Regulating EU LDV CO_2 beyond 2020: Some considerations.

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Climate Action

Overview

European Commission

The current regime

The big picture

Technology choices

Regulatory metric

Utility parameter

Embedded emissions

Monitoring

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LDV CO_2 after 2020: Where are we?

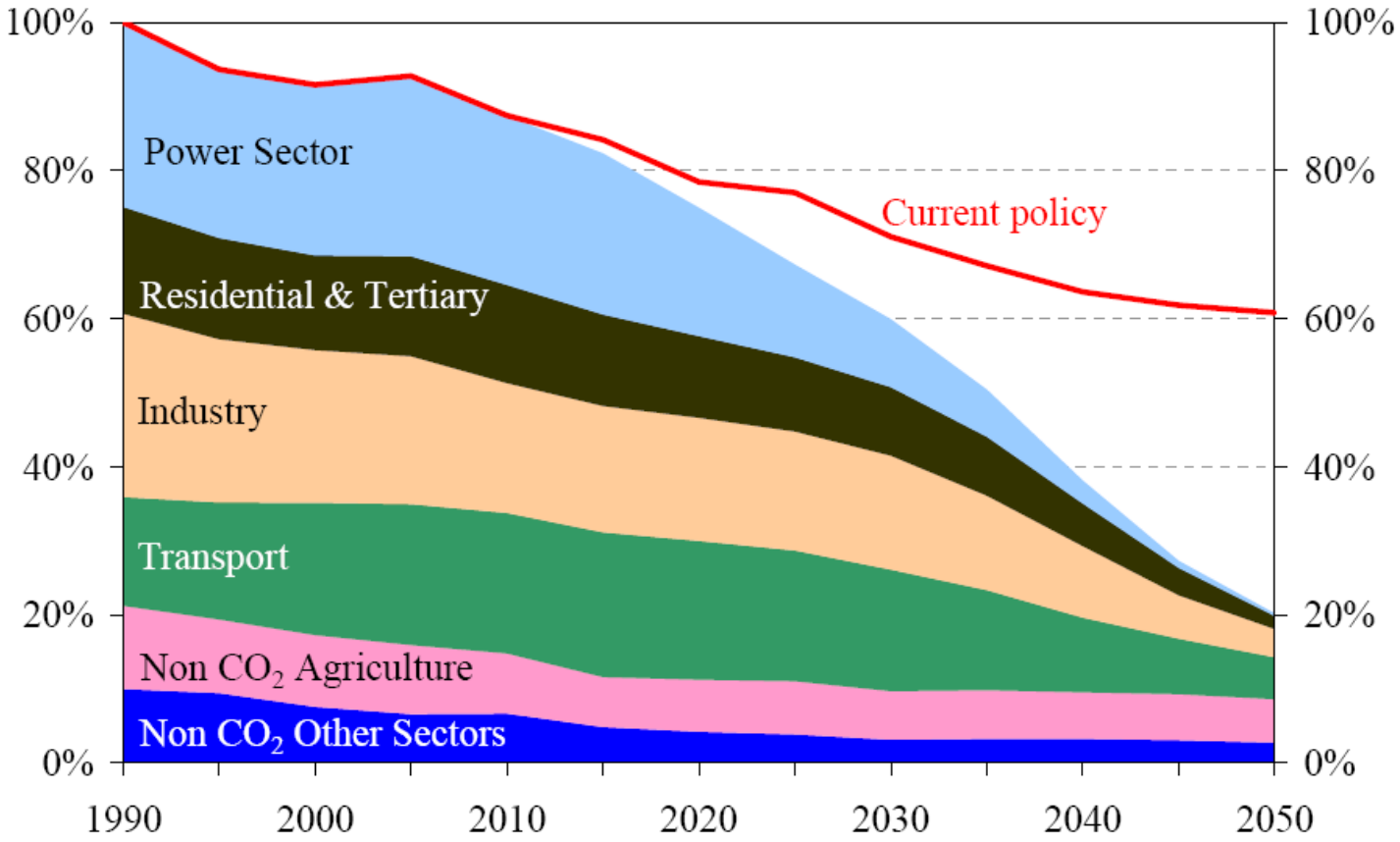
- Regulations setting 2020 targets and modalities almost finalised
- Proposed Regulations include review clauses
- Desirability of long term certainty for industry
- Request for Commission to propose 2025 targets
- Commission stated in Impact Assessment that it would publish a consultative Communication
- Aims to consider post-2020 regulatory regime and review *"targets, modalities and other aspects"*

LDV CO_2 after 2020: Some issues

- How much does LDV CO_2 need to reduce?
- How rapidly do those reductions need to occur?
- What technologies will be required?
- How fast are new technologies needed in the market?
- What roles for different technologies?
- How does the regulatory framework impact on choices?
- How to avoid perverse effects?

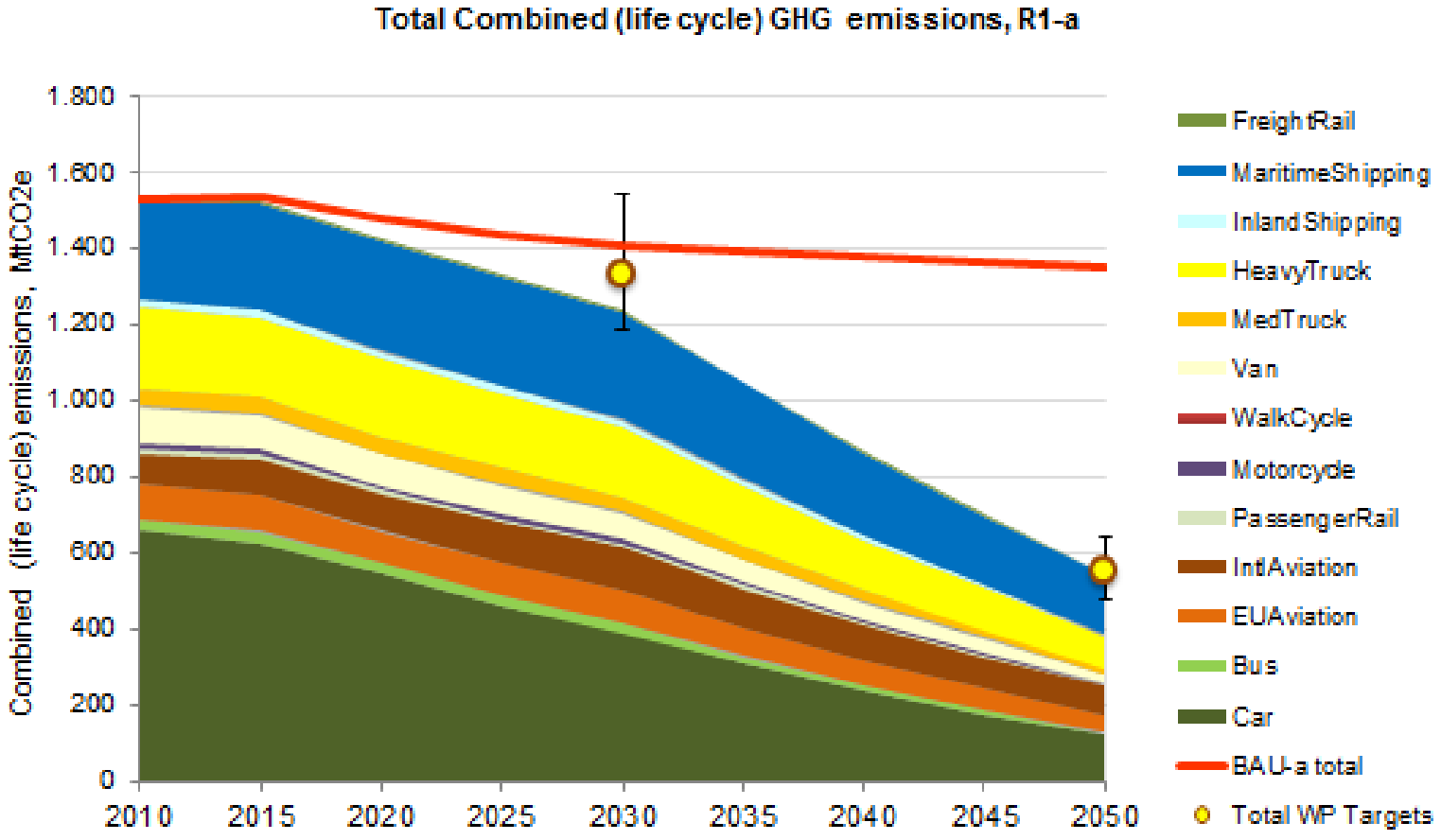
Low Carbon Economy Roadmap

European Commission



PRIMES-TREMOVE modelling to achieve 80% GHG reduction by 2050 compared to 1990: http://ec.europa.eu/clima/policies/roadmap/index_en.htm

EU Transport GHG: Routes to 2050?



Illustrative scenario to achieve 60% GHG reduction in transport by 2050: www.eutransportghg2050.eu - assumes continuation of current mobility patterns.

EU Transport GHG: Routes to 2050?

European Commission

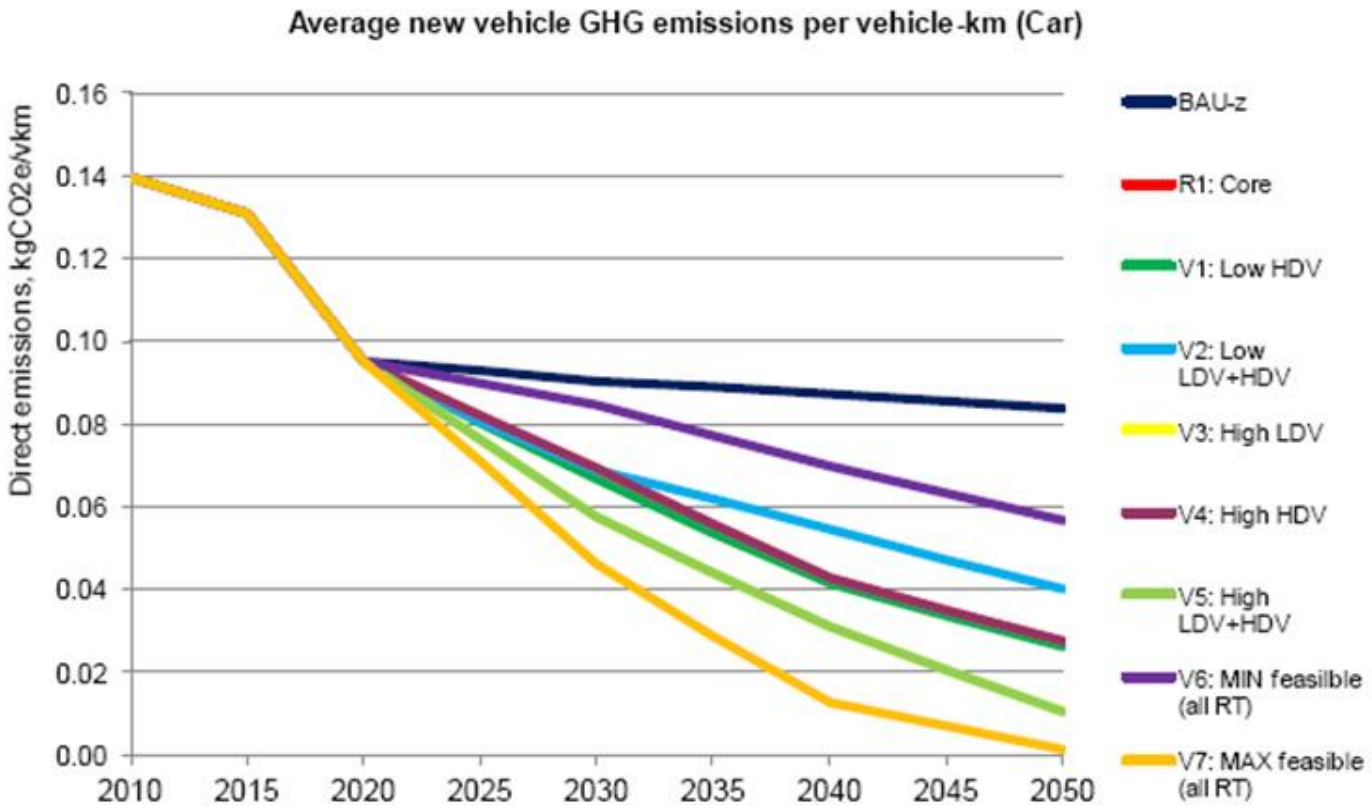


Illustration of new car TTW CO_2 trajectories compatible with 60% reduction in transport GHG by 2050. Scenarios achieve goal through adjustment of other policy assumptions.

What technology is needed?

European Commission

TRANSITIONS TO
ALTERNATIVE VEHICLES AND FUELS

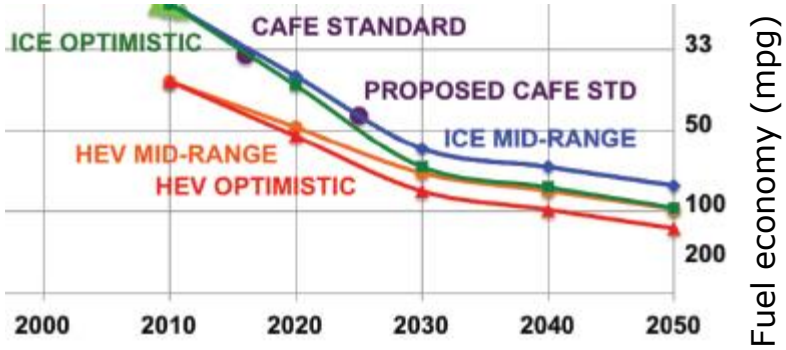
Committee on Transitions to Alternative Vehicles and Fuels

Board on Energy and Environmental Systems

Division on Engineering and Physical Sciences

NATIONAL RESEARCH COUNCIL
OF THE NATIONAL ACADEMIES

"Large increases in fuel economy are possible with incremental technology that is known now for both load reduction and drivetrain improvements."



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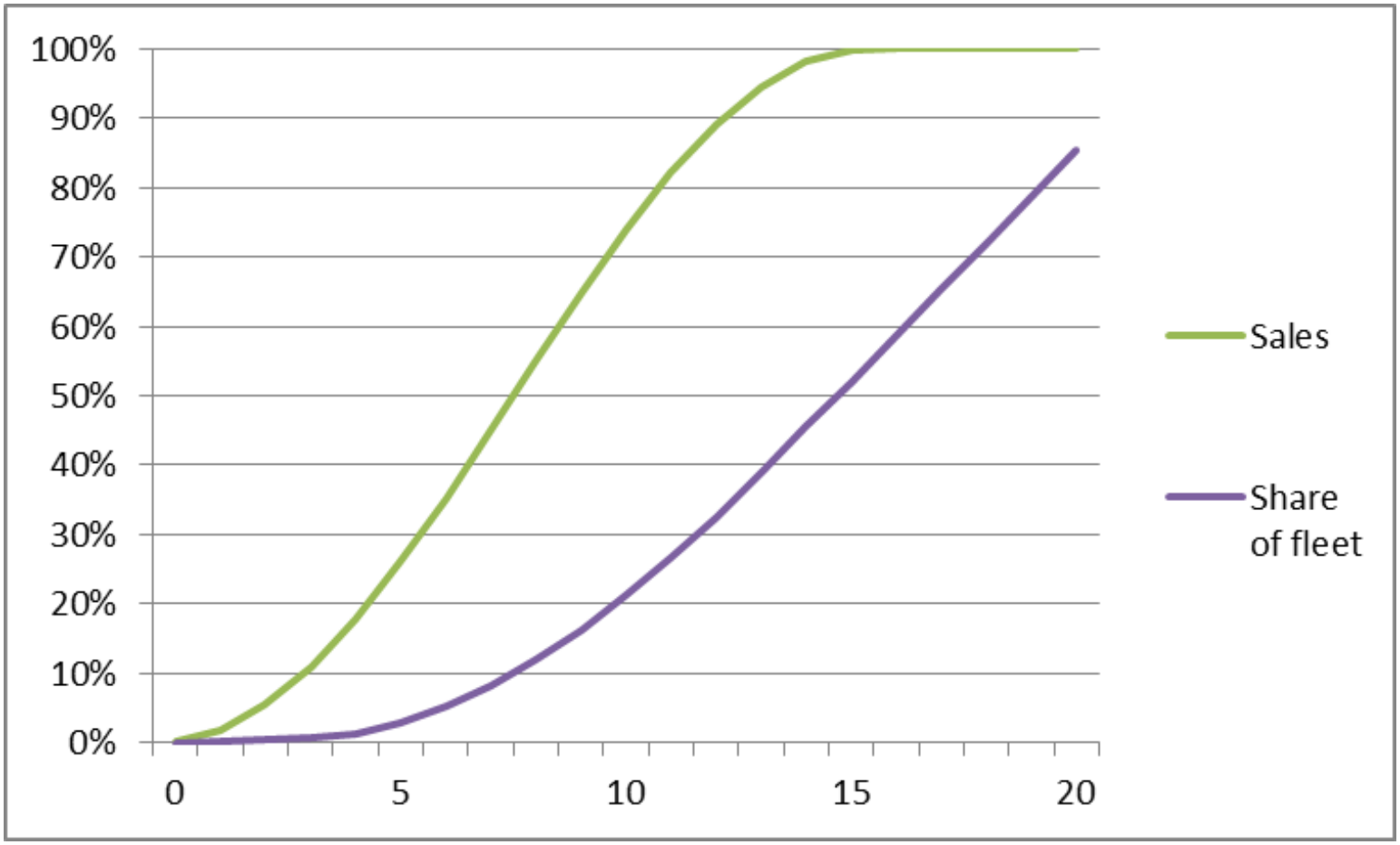
How fast is it needed?



Fleet turnover times mean a significant lag before lower emission powertrains dominate

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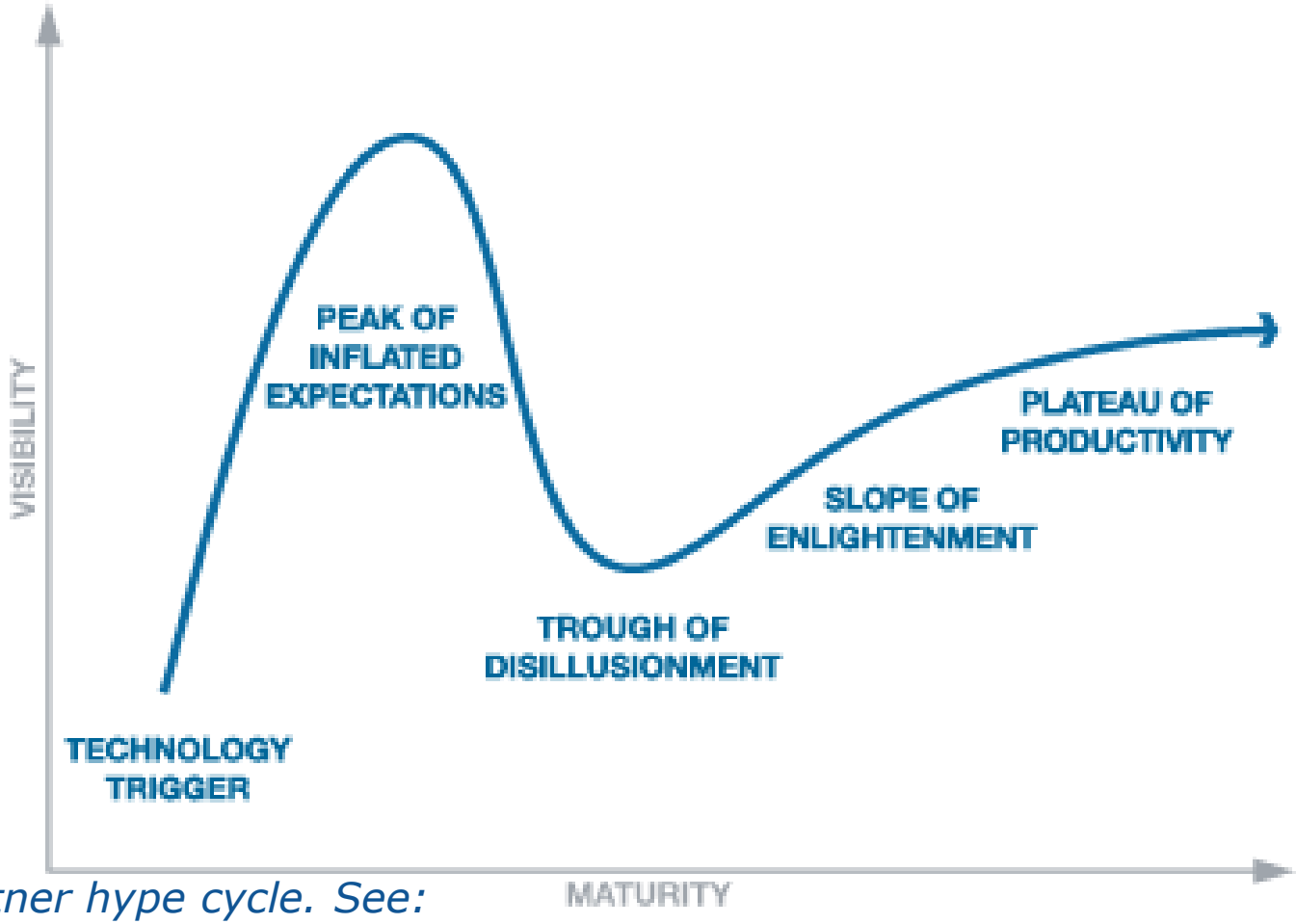
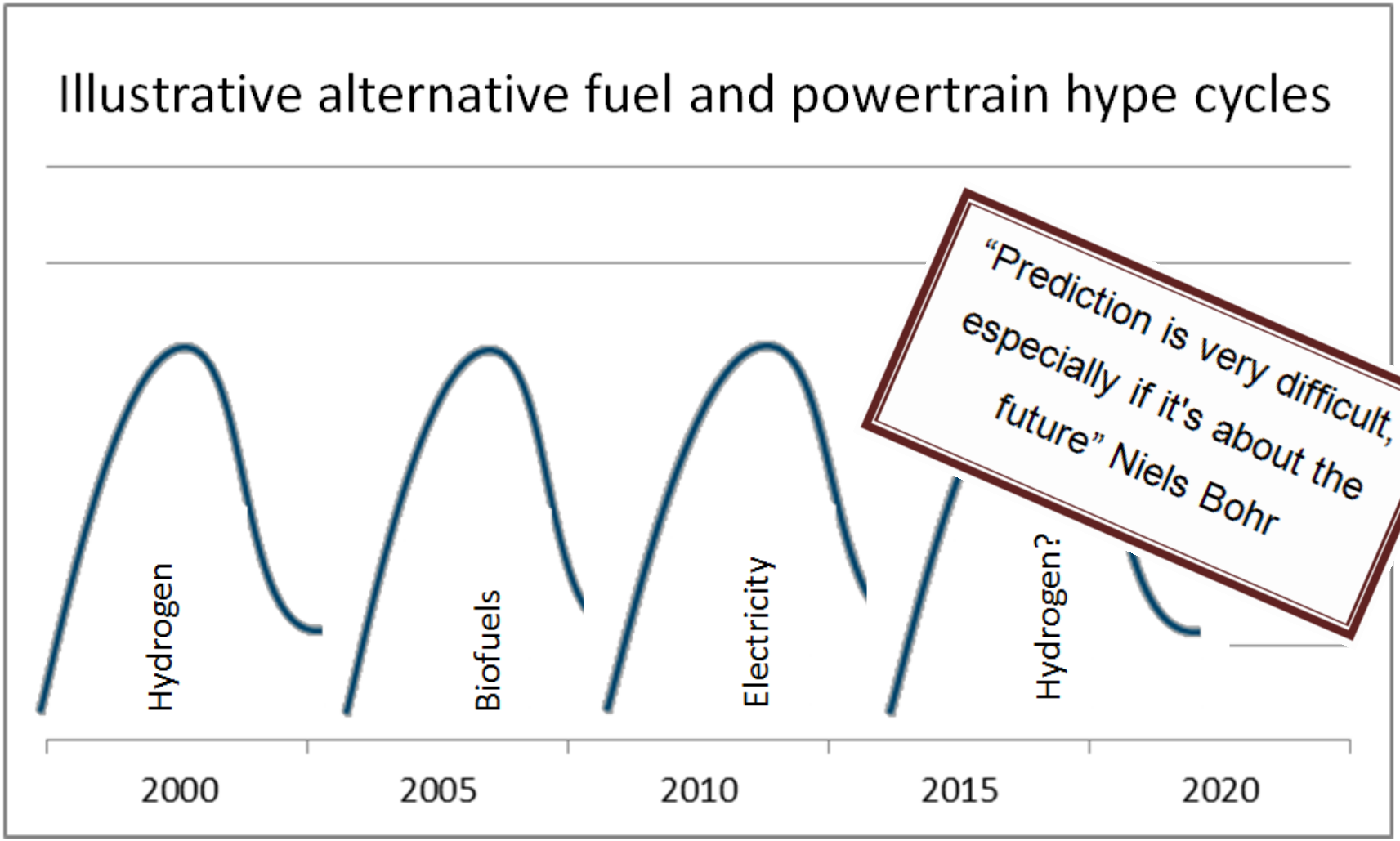
Risk of hypes



Gartner hype cycle. See:

http://www.gartner.com/technology/research/methodologies/hype-cycle.jsp

What powertrain for the future?



CO_2 from different options

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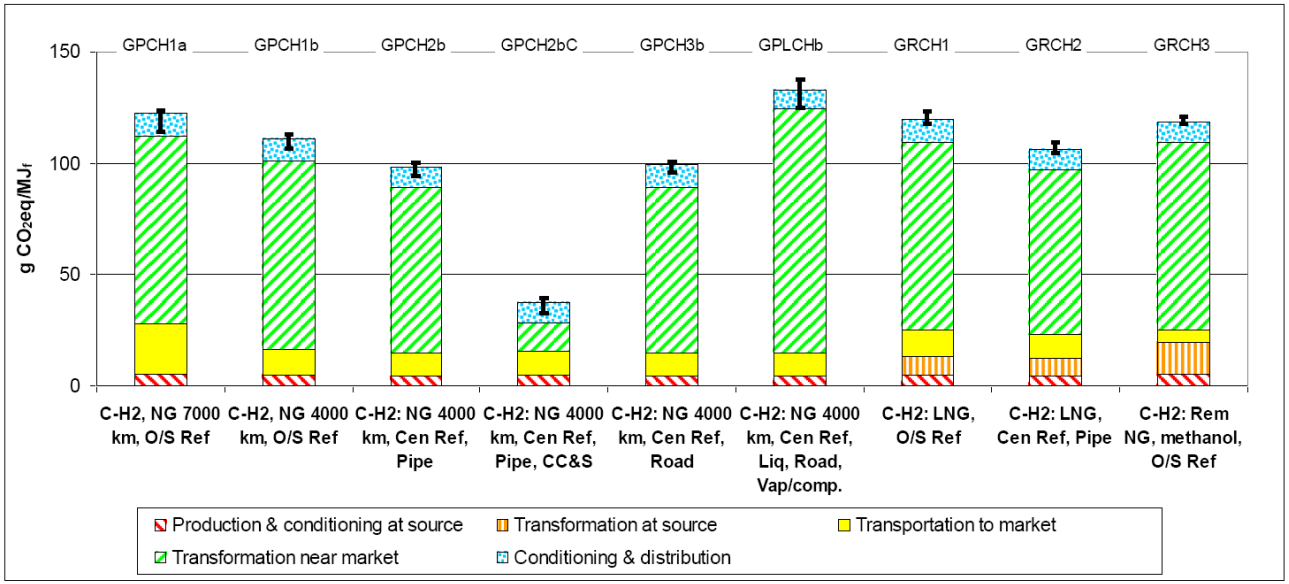
Figure 4.9.2-2 ***WTT GHG balance of selected NG to compressed hydrogen pathways***



2020 TTW ICE 95gCO_2/km ⇒ 2020 ICE ≈ **109gCO_2/km** WTW

H2 produced from Natural Gas approx. 120gCO_2eq/MJ ⇒ H2 FC hybrid @ 0,85MJ/km ≈ **102gCO_2/km** WTW

EU mix electricity 119gCO_2eq/MJe ⇒ BEV @ 0,75MJ/km ≈ **89gCO_2/km** WTW

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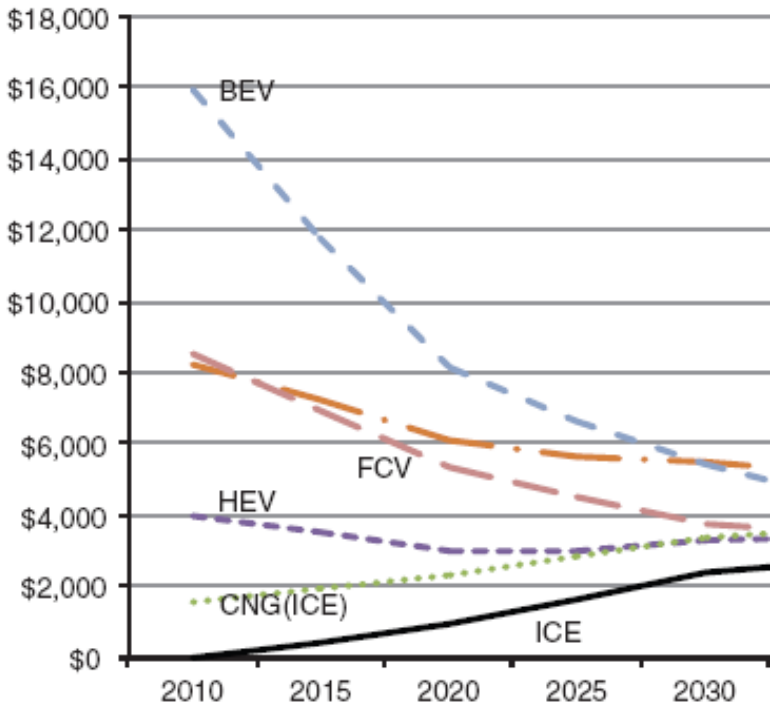
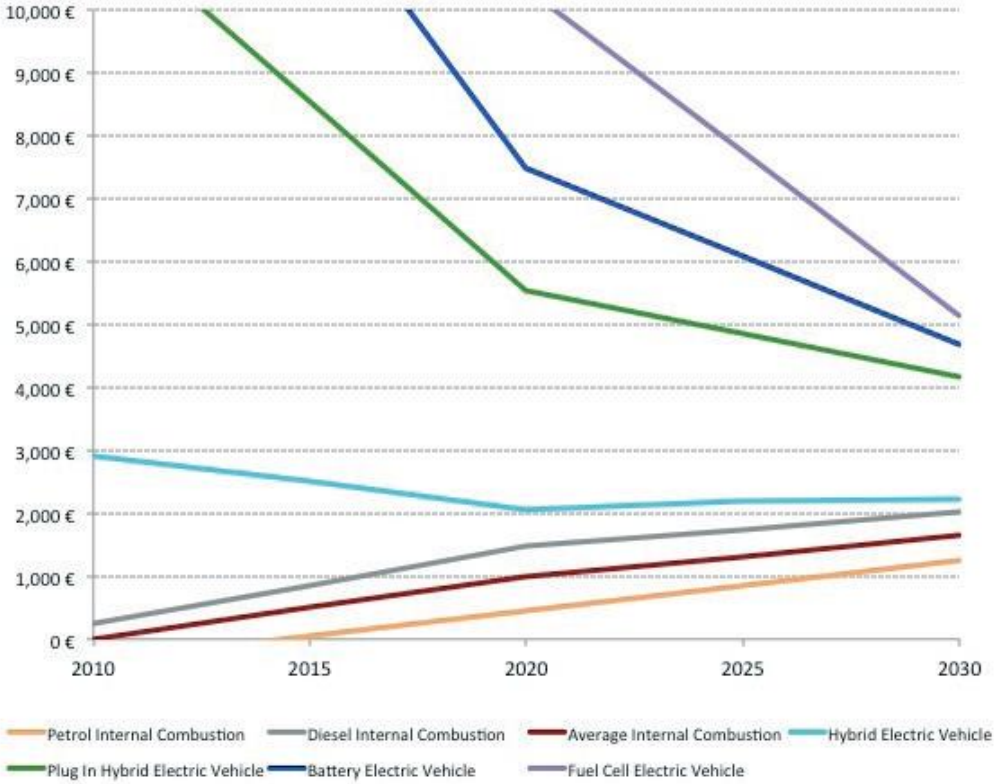
Technology costs?

European Commission

Additional capital cost compared to 2010 average ICE





Source: "*Transitions to alternative fuels and vehicles*"; National academies of science; 2013

Source: "*An economic assessment of low carbon vehicles*"; Cambridge econometrics / AEA-Ricardo; 2013

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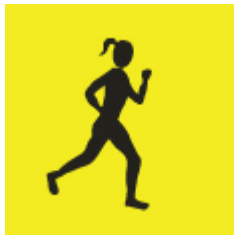
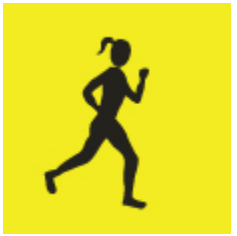
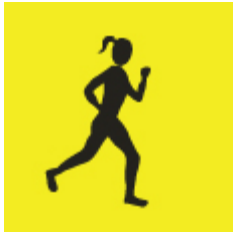
Continuous competition

All technology options are continually developing. They face different hurdles. The Regulatory framework is one factor affecting their relative attractiveness. Others include cost, driving range, consumer preferences, restrictions, fuel availability…







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Thinking beyond 2020?

- Current regulatory regime designed around ICE. Does it need adaptation?
- At some point LDV GHG targets may be cheaper to meet with non-ICE powertrains.
- Further reducing GHG targets may reach limits of ICE improvement.
- Uncertainty over costs and evolution of competing technologies.
- Unclear whether there will be a "winning" technology and if so which.
- Technologically neutral approach always favoured – reiterated in CARS21 – but unclear what this means.
- Would GHG emissions outcome differ depending on alternative approaches?

Regulatory metrics

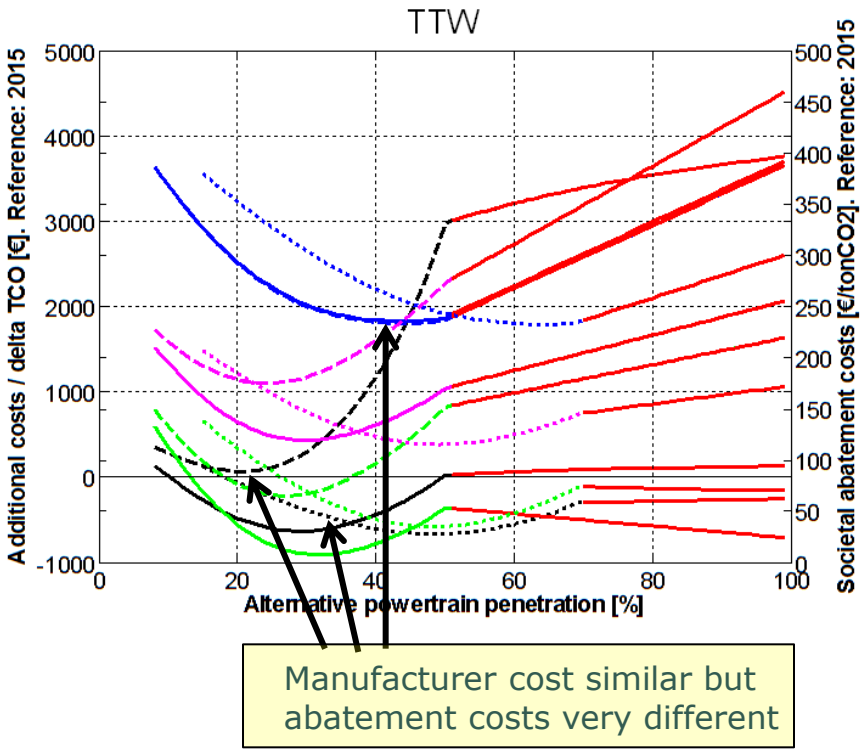
European Commission

TTW/WTW – CO_2/energy?

Is the regulatory approach likely to:

- *deliver the expected level of LDV GHG emissions?*
- *reduce compliance risk for manufacturers?*
- *align manufacturer, end user and societal interests?*
- *be resilient if outcomes are different from those assumed?*
- *deliver GHG goals at least costs?*
- *be technologically neutral?*
- *Other issues?*

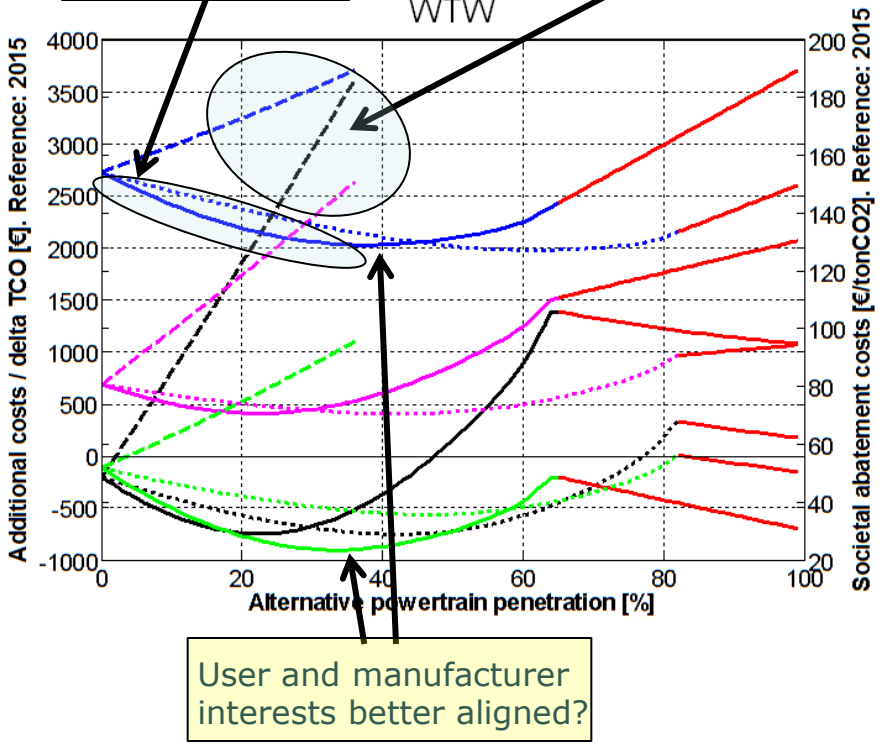
TTW or WTW CO_2?



Manufacturer cost similar but abatement costs very different

Share of BEV / PHEV less risky

FCEV unattractive



User and manufacturer interests better aligned?

BEV - Manufacturer
FCEV - Manufacturer
PHEV - Manufacturer
BEV - End User
FCEV - End User
PHEV - End User
BEV - Societv
FCEV - Society
PHEV - Society
BEV - Abatement
FCEV - Abatement
PHEV - Abatement
No ICEV improvements

Source: unpublished study by TNO

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Utility parameter

- Mass retained for 2020 - certainty for manufacturers
- Mass and footprint assessed in detail in impact assessment.
  - Footprint slightly more cost-effective.
  - Footprint slightly more socially equitable.
  - Mass not fully technologically neutral.
- Is there a case to change beyond 2020?
- Need to better understand costs and impacts of down-weighting to inform future decision.
- Study underway – AEA-Ricardo.

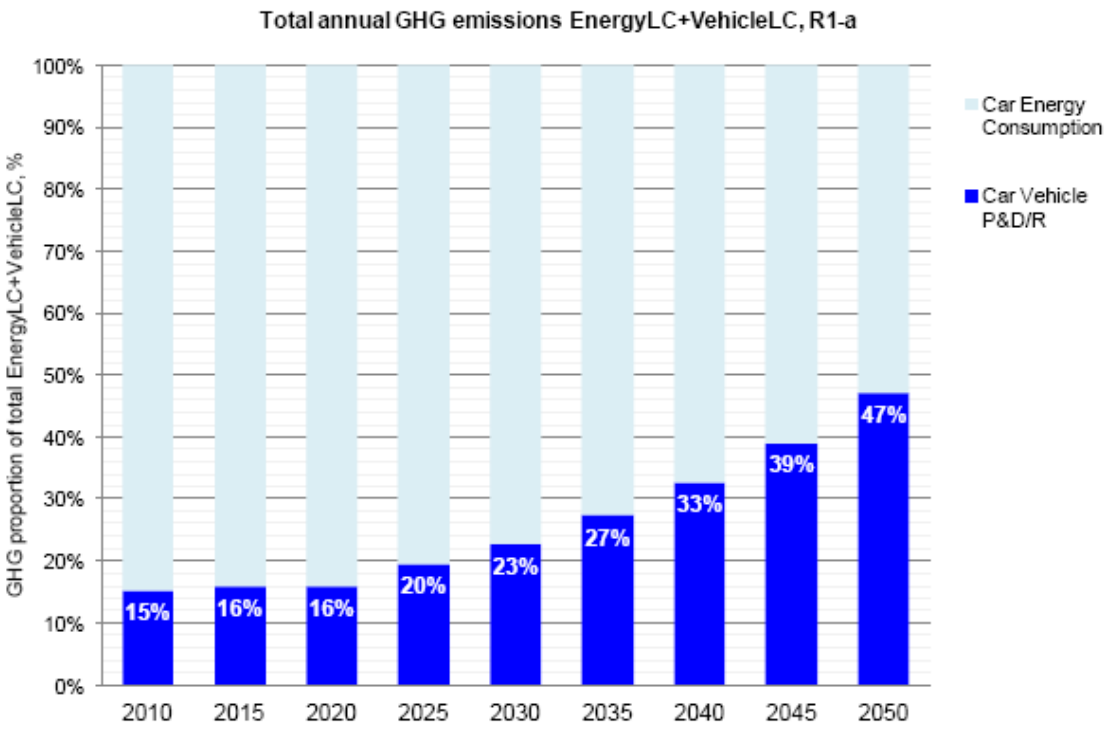
Embedded emissions

- CO_2 Regulations result in lower in-use emissions.
  - ❑ Manufacturing emissions become relatively more significant
  - ❑ Manufacturing emissions may increase due to more sophisticated technology or materials
  - ❑ Vehicle mass may increase
- Is this a problem?
- Currently production accounts for ≈ 9-13% lifecycle CO_2.
- Production share likely to increase in future.
- Explored in more detail:

  The role of GHG emissions from infrastructure construction, vehicle manufacturing, and ELVs in overall transport sector emissions; Task 2; EU Transport GHG Routes to 2050 II.

  http://www.eutransportghg2050.eu/cms/reports/

Embedded emissions



Production and disposal emissions are likely to become increasingly significant in coming decades. Does this matter? How to ensure this is adequately taken into account? Is it desirable to start already now? If so what/how?

Some issues: ▶ Complexity of LCA assessment. ▶ Agreeing methodology. ▶ Mandatory or voluntary approach? ▶ Separate from propulsion CO_2?

http://www.eutransportghg2050.eu/cms/assets/Uploads/Reports/EU-Transport-GHG-2050-II-Task-2-FINAL-30Apr12.pdf

European Commission

Divergence between real world and test emissions

- Energy using devices not activated during test procedure (a/c, lights, comfort features, electrical accessories, power steering)
- Exploitation of flexibilities in test procedures
- Test only approximates real conditions
- Length of test compared to battery range

As CO_2 emissions continue to reduce, discrepancies likely to increase. What is appropriate response in the long run?

- Include power using devices?
- Reduce available flexibilities?
- Adjustment for "real" conditions?
- Need for alternative approach?

Introduction of WLTP is first step. Aim to reduce flexibilities and improve representativeness.

Summary

- Car and LCV CO_2 emissions need to continue reducing to achieve long term climate goals.
- Commission consultative Communication due 2013 on regulating LDV CO_2 beyond 2020.
- Some important issues that have been raised:
  - Utility parameter
  - Regulatory approach
  - Regulatory metric
  - Rate of emissions reduction
  - Embedded emissions
  - Monitoring
- Are there other important aspects to consider?

Thank you

Questions?

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http://ec.europa.eu/clima/policies/transport/vehicles/index_en.htm

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