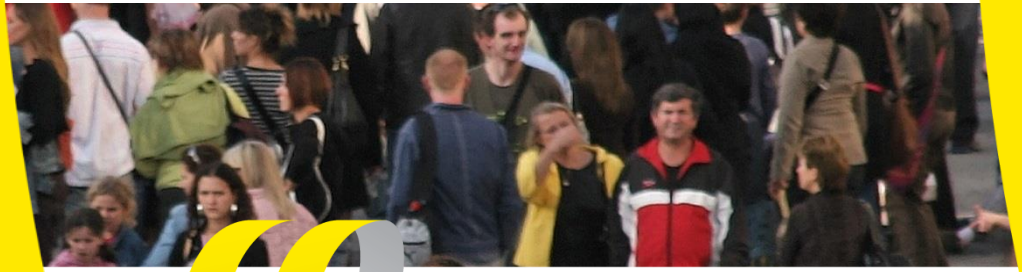
Assessment of the Modalities for LDV CO_2 Regulations beyond 2020



CE Delft

Outline

- Background, objective and scope of the study
- Objective of the regulation
- Findings on the level of ambition
- Main choices for the design (modalities)
- Scenarios assessed
- Impacts on emissions, costs and other
- Conclusions on impacts of modalities
- Main recommendations

Background of the study

- CO_2 regulations for cars and vans
- Have been set until 2020 (vans) and 2021 (cars)
- Effectiveness reduced by growing gap Real World / Type Approval (RW/TA)

- Key policy for achieving climate goals transport:
  - 60% reduction for transport in 2050 relative to 1990
  - 30% reduction for non-ETS in 2030 relative to 2005
  - Paris agreement

Objective and scope of the study

To evaluate the possible design options for the regulation of cars and light commercial vehicles (LCV) CO_2 beyond 2020 and their impacts and pros/cons of different design options (modalities and levels of ambition)

- Focus on 2025 and 2030
- Greenfield approach: starting from objectives
- Building on previous studies and new modelling

- Consortium: CE Delft (lead), TNO, Cambridge Econometrics & TML
- Building on extensive literature review and updated GHG reduction cost curves from other EC studies

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Committed to the Environment

Objective of the Regulation

Overall policy objectives:

- Reduce WTW GHG emissions, global perspective
- Contribute to meeting EU target of 80% reduction of direct GHG emissions in EU by 2050

Objective of regulation:

- Reduce the GHG emissions and fossil fuel consumption of new passenger cars and vans on the roads in the EU

Sub-objectives:

- Reducing the dependence on oil imported from unstable regions (security of energy supply)
- Improving the resource efficiency and competitiveness of the European economy

Findings on the level of ambition

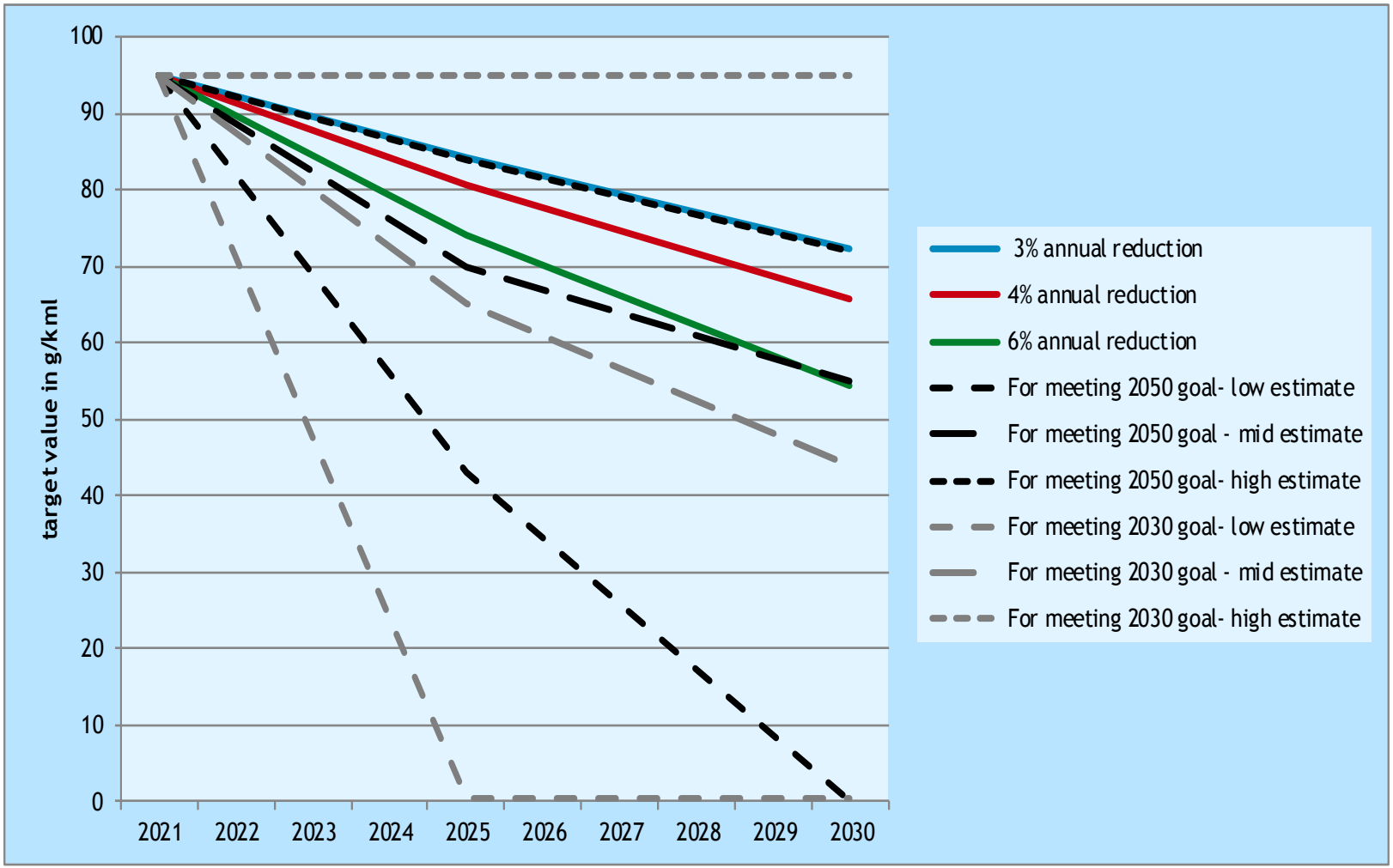
Reductions needed for cars and vans depend on:

- Transport volume growth
- Shares of low carbon fuels (e.g. biofuels)
- CO_2 development other modes and sectors
- Share of ZEVs (0 g/km) as they have no gap between RW/TA

When assuming medium volume growth, 25% biofuel, medium reduction path in others modes, required annual reduction rates until 2030 are:

- 6% for meeting 2050 target
- 8% for meeting 2030 target
- Even stricter for robust path to Paris goals: close to 0 g/km in 2030

Level of ambition: required NEDC target levels



Main choices for the design (modalities) (1)

Scope of the Regulation

Entities: brands or manufacturer groups

Metric: include well-to-tank emissions?

Embedded emissions: include emissions from manufacturing/end-of-life?

How to measure emissions?

WLTP test cycle

Other measurements (on road tests or data from engine control units)

How to determine the overall performance?

Super-credits / ZEV mandates

Include mileage weighting?

Main choices for the design (modalities) (2)

How to fairly distribute the burden across regulated entities?

Utility parameter and shape and slope of target function

How to provide flexibility and to correct for undesired side-effects?

Pooling or trading CO_2 credits

Banking/borrowing (across years)

Excess emission premiums

Derogations

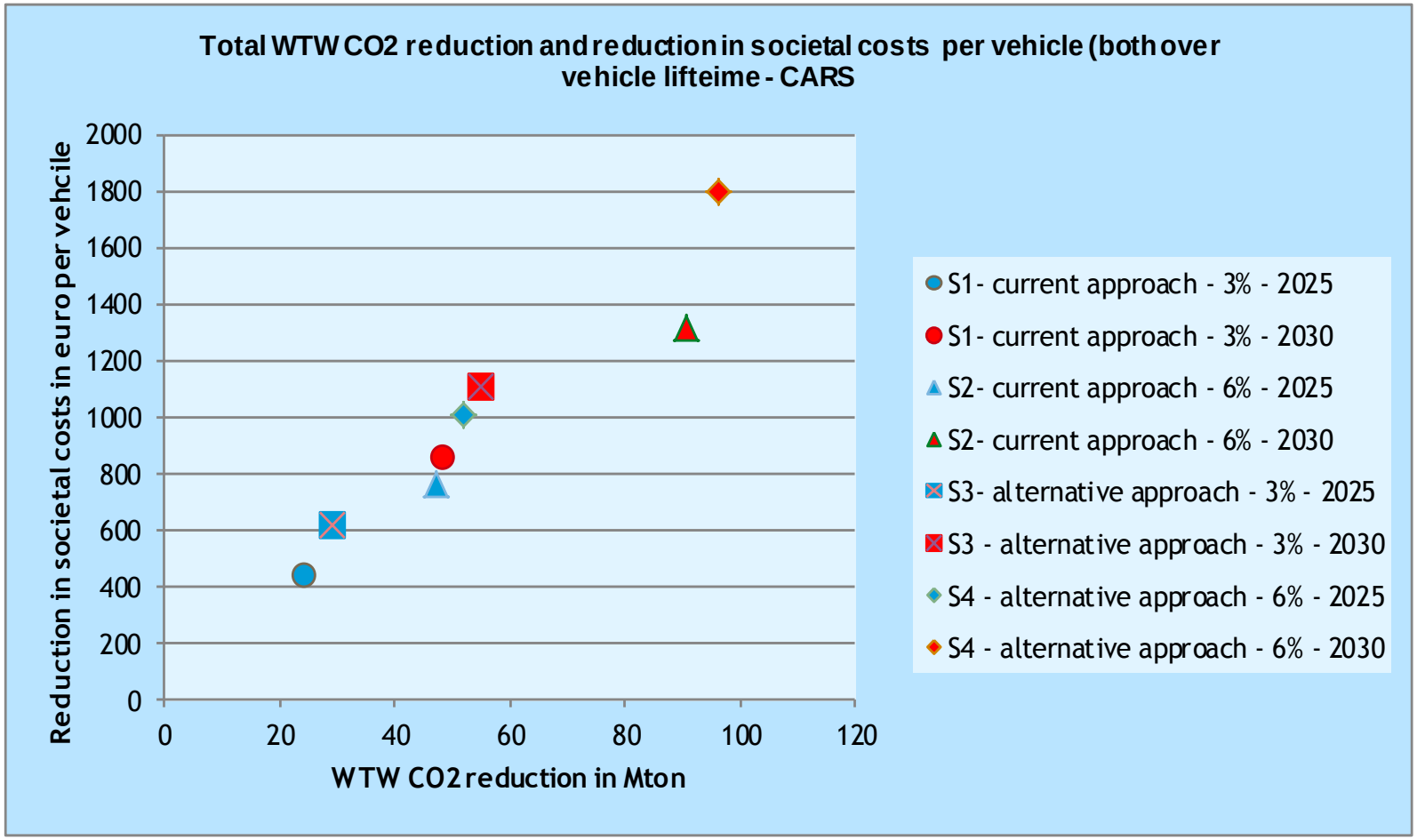
Scenarios assessed quantitatively

- cars and vans
- 2025 and 2030
- 3 sets of target levels, based on 3%, 4% and 6% annual reduction
- all combinations of selected modalities (including TTW or WTW metric, rewarding off-cycle technologies, mileage weighting, utility parameter and slope of target function)
- 5 different technology scenarios with shares of the various alternative powertrain technologies (BEV, PHEV, REEV and FCEV))

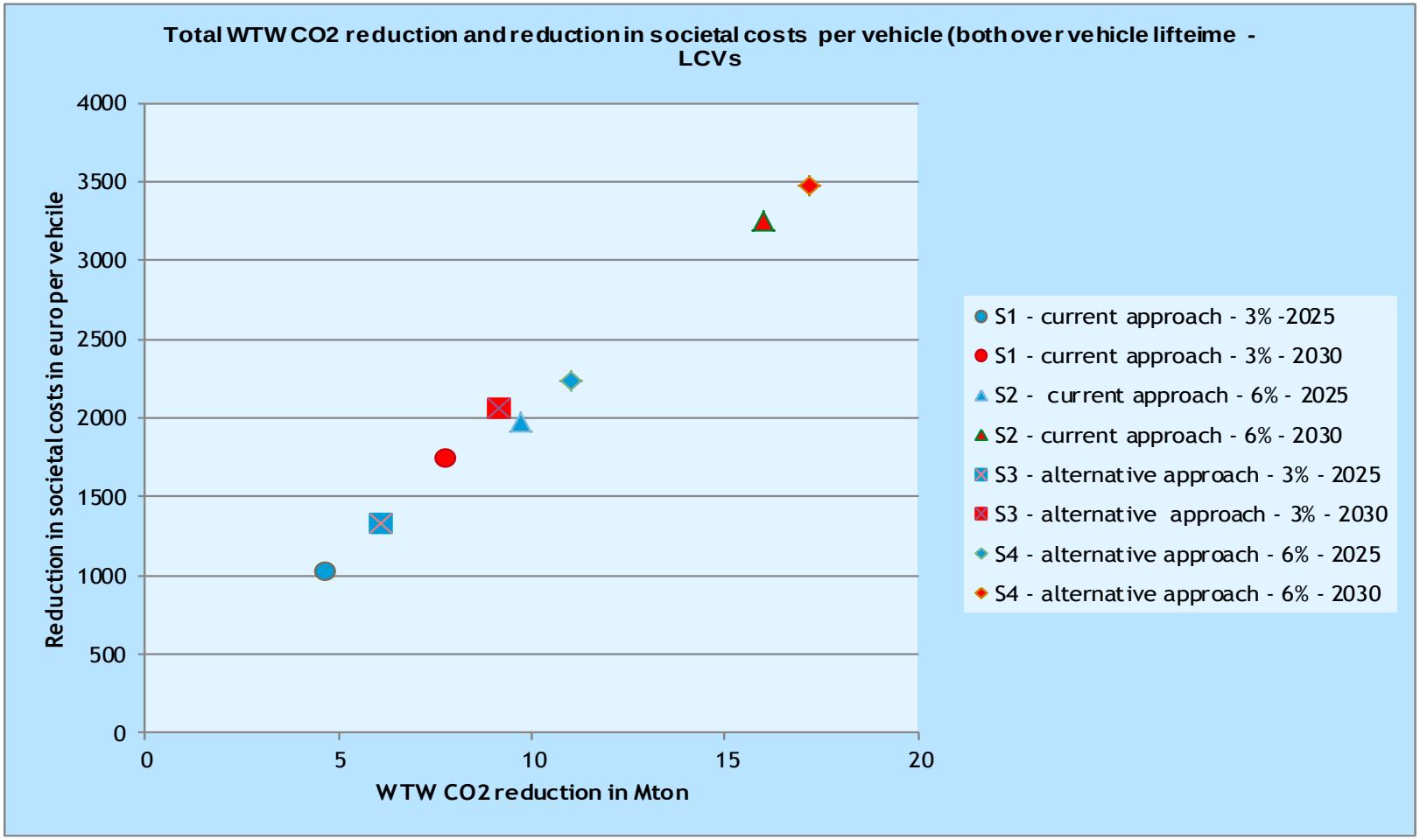
⇒ **All together 9,600 policy variants by TNO's cost assessment model**

⇒ **4 scenarios have been assessed in more detail and on other impacts**

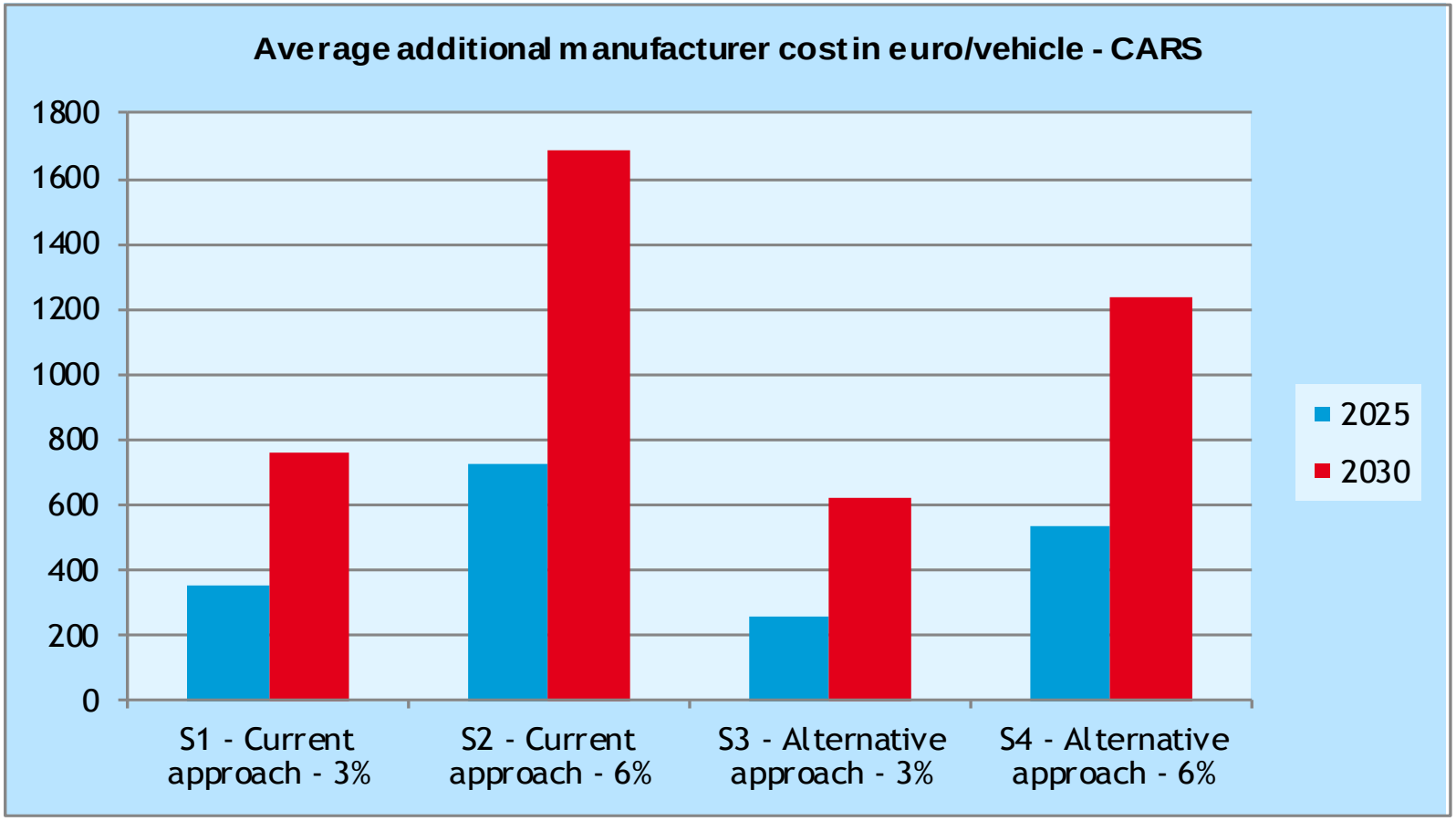
GHG reduction and societal cost savings - CARS



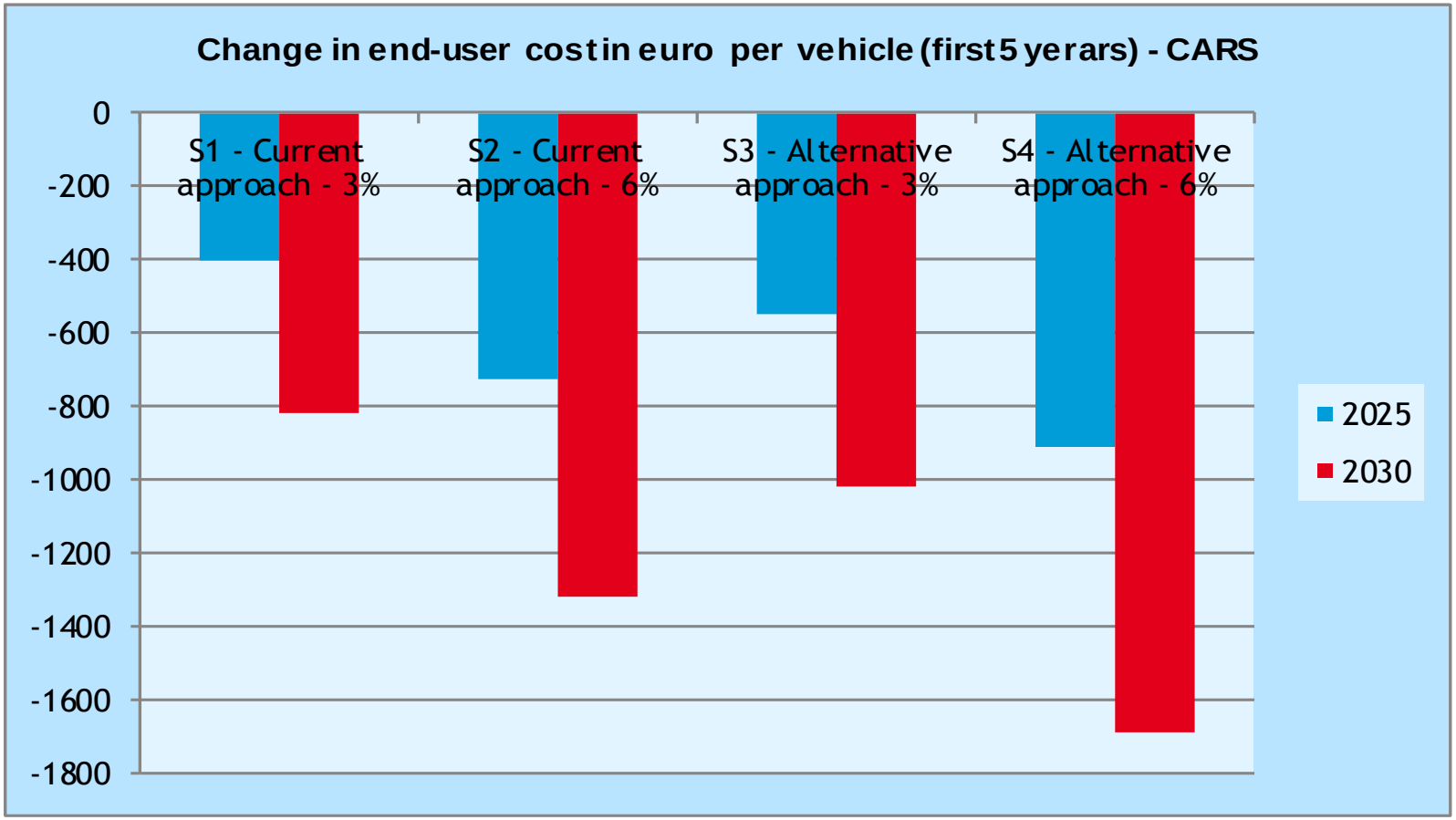
GHG reduction and societal cost savings - VANS



Increase in manufacturer costs - CARS



End-user cost savings first 5 years - CARS



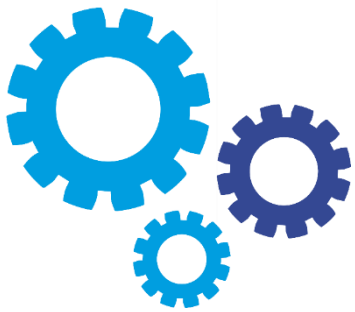
Economic impacts

Impacts on employment, consumption, investements and trade (modelled with E3ME)

- small positive impacts to be expected
- mostly in range 0.1 to 0.25% increase

Impacts on income levels (modelled by EDIP):

- increase for all income groups by 0.4 to 1.4% in 2030
- in most scenarios, highest increase in the highest income groups
- slight increase of the Gini coefficient: less than 0.2%



Competitive position of ACEA members

Choice of some modalities have only very small impacts

Very small negative impact in most policy variants for:

- introducing mileage weighting

Very small positive impact in most policy variants for:

- including off-cycle technologies
- keeping mass as utility parameter
- regulating manufacturer groups instead of brands
- a steep target function
- a less stringent target

Conclusions on impacts of modalities

Most important for costs and effectiveness:

- Target level
- Approach for determining emissions (not quantified)
- ZEV mandates: not quanitified, but scenarios with highest shares of ZEVs have lowest societal costs (very sensitive for cost assumptions)

Other modalities with significant impacts (resulting in lower costs and higher effectiveness):

- Changing utility parameter from vehicle mass to vehicle footprint
- Rewarding off-cycle emissions (like credits for eco innovations)

Varying the other modalities has relatively small impacts

Measuring emissions: how to close the RW/TA gap

- Switch from NEDC to WLTP is not expected to completely close the gap
- Conversion factors to WLTP will change over time, as vehicles will be optimized to WLTP
- Gap between WLTP TA and RW emission therefore likely to increase

Options for dealing with this:

- additional approaches for determining CO_2 emissions (like in USA)
- could be based either on road tests (e.g. using PEMS) or ECU data of on road vehicles
- procedures an arrangements to be set and agreed upon: complex process

Recommendations for rewarding off-cycle technologies

- Establish a pre-defined list of eligible technologies and the 'default' credits
- Keep option to apply for credits for new technologies not listed
- Enlarge scope of eligible technologies, if robust measurement or assessment procedures exist
- Option of granting credits for off-cycle technologies should be taken into account in target levels to avoid the risk of reducing effectiveness

Main conclusions

- Targets of 6-8% annual reduction or even much stricter (close to 0 g/km) likely to be necessary for meeting climate goals
- All targets assessed (up to 6%) result in significant net cost savings for both society as a whole and end-users
- Largest cost savings with most strict targets
- Changes design in the regulations result in lower costs and higher effectiveness: utility parameter and rewarding off-cycle emissions
- Gap with real world emissions jeopardizes the effectiveness and could be reduced by on road measurements or data from on road vehicles
- ZEV mandates not assessed in detail in this study, but promising option for accelerating shift to ZE-vehicles

Questions?