

# Assessment of competitiveness impacts of post-2020 LDV CO<sub>2</sub> regulation

Stakeholder meeting on CO<sub>2</sub> emissions from light-duty vehicles beyond 2020

Brussels, December 9, 2014



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# Introduction

## Scope and objective

### Objective:

- › Assess possible impacts of post 2020 EU LDV CO<sub>2</sub> legislation on the competitiveness of affected sectors in Europe

### Three elements of competitiveness:

- › Cost competitiveness
  - micro-economic perspective based on costs of compliance
- › Innovation
  - impact of available R&D resources on ability to meet targets
  - impact of legislation on R&D resources
- › International competitiveness
  - macro-economic perspective, looking e.g. at resulting impacts on trade flows and cross-border investments

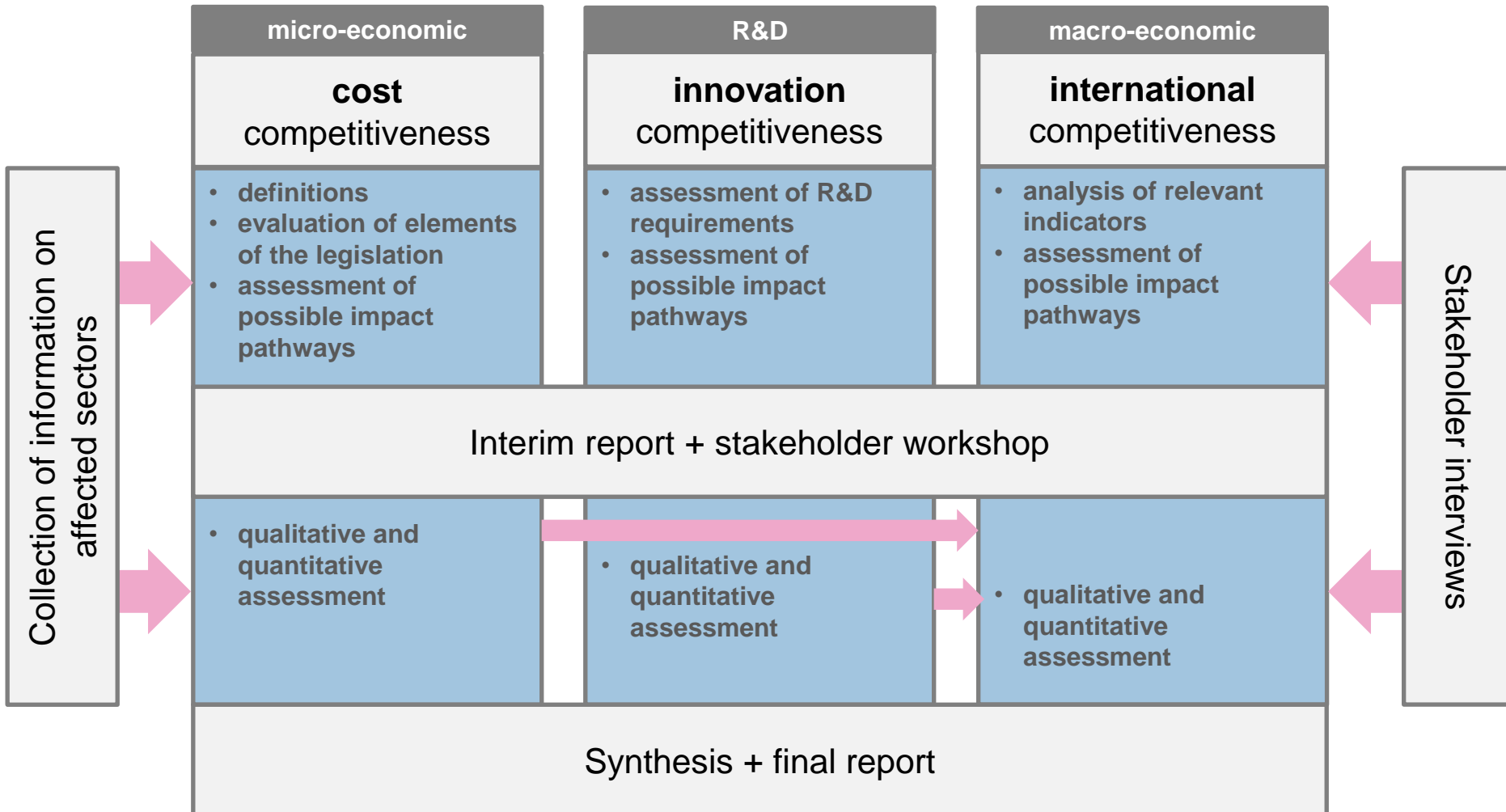
# Introduction

## Post-2020 LDV CO<sub>2</sub> legislation

- › No Commission proposal available yet
  - Focus on identifying possible competitiveness impact pathways and dependence on choices with respect to target and modalities
- › Elements of the legislation that are relevant for competitiveness impacts
  - **Metric: TTW CO<sub>2</sub> vs. WTW CO<sub>2</sub> / TTW energy / WTW energy**
  - **Target level**
    - › relative stringency compared to legislation in other regions
  - **Target function**
    - › utility parameter: mass vs. footprint
    - › shape and slope of target function
  - **Modalities**
    - › phase-in, pooling, super credits, eco-innovations, trading / banking and borrowing, combining passenger cars and (part of) LCVs in a single target, including mileage weighting and/or embedded emissions (vehicle life cycle), excess emission premiums

# Introduction

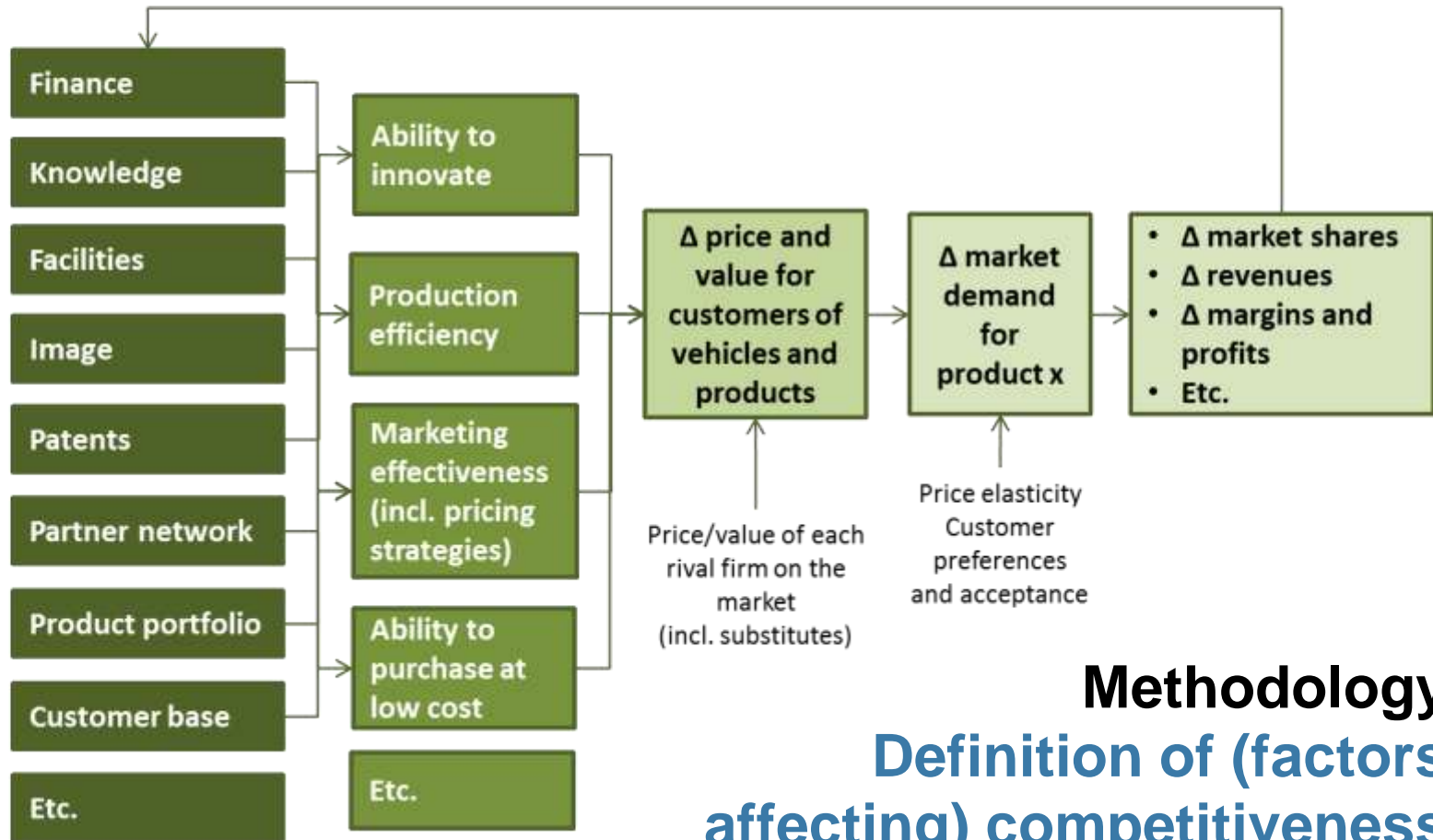
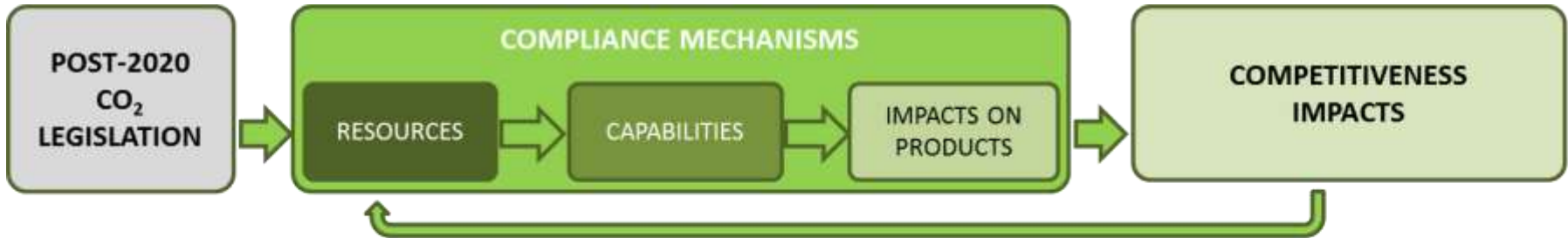
## Project structure / approach



# Methodology

## Focus

- › Focus on 4 selected main affected sectors:
  - automotive manufacturers
  - automotive suppliers
  - energy industry
  - (professional) end users
  
- › Focus on EU vs. other regions
  - NOT on competition between manufacturers from different EU member states
  
- › Focus on  $\Delta$ 
  - current market shares are results of existing competitiveness situation
    - › based on costs and attractiveness of existing products
  - how could market shares be affected as a result of EU LDV CO<sub>2</sub> legislation?
    - › defined by changes in the relative costs and attractiveness of the products of different companies (e.g. manufacturers / manufacturer groups)



**Methodology**  
**Definition of (factors affecting) competitiveness**

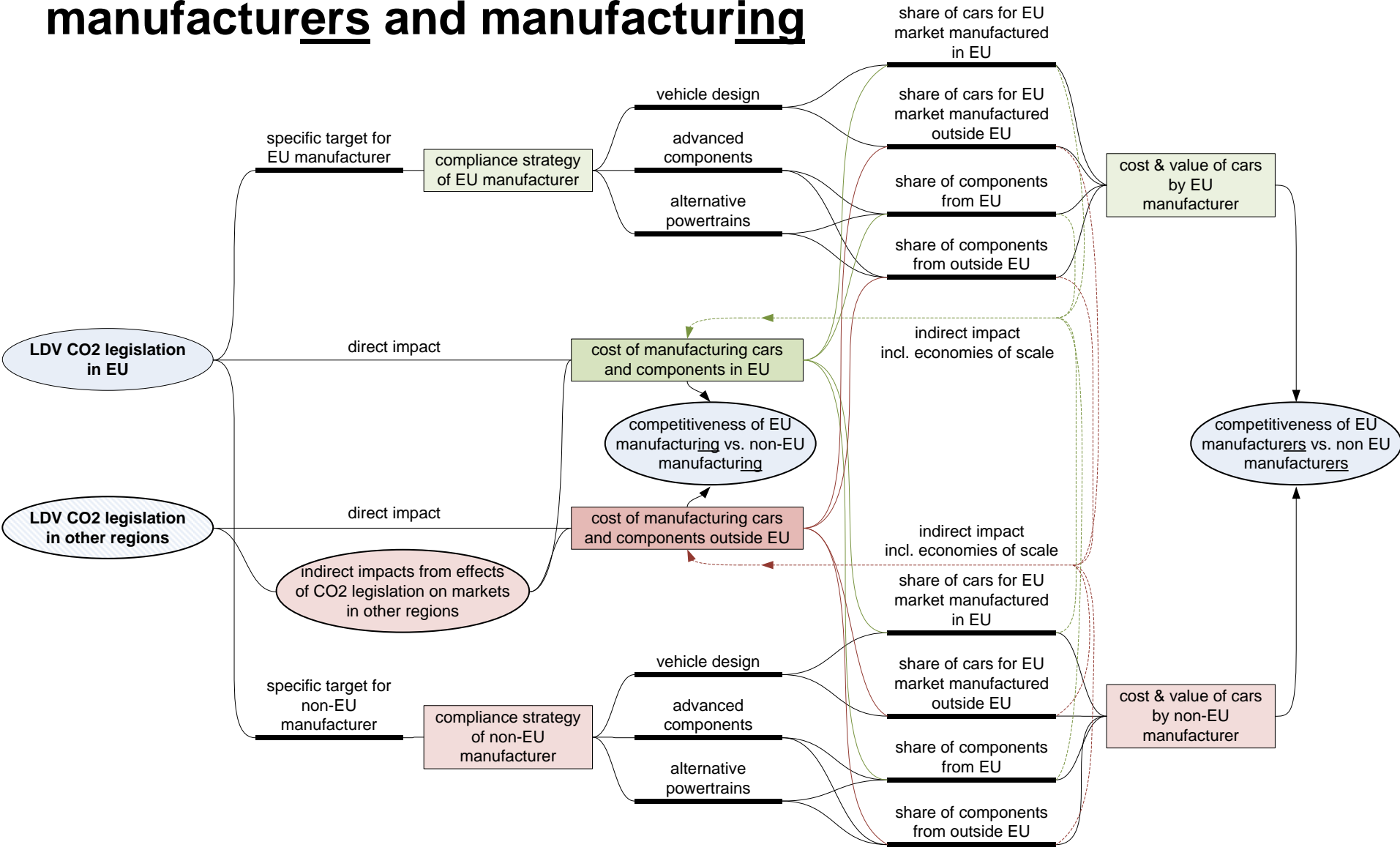
# Methodology

## Perspective

- › Assessment approached through two cases:
  - EU manufacturers vs. competing manufacturers from other regions
  - EU manufacturing vs. manufacturing in other regions
  
- › EU manufacturing
  - EU = production locations for vehicles, components and materials in the EU
  
- › How to define EU manufacturers?
  - Options:
    - › Current main association membership for the EU market
    - › Original association membership
    - › Location of headquarters / owner
    - › Share of the vehicles sold in the EU that are manufactured in the EU
  - No single definition used:
    - › Attempt made to draw conclusions that are robust under different definitions



# Connection between perspectives of competitiveness of manufacturers and manufacturing



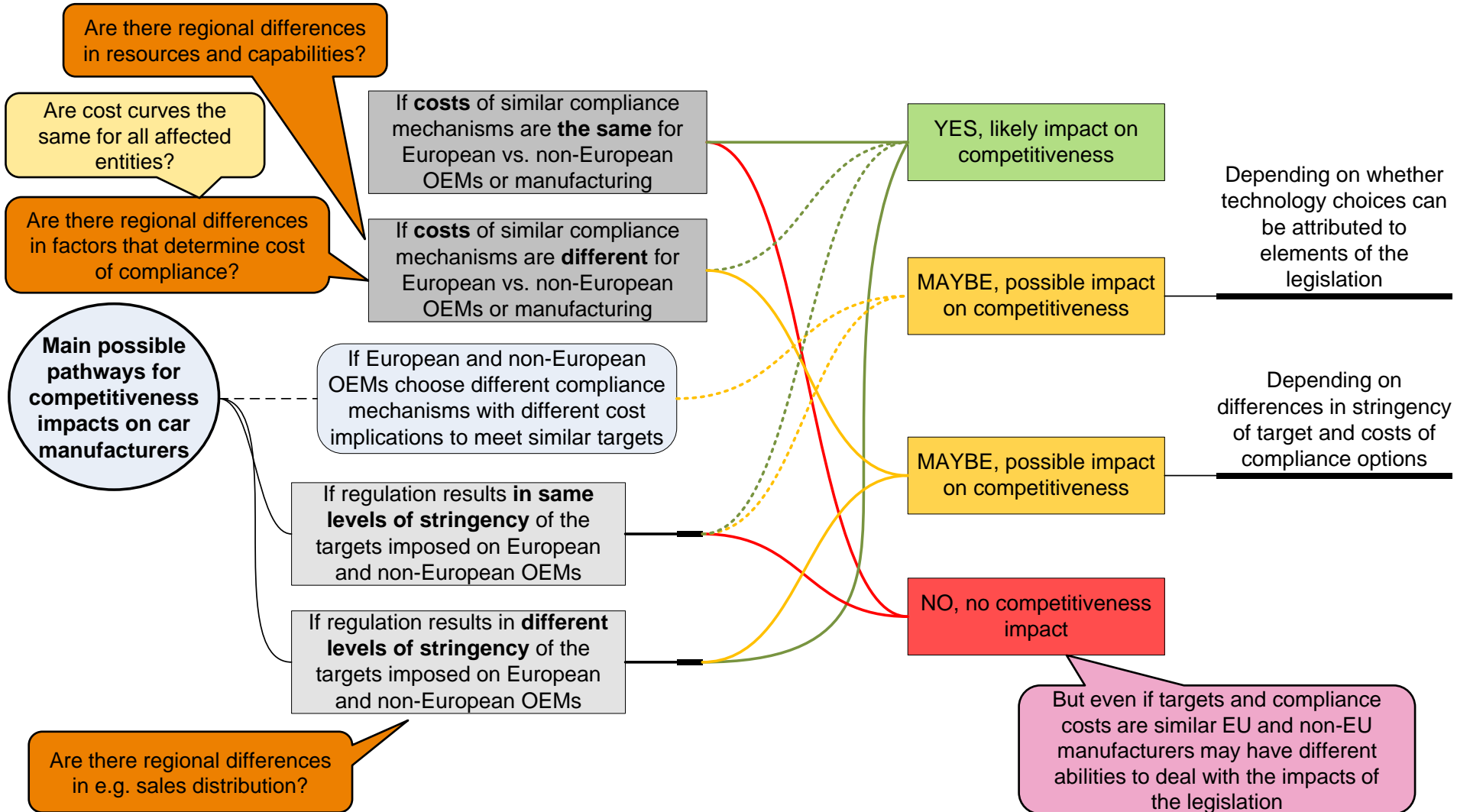
# Cost competitiveness

# Methodology

## Compliance mechanisms

- › Manufacturer specific target and required reduction efforts effectively defined by:
    - **target function**
    - **sales portfolio / average utility of OEM**
    - **additional modalities**
      - › pooling, banking & borrowing, ...
      - › eco-innovations, supercredits
  
  - › Main mechanisms for meeting target
    - **technical options**
      - › improving efficiency of ICEVs
      - › increase share of AFVs (NGVs, BEVs, PHEVs, FCEVs)
      - › apply eco-innovations
    - **non-technical options**
      - › changing vehicle design (affecting utility) or portfolio (affecting average utility)
      - › utilisation of test flexibilities, paying excess premiums, ...
- } + distribution over models / segments

# Overview of main direct pathways for competitiveness impacts on EU vs. non-EU manufacturers

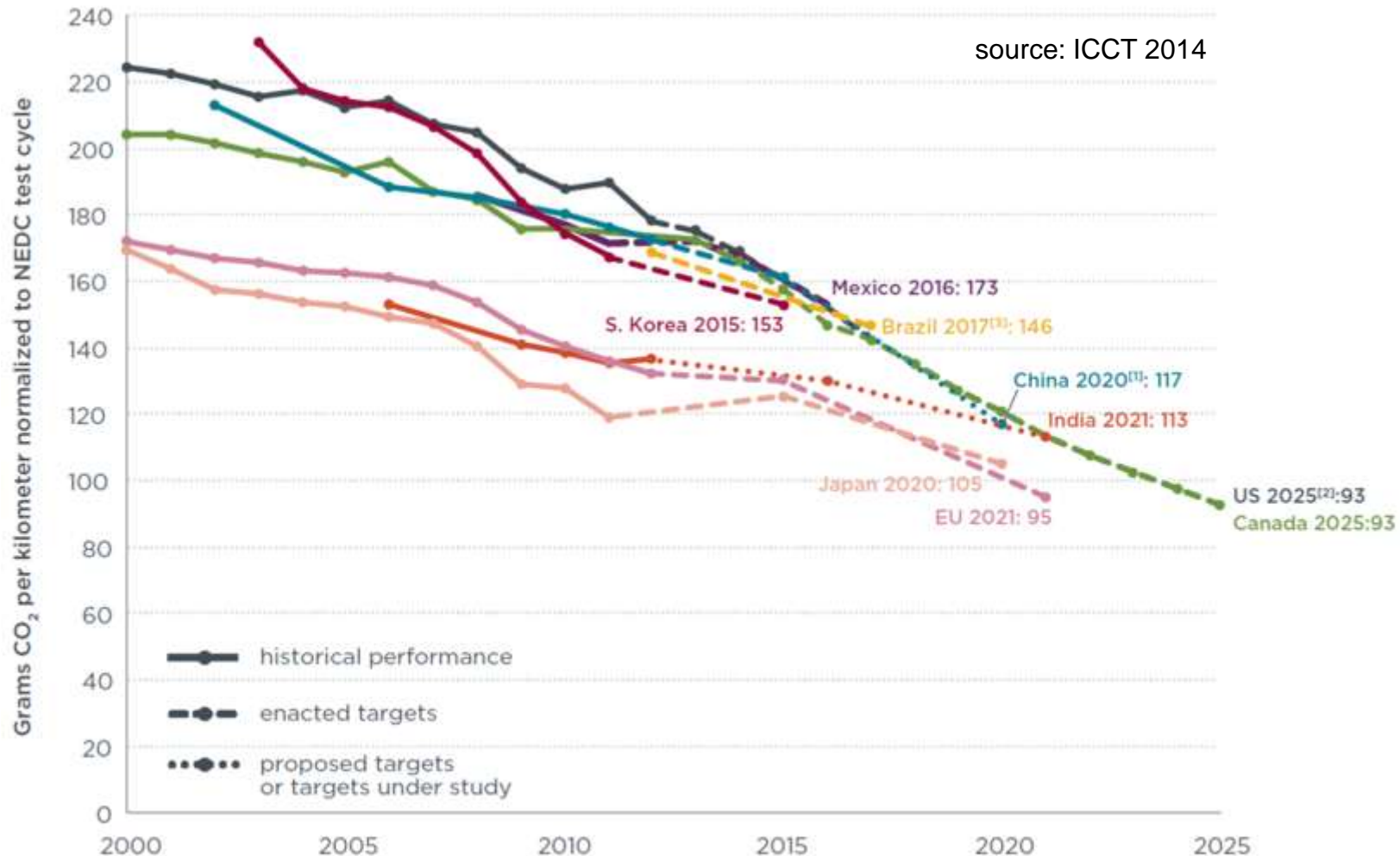


## Important factors

### Target level / CO<sub>2</sub> legislation in other regions

- › Economies of scale are likely to play a significant role in the cost of compliance
  - advantage for OEMs with higher sales on the EU market if EU legislation is more stringent than in other regions
  - impact on competition in other markets depends on extent to which OEMs differentiate their products for different markets
  
- › What is relative stringency? Comparison depends on:
  - definitions
  - differences in regional fleet composition
  - not yet known targets in EU and other regions for 2025 and 2030

# Target level / CO<sub>2</sub> legislation in other regions



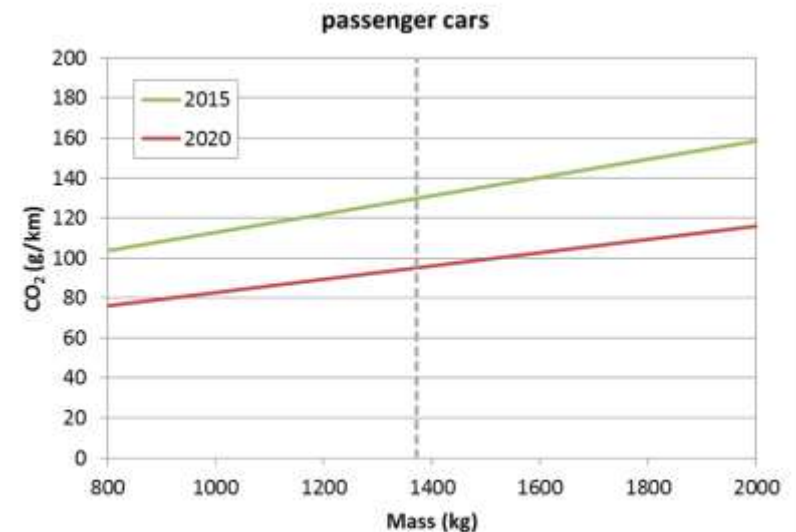
[1] China's target reflects gasoline vehicles only. The target may be higher after new energy vehicles are considered.  
 [2] US standards GHG standards set by EPA, which is slightly different from fuel economy standards due to low-GWP refrigerant credits.  
 [3] Gasoline in Brazil contains 22% of ethanol (E22), all data in the chart have been converted to gasoline (E00) equivalent  
 [4] Supporting data can be found at: <http://www.theicct.org/info-tools/global-passenger-vehicle-standards>

## Important factors

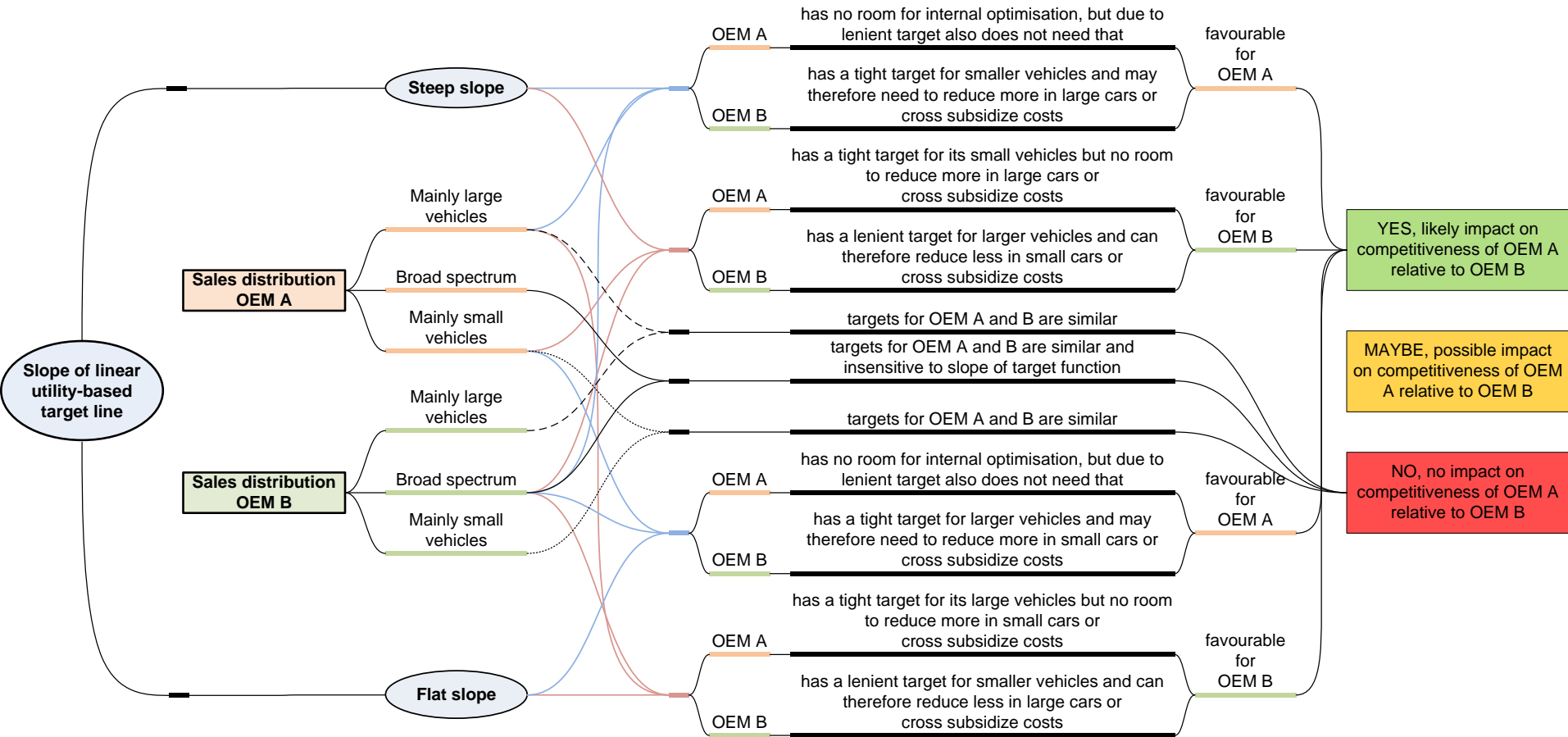
### Slope of target function

- › Affects competition between individual OEMs depending on their sales distributions
- › Net effect on competition between EU and non-EU OEMs only if average sales distributions are markedly different.

Slope of 2020 target function for cars is already quite flat. For post-2020 legislation variation in targets as function of utility is likely to be quite small.



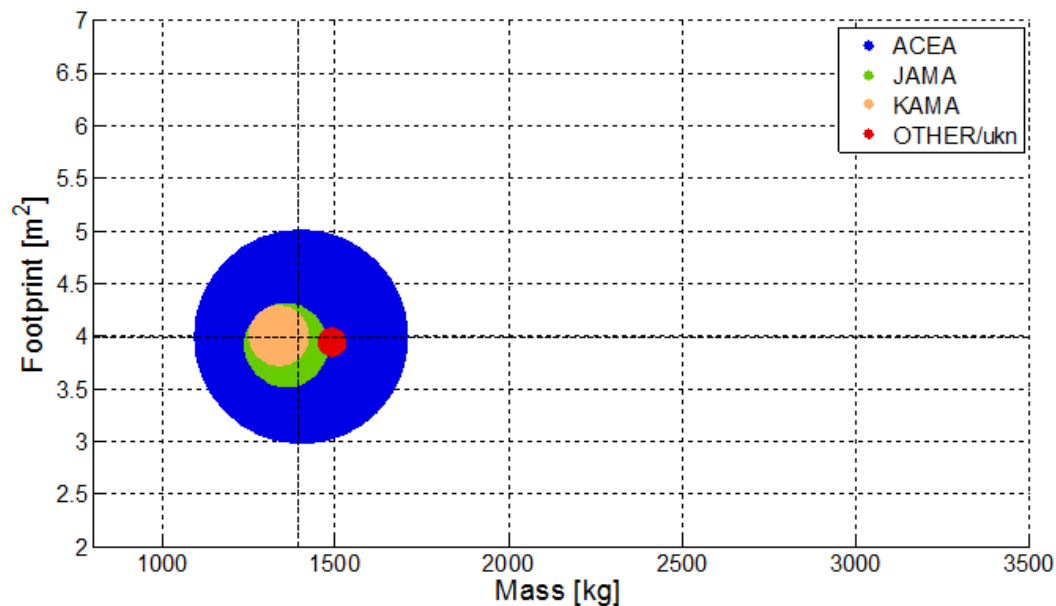
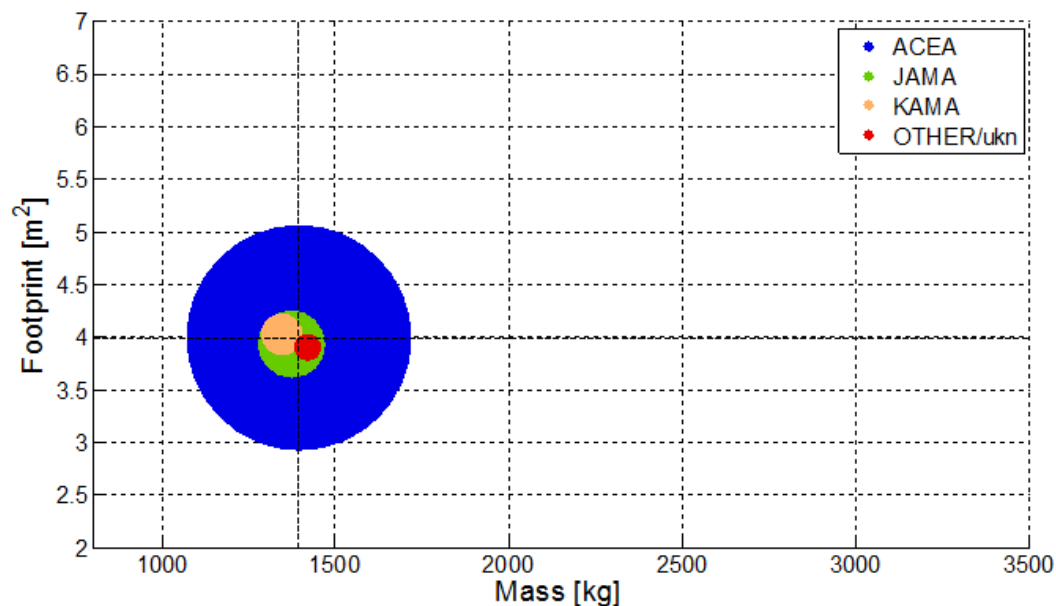
# Ways in which the slope of the limit function may affect competitiveness between OEMs





## Average utility value

- Toyota and Hyundai as ACEA members
- Jeep, Dodge and Chrysler as ACEA (through FIAT)
- Toyota with JAMA and Hyundai with KAMA
- Jeep, Dodge and Chrysler as other/unknown



## Important factors

### Technology costs

- › Competitiveness impacts likely if costs of efficiency improvement in ICEVs and costs of manufacturing AFVs are different for EU and non-EU manufacturers
  - › Differences in labour costs and productivity in different regions
  - › Differences in capital costs and cost of capital
  - › Economies of scale
- › Cost of components from regional suppliers will be different for the same reasons as why cost of manufacturing vehicles in different regions is different (e.g. wages, taxes, etc.).
- › Net impact on relative price of products only if ratio of cost factors (labour, capital, etc.) for additional / new technology are different than for baseline vehicles

## Important factors

### Influence of market presence and crisis

- › Differences in presence of different OEMs in different markets mentioned as driver for competitiveness impacts in combination with effects of economic crisis
  - › EU OEMs have stronger focus on the EU market
  - › EU OEMs have made losses there which some couldn't recover by profits in in other markets, unlike their non-EU competitors
  - › This influences their (financial) capability to comply with post-2020 targets

Is that a structural issue or specifically related to the current situation and strong response of EU market on the crisis?

## Important factors

### Premium vs. volume manufacturers

- › (EU) premium OEMs said to be in a better position than (EU) volume OEMs to deal with post-2020 legislation
  - EU premium manufacturers:
    - › are less affected by economic crisis
    - › can recover losses on EU market through profits in other markets
    - › face limited competition on EU market from non-EU OEMs
    - › have a client-base with high willingness to pay for innovative technologies
- › Possible advantage for premium OEMs despite higher costs due to more stringent target (flat slope) and add. higher costs per vehicle
- › EU volume OEMs more likely to lose market share to non-EU volume OEMs and EU premium OEMs
- › High share of EU companies in premium market would mean that on average EU OEMs could have a competitive advantage over non-EU OEMs

# Cost competitiveness

## Car manufacturerer perspective

- › Many possible impact pathways that might have negative as well as positive impacts on competitiveness of EU OEMs
  - › Due to large number of compliance mechanisms and large number of resources and capabilities that may be different
- › This makes it appear less likely that the regulation as a whole would lead to large net impacts on competitiveness of EU OEMs
- › Nevertheless choices with respect to specific elements of the legislation could enhance possibility of specific competitiveness impacts to occur

# Cost competitiveness

## Car manufacturerer perspective

- › Capability of EU OEMs to develop advanced ICEVs and AFVs may be less than that of non-EU OEMs, especially if powertrain electrification becomes an important compliance mechanism
  - › worse financial position of EU OEMs
  - › technological focus of EU OEMs (and their suppliers) on diesel technology rather than hybrid/electric propulsion
  - › a possible shortage of skilled R&D personnel
- › Various impact pathways related to ability to manufacture vehicles with CO<sub>2</sub>-reducing technologies at competitive cost
  - › for most pathways likelihood, sign and size of impacts difficult to judge
  - › Japanese OEMs appear in a better position to scale up production of electric and hybrid vehicles
  - › EU OEMs may have a possible advantage to achieve cost reductions for integration of different powertrains due their advanced platform approach

# Cost competitiveness

## Car manufacturer perspective

- › Ability to sell at competitive prices not only determined by additional costs of manufacturing vehicles with CO<sub>2</sub>-reducing technologies
  - › also by e.g.: amount of R&D costs to be earned back per vehicle, ability to cross-subsidize within the product portfolio, and ability to absorb losses
- › Ability to sell vehicles with new technologies on EU market better for (some) EU OEMs due to stronger position in premium segments
  - › whether OEMs is a premium or volume manufacturer may be a stronger determinant for its ability to deal with impacts of CO<sub>2</sub> legislation than whether it is European or not
- › Timing of legislation, specifically lead time between announcement of target and target year, is expected to affect the above impacts
  - › short lead time leads to higher costs for developing and marketing new technologies, which are more difficult to bear for OEMs with a less strong financial position

# Cost competitiveness

## Car manufacturing perspective

- › **No direct impact on the cost competitiveness of EU car manufacturing**
- › Limited number of possible **indirect impacts**
- › Impact pathways seem to be quite generic and the same for the car and van regulation.



# Cost competitiveness

## Car manufacturing perspective

### Possible indirect impacts:

- › Access to materials and costs of materials could be different for EU and non-EU OEMs
  - › e.g. electric powertrains and vehicle light-weighting
- › Possible positive or negative impacts in relation to regional differences in the cost of components for advanced ICEVs and AFVs
  - › depending e.g. on relative stringency of EU legislation compared to that in other regions or whether components are required for which suppliers are mainly located outside Europe
- › Regional differences in labour costs have impact of unknown sign
- › Some potential pathways relating to differences in costs of capital goods, transport costs and tariffs, and sales volume over which R&D costs can be divided
  - › size and sign of impacts depend on the relative stringency of EU legislation

# Cost competitiveness

## Component manufacturer perspective

- › Ability of EU suppliers to develop and manufacture components for CO<sub>2</sub> reduction in passenger cars and vans appears likely to be less than that of non-EU competitors
  - › specifically if regulation increases demand for vehicles with electric powertrains
  - › due to technology position, financial position, shortages in skilled R&D personnel
- › Ability of EU suppliers to sell at competitive prices may be affected by their limited ability to absorb (temporary) losses
- › Other possible pathways identified
  - › manufacturing costs depending on costs of labour and equipment + economies of scale
  - › costs of materials, R&D costs per unit of product
  - › ability to cross-subsidize over the product portfolio
  - › sign and size of these impacts is difficult to estimate
- › Likelihood of negative competitiveness impacts for EU suppliers seems somewhat higher than for vehicle manufacturers

# Cost competitiveness

## Component manufacturing perspective

- › **No direct impact on the cost competitiveness of EU components manufacturing**
- › **Limited number of possible indirect impacts:**
  - › access to and costs of materials could be different for EU and non-EU suppliers
  - › e.g. materials for electric powertrains and vehicle light-weighting
  - › sign and size of effects cannot be determined at this stage, but effects likely to be more pronounced for component manufacturing than for car manufacturing
- › With respect to the costs of purchased components small positive impacts could occur
  - › if EU has more stringent regulation than other regions
  - › if large share of new (sub)components for advanced ICEVs and AFVs produced in EU
- › Small negative impacts may occur if (sub)components for advanced ICEVs and AFVs are mainly produced outside the EU

# Cost competitiveness

## Component manufacturing perspective

- › Regional differences in labour costs may have impact of unknown sign and size
  - › new technologies may require more/less labour or have a higher/lower share of (manual) labour in assembly/production
- › Some indirect impact pathways identified:
  - › related to differences in costs of capital goods and volume of sales over which R&D costs can be divided
  - › size and sign of impacts depend on the relative stringency of EU legislation
- › Impact pathways seem to be quite generic and the same for the car and van regulation

# Cost competitiveness

## Fuel supply sector

- › The energy supply sector can be divided into:
  - **producers of fuels and other energy carriers**
    - › the oil refining industry for petroleum based fuels
    - › electricity generation
    - › production of alternative (bio)fuels and energy carriers (e.g. hydrogen)
  - **distributors of fuels and other energy carriers**
    - › fuel distributors and operators of filling stations
    - › operators of electricity distribution networks and operators of charging stations
- › Both sub-sectors contain large, medium-size and small companies
- › The analysis of possible competitiveness impacts has been done separately for the two sub-sectors

# Cost competitiveness

## Fuel supply sector: fuel producers

- › Reduced profitability of EU refineries (if capacity is not adjusted) due to
  - › declining demand for petroleum fuels putting pressure on the prices of fuels
  - › reduced refinery utilisation rates, leading to an increase in costs per unit production
- › Negative effect on ability of EU refineries to compete on EU market with imports from Russia or new state-of-the art refineries being opened in India and the Middle-East
- › Ability of EU companies to deal with changes in the EU market depends on various factors
  - › size of their European activities and the share of these in their global activities
  - › extent to which they produce in the EU for the EU market or also import and export to and from the EU
- › Net effects difficult to predict with available information

# Cost competitiveness

## Fuel supply sector: fuel producers

- › In decisions on (des)investments in refining capacity, also status of facilities may play a role
  - › decommissioning refinery capacity more costly for newer than for older facilities
  - › likely differences between different refineries in Europe, but not assessed
- › Closing of refineries in the EU will lead to a loss of jobs and of value added within the EU
  - › economic impact likely to happen if EU LDV CO<sub>2</sub> legislation is effective
  - › could be amplified by fact that EU fuel producers are affected more severely by CO<sub>2</sub> legislation than producers outside the EU
  - › non-EU fuel producers operate new facilities and have a large share of their sales in growing markets

## Cost competitiveness

### Fuel supply sector: fuel distribution

- › Fuel distribution companies (distribution infrastructure and filling stations) in the EU operate locally or regionally
  - › not directly competing with companies in other regions
- › Reduced demand for petroleum-based fuels could lead to negative economic impacts on this sub-sector of the fuel supply sector, including a significant loss of jobs and value added
  - › these are not to be classified as competitiveness impacts



# Cost competitiveness

## Professional end users

- › Total cost of ownership (TCO) for using vehicles is element in their cost of doing business
  - › if post-2020 EU LDV CO<sub>2</sub> legislation affects TCO of vehicles, it directly affects the costs of doing business for all companies that use LCVs (professional end-users)
  - ›  $\Delta$ TCO depends on stringency of target and compliance mechanisms chosen by OEMs
- › Changes in cost of doing business for a company affect the price of products and/or services
- › This may affect competition in the market leading to change in market shares
  - › competitiveness impacts only if  $\Delta$ TCO works out differently for different companies in same market

# Cost competitiveness

## Professional end users of LDVs

- › Competitiveness impacts only for EU companies that provide products / services competing on EU market or other markets with products / services from non-EU companies
  - › positive impacts expected as legislation is in principle expected to lead to net reduction of end-user costs
- › If different regions have LDV CO<sub>2</sub> regulations with similar stringency, EU companies will benefit more as fuel prices are higher in Europe
  - › size of impact is expected to be small: costs of operating LDVs generally only a small fraction of the cost of doing business
- › No competitiveness impacts for EU-based SMEs, which in their operations make extensive use of LDVs
  - › EU SMEs are not competing with non-EU companies, regardless of whether or not these LDVs are directly used for providing transport services
  - › companies competing on the EU market will be similarly affected

# Innovation competitiveness

# Innovation competitiveness

## Car manufacturers and suppliers

- › The regulation impacts RDI investment choices as regards product innovation and the prioritisation of R&D expenditures
  - › due to limited resources innovation in CO<sub>2</sub> reduction technologies will go at the expense of other innovations
- › The regulation enhances the trend of externalisation of OEM RDI activities
  - › to Tier 1 suppliers as well as through joint R&D with other OEMs
- › Post 2020 legislation is likely to increase demand for AFVs, particularly powertrain electrification, and innovation requirements consequently
  - › creates demand for R&D personnel with specific technological knowledge/skills to be recruited internationally given shortages in the EU
  - › imposes less need for adjustment to 'first movers' namely non-EU OEMs and suppliers (Japan) with stronger technology / patent position in electric propulsion

## Innovation competitiveness

### Energy suppliers

- › No innovation requirements for conventional fuel suppliers
- › Increasing shares of AFVs may require innovation by suppliers of alternative fuels (e.g. electricity and hydrogen)
  - › but as most of these companies are only competing on the EU market this is not expected to affect innovation competitiveness

## Innovation competitiveness

### Professional end users

- › Main impact through  $\Delta$ TCO
- › Increased share of AFVs may require some innovation in fleet operation
  - › but as most EU end-users of LDVs are not in competition with companies from outside EU this is not expected to affect innovation competitiveness

# International competitiveness

# International competitiveness

## Car manufacturers and suppliers

- › International competitiveness impacts depend partly on net cost competitiveness impacts at EU level
  - › as size and sign of these depend on details of legislation, international competitiveness impacts are difficult to assess at this stage
- › EU-based manufacturers hold strong international competitive positions in passenger cars and components but not in LCVs
- › As a result of CO<sub>2</sub> emission legislation, trade competitiveness of the EU manufacturers of vehicles and automotive components is not expected to change to a great extent
  - › overall, regulation is likely to be trade-neutral
  - › with the view that the stringency of CO<sub>2</sub> legislation will be broadly similar in the EU and main competing regions
  - › many second-order effects are possible and of either positive or negative sign

# International competitiveness

## Car manufacturers and suppliers

- › Competitiveness possible in narrower defined markets
- › EU OEMs might to some extent lose in competitiveness in gasoline vehicles while gain in competitiveness in diesel vehicles
- › Asian component manufacturers may get advantage in electric car components while EU manufacturers win market in diesel engine components
- › Some extra inward FDI flows may result but their magnitude is unclear
  - › due to required investments in EU production plants of non-EU OEMs



## General conclusions

## General conclusions

- › Post-2020 EU LDV CO<sub>2</sub> legislation will not directly affect competitiveness of EU car manufacturing, component manufacturing and fuel or energy supply industry
  - › direct meaning: through direct impact on the costs factors of production
- › For professional end-users some direct competitiveness impacts possible
  - › legislation affects the costs of operating passenger cars and vans, which are part of their cost of doing business
  - › however, for the type of EU companies that are in competition with companies from other regions the share of costs related to using cars and vans in their total cost of doing business will generally be small, so that this impact is not considered significant

## General conclusions

- › There are a large number of indirect pathways that could result in competitiveness impacts for OEMs and component suppliers
- › The likelihood and size of these indirect impacts depend on:
  - › the way in which the legislation is designed
    - › stringency of target
    - › target function
  - › ways in which resources and capabilities of EU companies and sectors may be different from those of non-EU competitors
    - › these determine ability of companies and sectors to deal with consequences of the EU legislation
- › Detailed decomposition of possible pathways in report will help to identify concrete impacts of specific proposals for post 2020 legislation

## General conclusions

- › Various possible cost competitiveness impacts on EU OEMs and component suppliers were found to relate to:
  - the economic / financial situation of the European automotive industry
    - › EU industry appears to be more strongly affected by the economic crisis than the industry in other regions
    - › Question whether that remains the case up to 2030
  - EU OEMs having a larger share in premium market
  - Technology position:
    - › Non-EU OEMs and suppliers have stronger position in electric powertrains
  - Economies of scale
    - › If EU legislation is more stringent than legislation in other regions
- › Innovation competitiveness impacts on EU OEMs and component suppliers may relate to:
  - possible shortage of R&D personnel with skills for new technologies in EU
  - R&D on efficient ICEVs and AFVs going at the expense of other innovations

## General conclusions

### › Fuel supply industry



- EU legislation may exacerbate already increasing competition between EU refineries and new refineries in other regions



- No competitiveness impacts on fuel / energy distribution sector

### › Professional end users



- No significant competitiveness impacts expected

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