

Renewable Energy for Transport Policy Report

26th January 2017, Brussels

Lead author: Robert Kunze (KIT), Jonathan Gomez (KIT), Dogan Keles (KIT)
Authoring team: Thomas Haasz (USTUTT), Ulrich Fahl (USTUTT), David Fraboulet (KIC-IE), Louise Coffineau (KIC-IE), Paul Deane (UCC), Eamonn Mulholland (UCC)
Type: Policy Report (PR)
Publication date: September 2016

Outline

- Background and Objectives
- Transport without Fossil Fuels
- Model-based Scenario Analysis
- Conclusions

Background

- Transport is vital to societies and economies
- Transport is a major contributor to GHG emissions
- Traffic emissions are the main cause of local air pollution
- Reduction in oil-based energy for transport is needed

Objective of the Policy Report

- Overview of the status quo of renewable energy in transport sector regarding EU targets
 - Not covered in this presentation
- Analysis of pathways to reach the long-term targets
 - Opportunities for transport without fossil fuels
 - Scenario assumptions
 - Model results TIMES PanEU and TE3

Transport without Fossil Fuels

- Non-motorised transport and public transport
- Small Individual Carriers (SICs)
 - low-power electrified urban mobility, multimodality
- Synthetic fuel (BioFuel) and Combustion Engine
 - no new major investments, but emissions
- Battery
 - energy efficient, but lower range
- Hybridations
- Hydrogen Fuel Cell



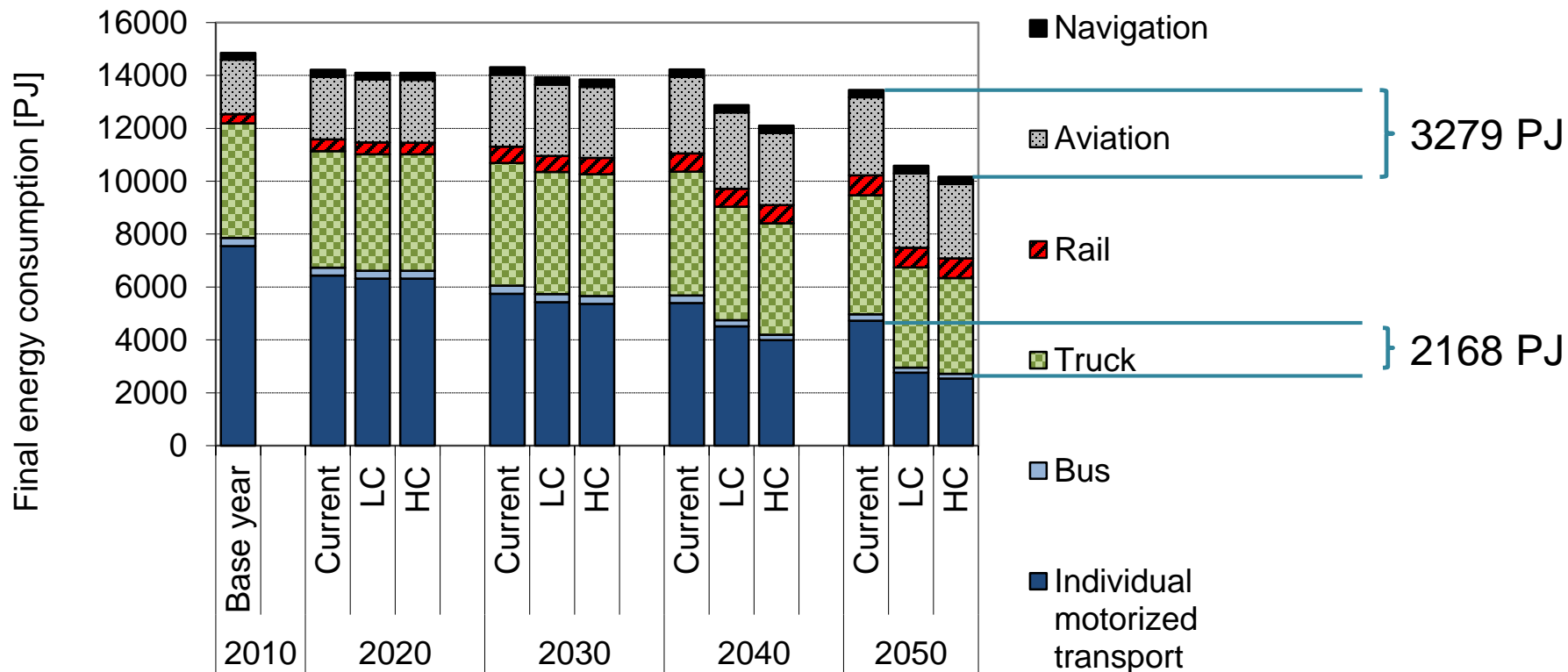
Model-based Scenario Analysis

Scenarios description

| Scenario | ETS target (compared to 2005) | GHG reduction target (compared to 1990) | Share of renewable energy in (gross) electricity consumption | Share of renewable energy in gross final energy consumption | Transport policies |
|-----------------------------|--|---|--|---|---|
| Current | EU-28: -21 % (2020) -75 % (2050) | none | EU-28: 30 % (2020) | | none |
| LC (Low Commitment) | EU-28: -21 % (2020) | EU-28: -30 % (2020) -80 % (2050) | 45 % (2035) 60 % (2050) + | EU-28: 20 % (2020) 54 % (2050) | National targets for e-mobility and biofuel blending quotas |
| HC (High Commitment) | -43 % (2030) | EU-28: -30 % (2020) -90 % (2050) | Country specific objectives when available | | |

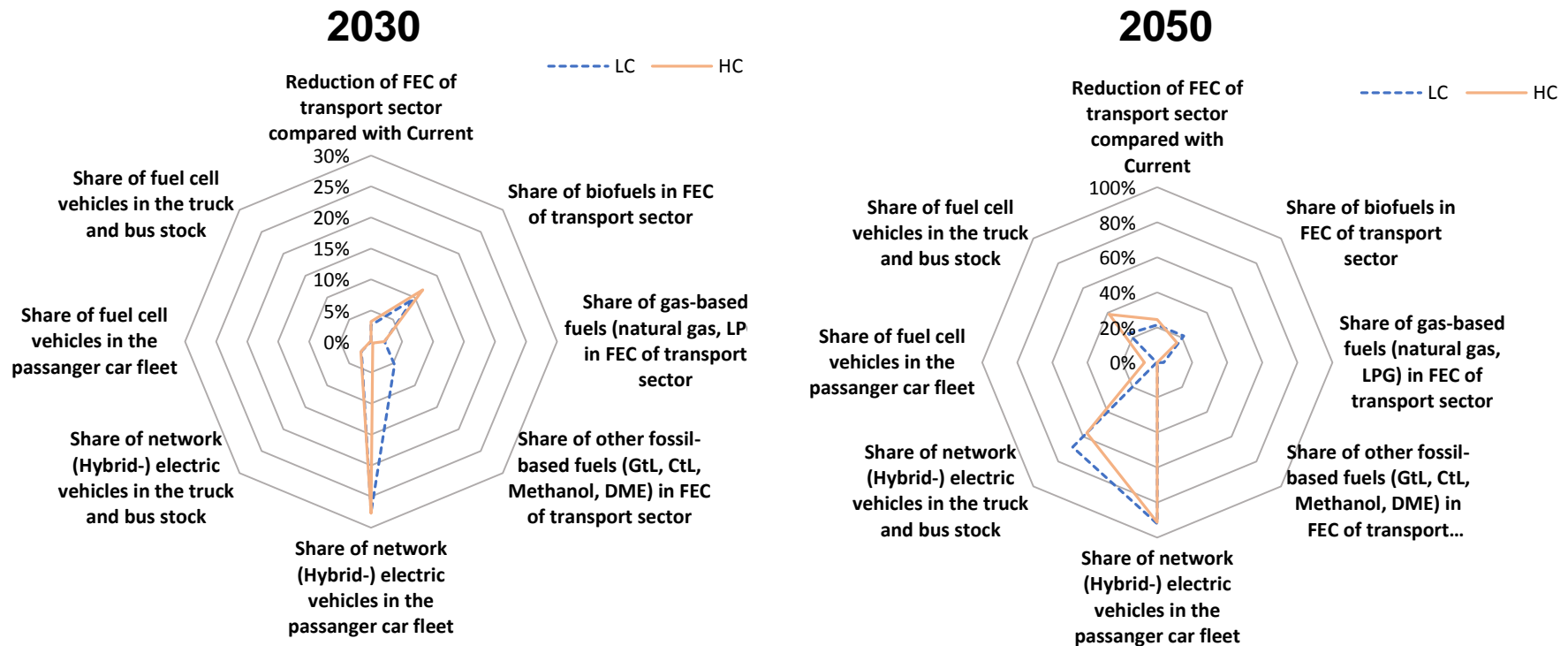
- Low Commitment (LC) and High commitment (HC) scenarios: Economy wide GHG reduction target starting in 2020, replacing the ETS in 2030
- Cost minimization determines technology choices in TIMES PanEU

Final energy consumption of the transport sector in the EU-28 by transport mode from 2010 to 2050



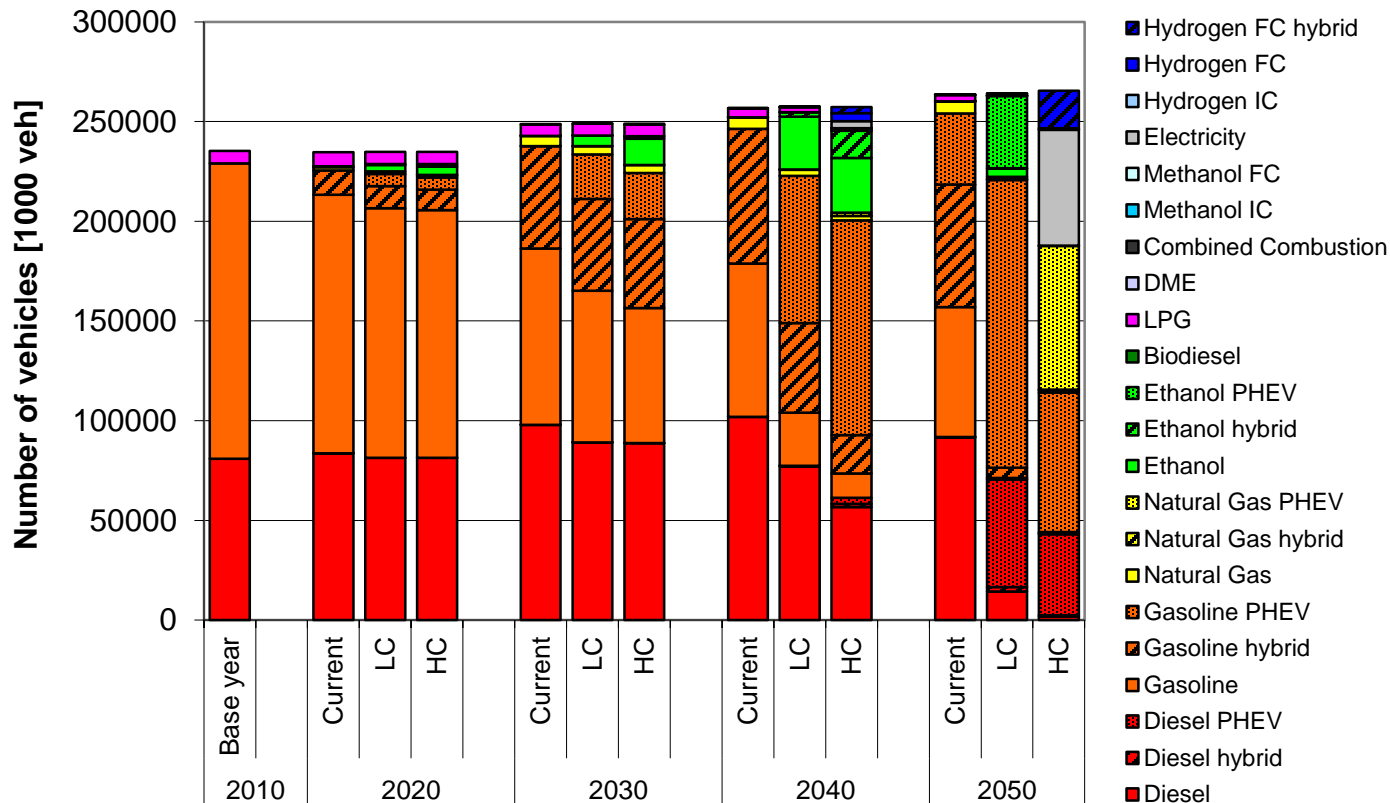
- Until 2030 the sectoral scope of the GHG emission target hardly influences final energy consumption in the transport sector
- The largest savings in energy consumption in the High Commitment (HC) scenario in 2050 are achieved through cars

Impact of GHG mitigation targets on key indicators in the transport sector



- In 2030 the main GHG mitigation measures are biofuels and hybrid electric vehicles
- In 2050 PHEVs is the main GHG mitigation measure with biofuels only gaining importance in the Low Commitment (LC) scenario

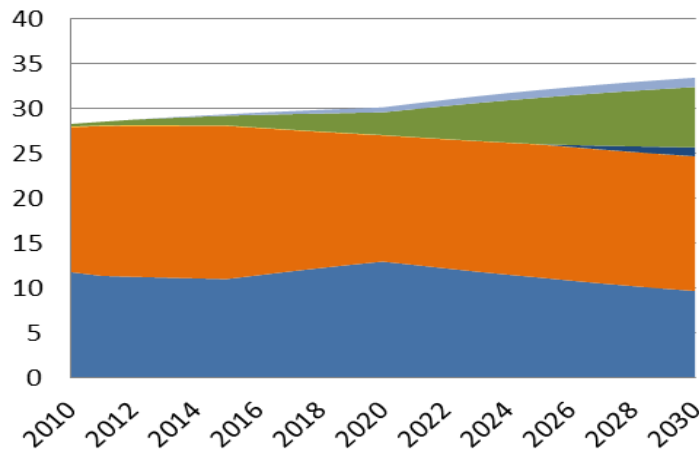
Car stock by energy carrier in the EU-28 from 2010 to 2050 by scenario



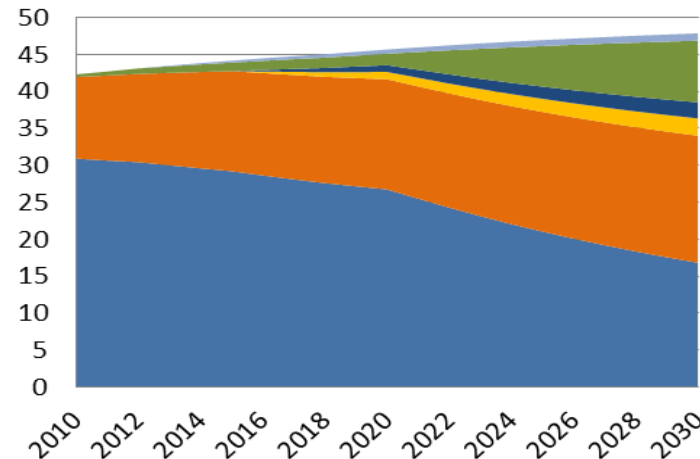
- If transport sector is subject to GHG mitigation targets, combustions engines are only applied as range extenders
- Large shares of full electric and fuel cell (FC) vehicles are only observed in the High Commitment (HC) scenario

Policy simulation for FR and DE with a focus on ethanol and plug-in hybrid electric cars

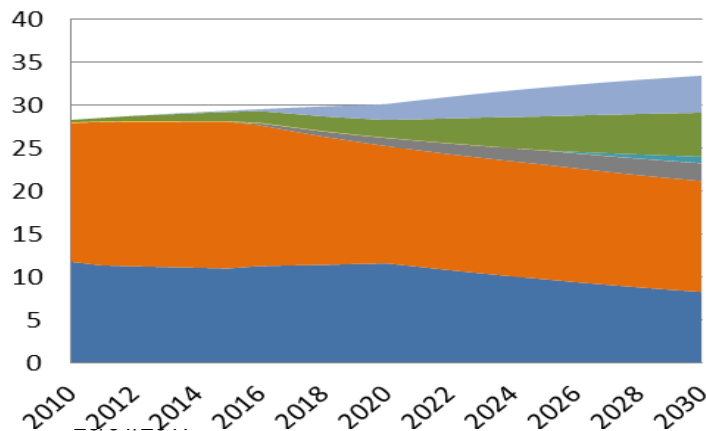
France (Current)



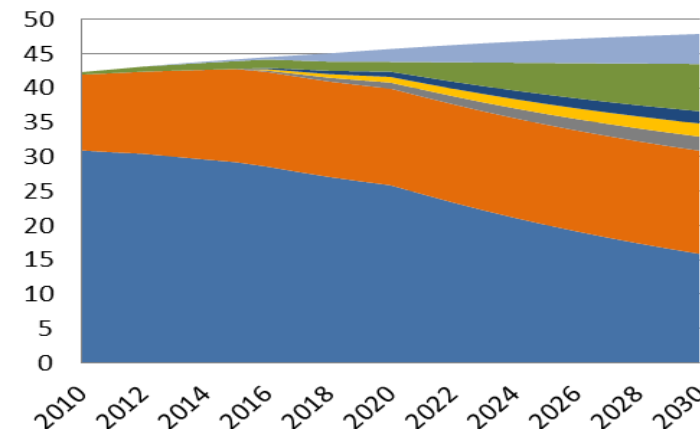
Germany (Current)



France (LC)



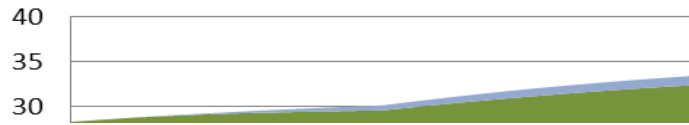
Germany (LC)



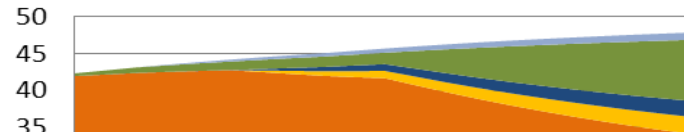
- Hydrogen FC
- Electricity
- Gasoline PHEV
- Gasoline Hybrid
- Natural Gas
- LPG
- Ethanol
- Diesel
- Gasoline

Policy simulation for FR and DE with a focus on ethanol and plug-in hybrid electric cars

France (Current)



Germany (Current)



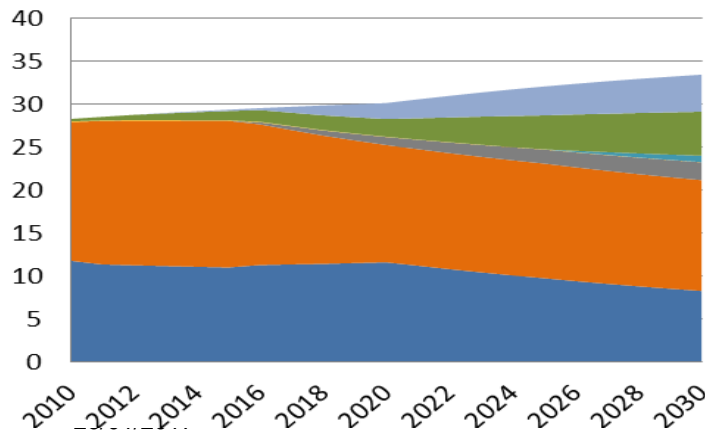
Hydrogen FC

Comparison of the LC scenario to the Current scenario:

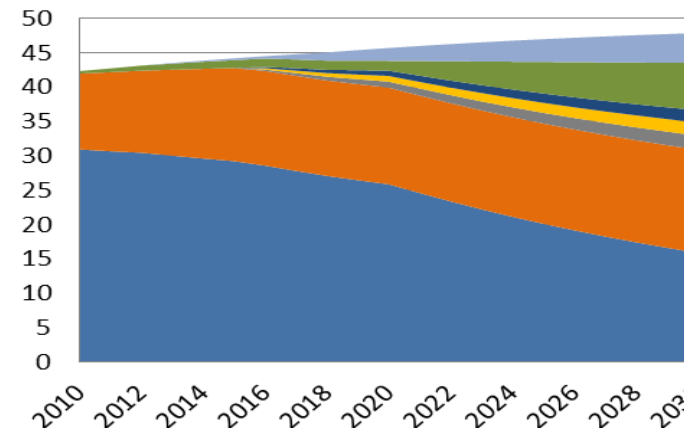
- Subsidy of 4.000 €/car for PHEV from 2016 to 2018
- Assumed increase in popularity of this technology afterwards
- PHEV substitut gasoline hybrids and conventional combustion engines

Million cars

France (LC)



Germany (LC)



LPG
Ethanol
Diesel
Gasoline

Conclusions

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- France and Germany until 2030:
 - Addressing CO₂ emission gaps, other GHG emissions and setting of post-2021 standards
 - Recharging infrastructure as well as high taxation for conventional vehicles/fuels and economic incentives for alternative vehicles/fuels is necessary to trigger market effects

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 - Recharging infrastructure as well as high taxation for conventional vehicles/fuels and economic incentives for alternative vehicles/fuels is necessary to trigger market effects
- EU-28 until 2050:
 - Until 2030, transport shows the smallest sectoral contribution to GHG reduction
 - With ambitious EU 2050 GHG targets, transport becomes of great importance
 - By 2050, electric vehicles might reach a market share of over 90 % in the car stock

Outlook

- Uncertain development of fuel cell and battery prices requires regular monitoring
- The policy measures examined are to be understood as ‘starting points’
- Economic evaluation of impacts at the country level not investigated yet
- Analysis of optimal policy packages desirable

Selected References

EC-related references: see the Policy Report for additional references

- [2009/28/EC] 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 (Text with EEA relevance). In: Official Journal of the European Union L 140, 5.6.2009, p. 16-62.
- [2009/29/EC] Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community (Text with EEA relevance). In: Official Journal of the European Union L 140, 5.6.2009, p. 63–87.
- [2009/30/EC] Directive 2009/30/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 98/70/EC as regards the specification of petrol, diesel and gas-oil and introducing a mechanism to monitor and reduce greenhouse gas emissions and amending Council Directive 1999/32/EC as regards the specification of fuel used by inland waterway vessels and repealing Directive 93/12/EEC (Text with EEA relevance). In: Official Journal of the European Union L 140, 5.6.2009, p. 88-113.
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- [COM(2011)112] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A Roadmap for moving to a competitive low carbon economy in 2050, Brussels 2011.
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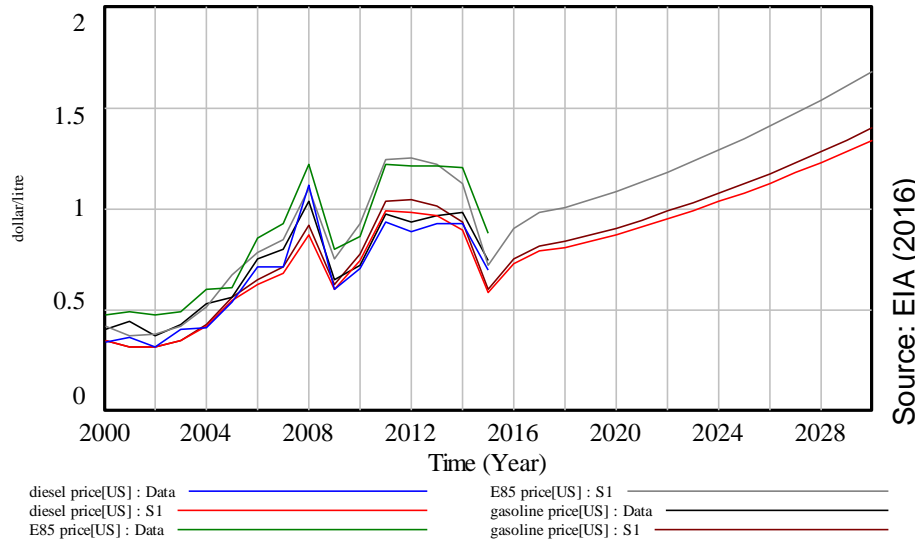
THANK YOU!

Policy report available on:

www.insightenergy.org

TE3 Model

Selected Variables



projected battery cost per kWh

