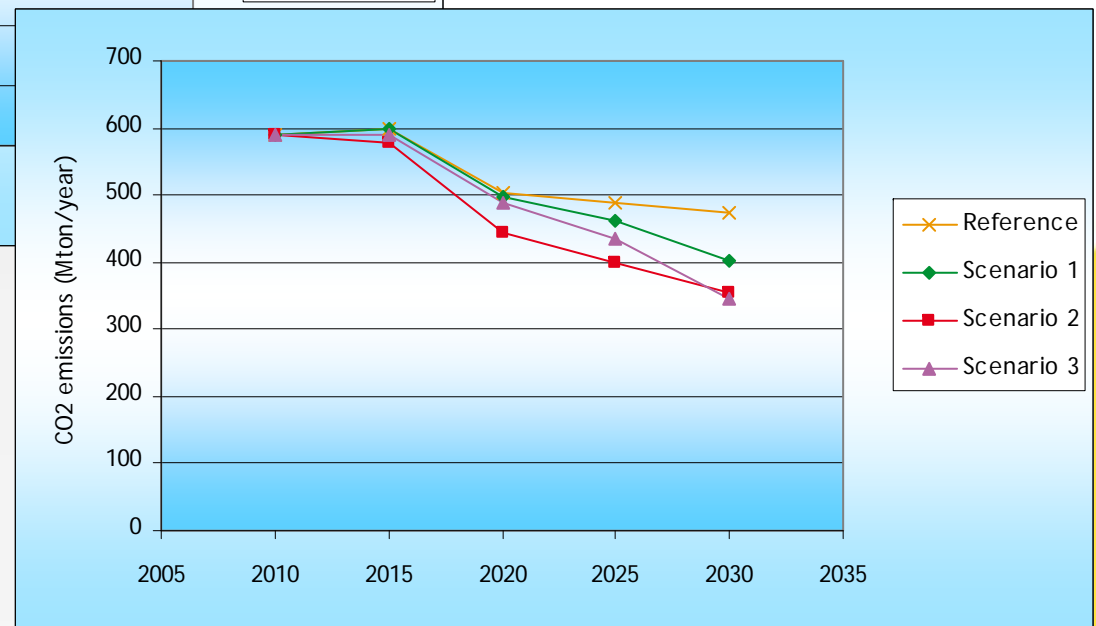
Electricity sector modelled with IPM model (by ICF)

▶ Impact on CO₂ emissions



Excl. ETS effects

Direct vehicle emissions:



▶ Other impacts

- NO_x emissions could increase, PM₁₀ emissions reduce
- Air quality:
 - On average, no significant effects before 2025/2030
 - EV 'hot spots' may have positive effects earlier
- Noise impacts: limited (but positive)
- Materials:
 - Lithium reserves seem sufficient, but production must increase significantly
 - Rare Earth Element requirements more difficult to predict
- EV uptake has a large range of economical impacts, only some estimated in this study
- Government revenues reduce over time, if not adapted
 - Fuel and electricity taxes, vehicle taxes

▶ A large range of EU policies relevant for EVs (and vice versa)

Vehicle regulation

- CO₂ and Cars Regulation, CO₂ regulation for light commercial vehicles
- Framework Directive for Type-approval of Motor Vehicles
- Directive Relating to Consumer Information on Fuel Economy, Directive to Promote Clean and Energy Efficient Vehicles

Regulation of energy carriers

- Renewable Energy Directive
- Fuel Quality Directive
- ETS Directive

Fiscal policies

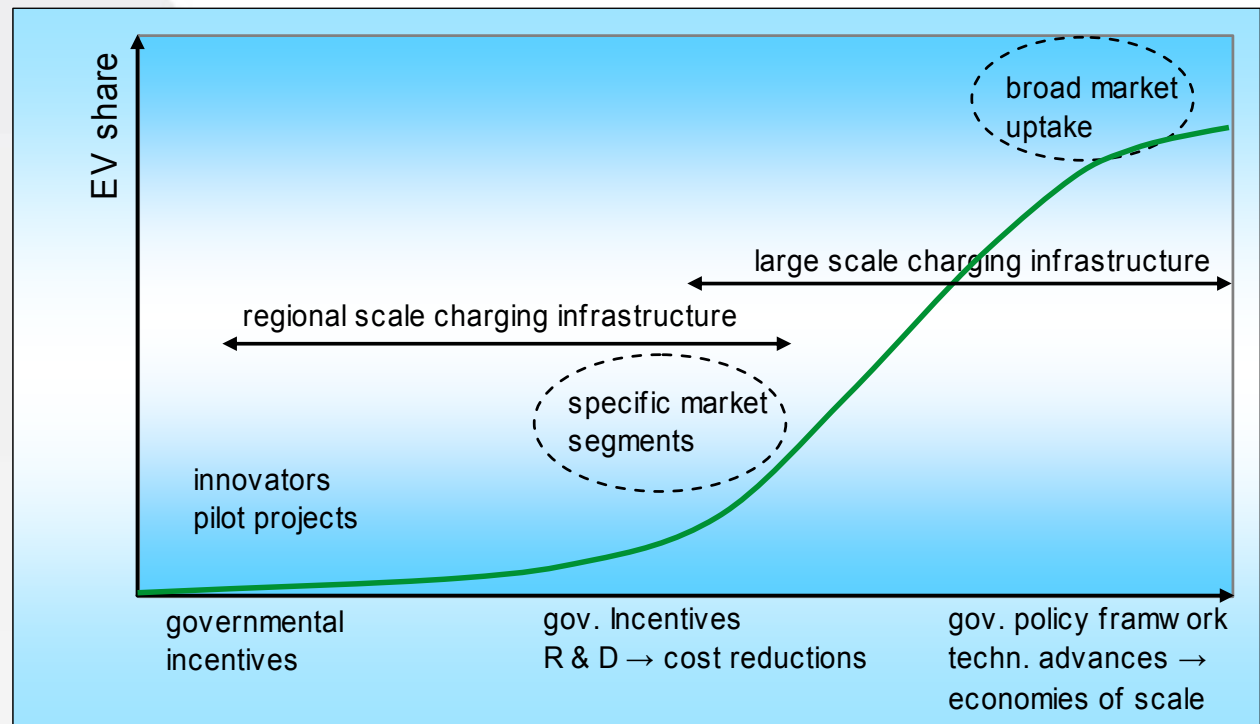
- Framework Directive for the Taxation of Energy Products and Electricity
- Eurovignette Directive

Other relevant policies

- Raw Materials Initiative, End-of-Life Vehicles Directive, Batteries Directive, Directive on information in the field of technical standards and regulations

▶ Policy goals and timing

- Various goals may be pursued:
 - Facilitate EV market uptake
 - Influence impacts
 - Avoid harmful market distortions
- Policies may vary over time



▶ Policy conclusions

- EVs impact on a large range of policy areas (and vice versa)
 - Many need to be adapted when EVs enter the market
 - Some may require action in the short term
 - e.g. standardisation of charging
 - Others should be reviewed, require action in the medium or longer term
 - e.g. CO₂ regulation of cars, harmonisation of fiscal policies, smart charging, charging infrastructure issues

Thank you

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www.cedelft.eu