Towards the decarbonisation of the transport sector by 2050

Backcasting policies for climate friendly transport

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Presentation overview

- Context
- Overview of project
- Some findings & scenarios
- Conclusions

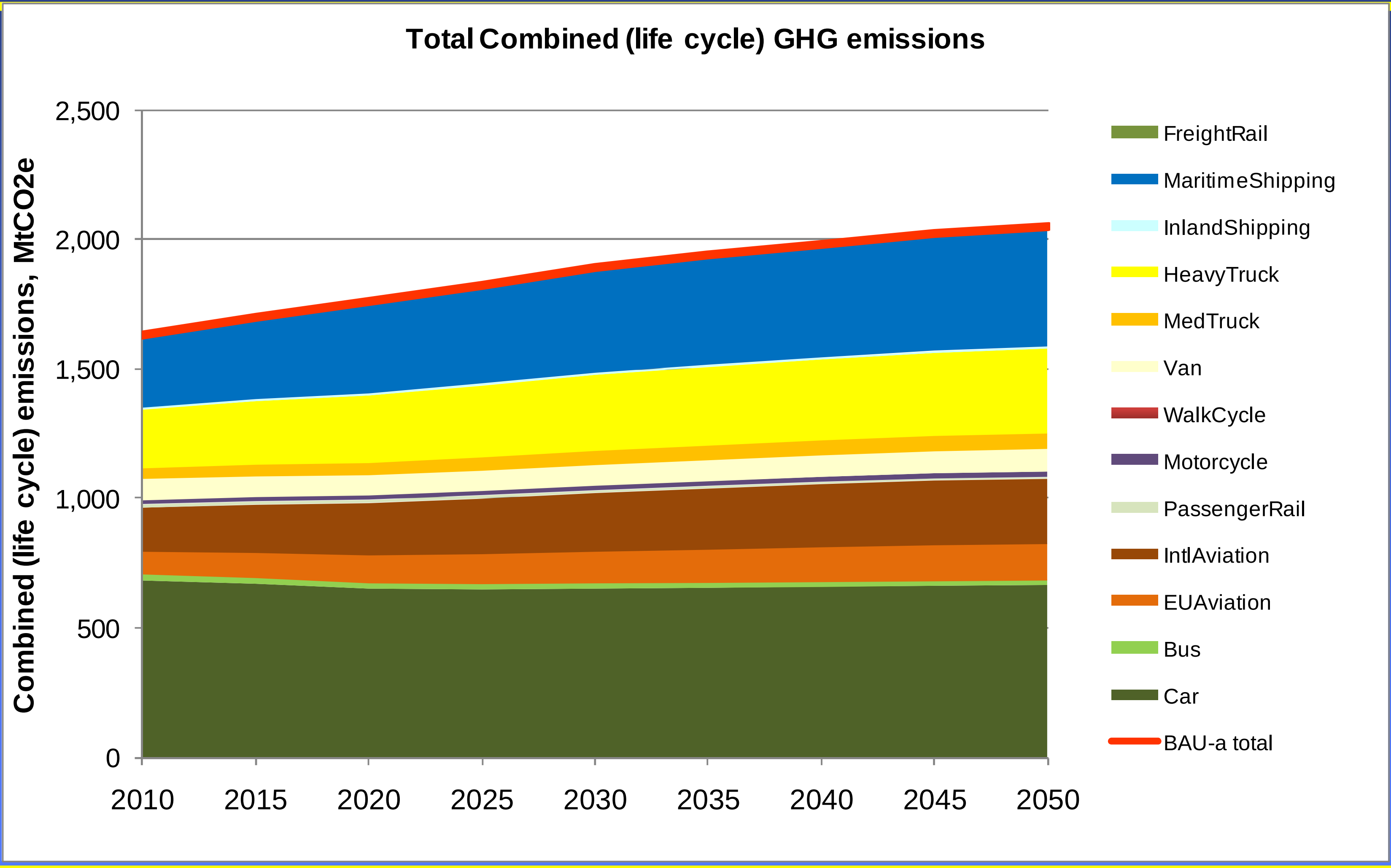
Context

- EU objective of maximum 2 degree increase
- Low Carbon Economy Roadmap
  - Adopted March 8th
  - Foresees 50-70% GHG reduction from transport
- Transport White Paper
  - Adopted March 28th
  - Strategy aiming at 60% reduction in transport GHG by 2050

"EU Transport GHG: Routes to 2050?"
Goals of project

- Carried out in 2009-10
- Begin to consider long-term GHG policy framework for transport in context of need to reduce overall emissions
- Medium to longer-term (2020 to 2050) i.e. moving beyond short-term policy measures
- Identify what we know about reducing transport's GHG emissions and what we do not
- Identify by when we need to take action and what that should be
- Qualitative and quantitative approach (necessarily given timeframe)
- Engage transport and other stakeholders in discussing what transport might have to deliver in terms of GHG emissions reductions to 2050
- Covered all modes but main focus on road

Projected BAU-a GHG emissions by mode



Source: SULTAN BAU Scenario, April 2010

"EU Transport GHG: Routes to 2050?"
Options to reduce transport GHG emissions…

GHG emissions reductions in transport

- Decarbonise transport energy
- Make vehicles more energy/ GHG efficient
- Efficient use of vehicles, e.g. co-modality
- Efficiency of system

17 Technical project papers and reports covering a range of topic areas

“EU Transport GHG: Routes to 2050?”
Part 1 - Assess current knowledge

- **Options:**
  - Inventory and assessment by mode of the technical and non-technical actions that can be taken to reduce GHG emissions.
  - Identification of likely scale of emission reduction
- **Policies:**
  - Assessment of potential policy instruments for stimulating uptake of these options
  - Issues, risks and limitations associated with these options and instruments
- **Other influences:**
  - Energy security: understand impact of options
  - Other sectors impact on transport demand
  - Factors limiting uptake of options
  - Other studies: identify assumptions re options and policy instruments
  - Potential technological game-changers

"EU Transport GHG: Routes to 2050?"
High level findings – technical options

- **Potential technical improvements to existing technologies for all modes**
- **Up to 50% lower energy consumption per unit transport (compared to current new vehicles) by 2050 from e.g.:**
  - **Electrification of drivetrains, recovery of energy**
  - **Improved aerodynamics, lighter vehicles**
- **Reduction potential from changes to fuels/energy:**
  - **Electrification of powertrains**
    - Fully electric vehicles for (short-distance) road vehicles and trains
    - Hybridisation of vehicles on other road applications
  - **Biofuels (in longer-term) for long distance road freight, aviation, inland waterways?**
  - **Fuel cells/hydrogen: Specialised road (fleets, urban buses) and rail applications**
  - **Wind and Liquefied Natural Gas for maritime ships**

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IWW – technical options

Table 7: GHG emissions reduction potential of the technical inland shipping options

Technical option	Current reduction potential on ship level where applicable	Current payback time
Powertrain		
More efficient engines	15 – 20%	> 10 years
Diesel-electric propulsion	10%	> 10 years
Reduction of required propulsion		
Larger units (economy of scale)	Up to 75% depending on difference in scale	No general conclusion possible
Improved propeller systems	20 – 30%	Short payback time
Improved hull design	10 – 20%	Short payback time
Computer assisted trip planning and speed management	5 –10%	< 1 year
Lightweight hulls	5-15%	> 10 years (experimental)
Air lubrication	10%	Unknown (experimental)
Whale tail/experimental propulsion systems	25%	Unknown (experimental)

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High level findings – non technical options

- Similar non-technical options applicable across modes
- Optimisation of speeds and routes:
  - Speeds: Limits and enforcement
  - Eco-driving/improved driving behaviour - 10% (short-term)?
  - Routes: Voyage optimisation, air traffic management
- Improved maintenance and vehicle optimisation
- Optimised utilisation of freight and passenger transport
- Co-modality/modal shift – GHG benefits depend on:
  - Difference in carbon intensity of the modes concerned; and
  - Potential volumes/passenger that can be shifted
- Improved structure and planning of transport system
- Mobility management and system efficiency measures
- Potential role of Intelligent Transport Systems
- Reduction potential highly dependent on specific circumstances, e.g. products being transported

"EU Transport GHG: Routes to 2050?"

IWW – non technical options

- **Speed optimisation**
  - **Strongly dependent on fuel pricing or possible CO_2 instrument**
- **Improved maintenance**
  - **Limited information – possibly 3-5% per component**
- **Just –in time routing**
  - **Likely to be limited in practice**

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High level findings – policy instruments

- **Similar policy instruments applicable across modes**
- **Regulation to set standards, e.g.**
  - **Vehicle fuel efficiency/CO_2 emissions;**
  - **Fuel carbon intensity.**
- **Economic instruments to, e.g.:**
  - **Increase the cost of use**
  - **Incentivise different patterns of purchase or use**
  - **Removal of subsidies and perverse incentives**
- **Spatial planning/infrastructure provision to:**
  - **Minimise need for travel**
  - **Enable use of least carbon intensive modes**
- **Information policies to increase awareness of, e.g.:**
  - **Climate change reduction options**
  - **Travel options available**
  - **New transport technologies**
- **Ultimate GHG reduction potential depends on scale, scope and level of ambition of policy instruments**

"EU Transport GHG: Routes to 2050?"
Illustrative scenarios

- **Options and policy instruments papers provided overview of:**
  - Reduction potential of various options by mode
  - Potential policy instruments for stimulating uptake of these options
  - Issues, risks and limitations associated with these options and instruments
- **Other influences inform development of illustrative scenarios:**
  - Assumptions in other studies re options and policy instruments
  - Timing issues for policies
  - Energy security implications
  - Possible breakthrough technologies
- **SULTAN "illustrative scenarios tool":**
  - Range of possible scenarios to reduce transport GHG
  - What do these mean for GHG emission reduction potential in transport
  - Assumptions made are transparent way
  - Assumptions can be altered to illustrate what change this might deliver

"EU Transport GHG: Routes to 2050?"
Combination scenarios assessed

C1	Technical: Increased biofuels penetration
C2	Technical: Mandatory CO_2 standards and biofuels
C3	Technical + Planning + Modal Shift
C4	Technical + Planning + Modal Shift+ Speed + FED Training
C5	Technical + Planning + Modal Shift+ Speed + FED Training + Tax (inc CO_2 Price)
C6	Non-Technical: Planning + Modal Shift+ Speed + FED Training + Tax (inc CO_2 Price)

- **Combination impacts are NOT additive – based on multiplicative combinations of % changes, e.g. for change of X% and Y% for two different scenarios, total impact is: ((1+X%) x (1+Y%) – 1)**

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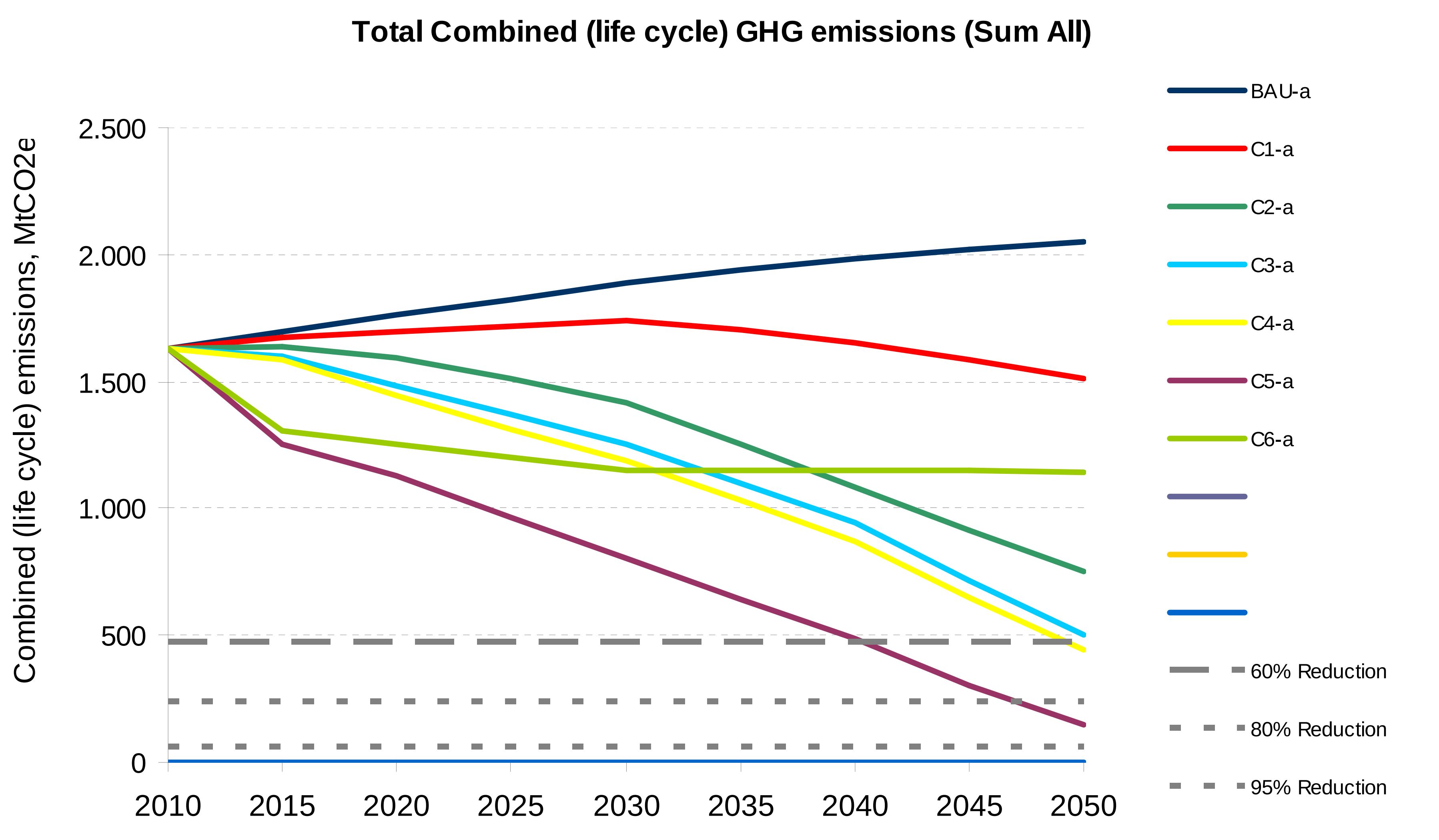
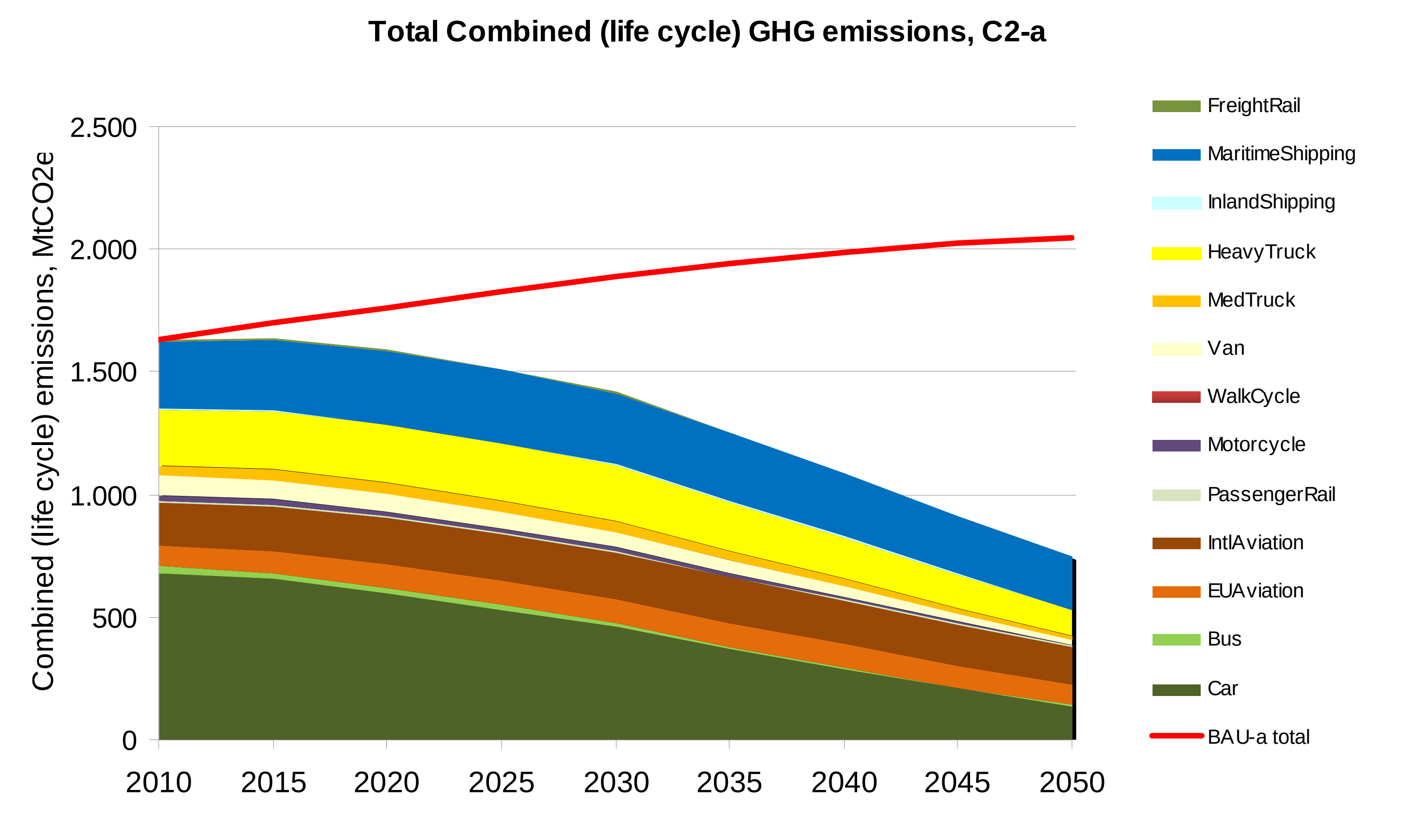
Comparison of scenarios assessed



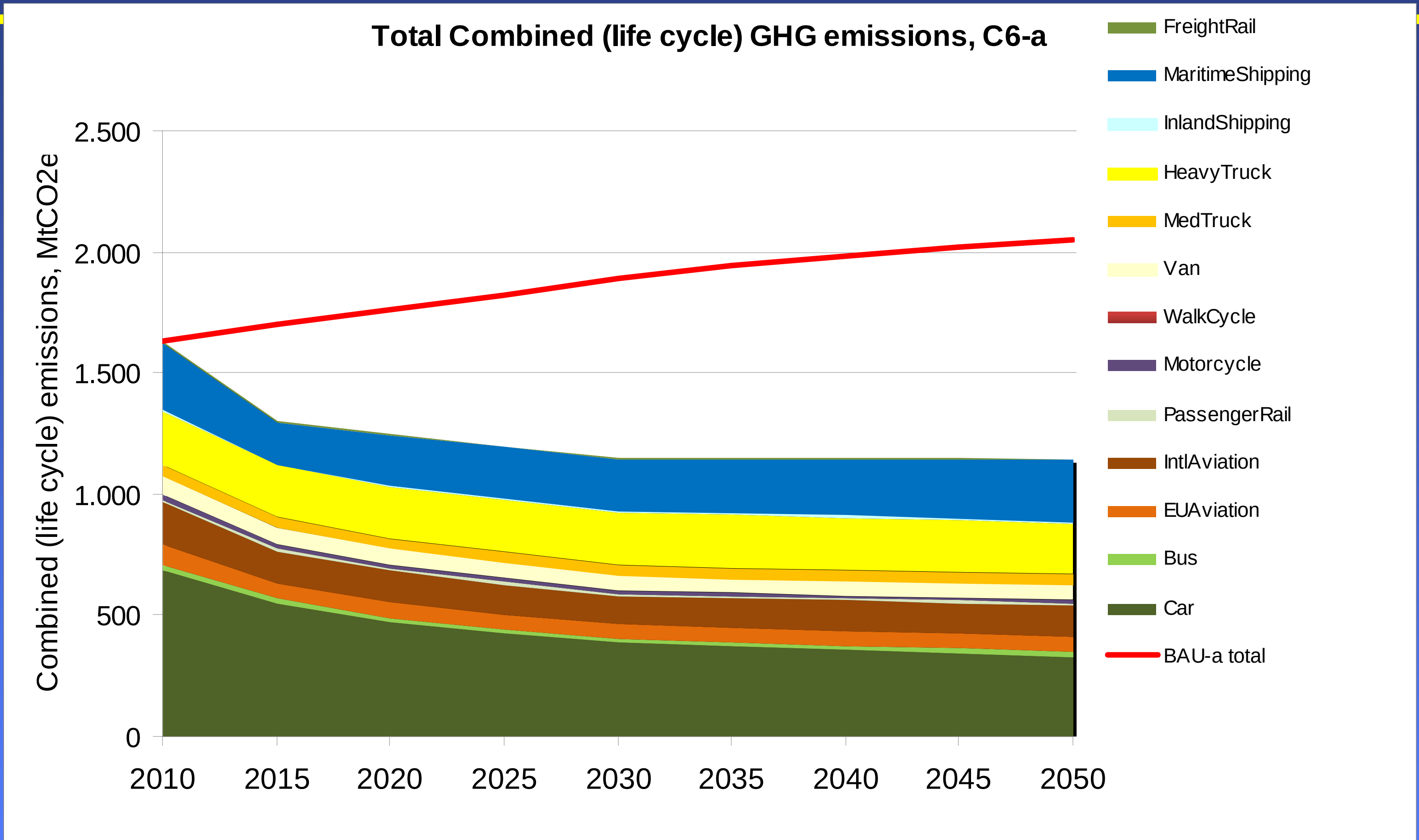
"EU Transport GHG: Routes to 2050?" Scenario 2a – only technical measures



Achieves 36% lower GHG compared to 1990 level

“EU Transport GHG: Routes to 2050?”

Scenario 6a – all non-technical measures



Achieves 3% lower GHG compared to 1990 level

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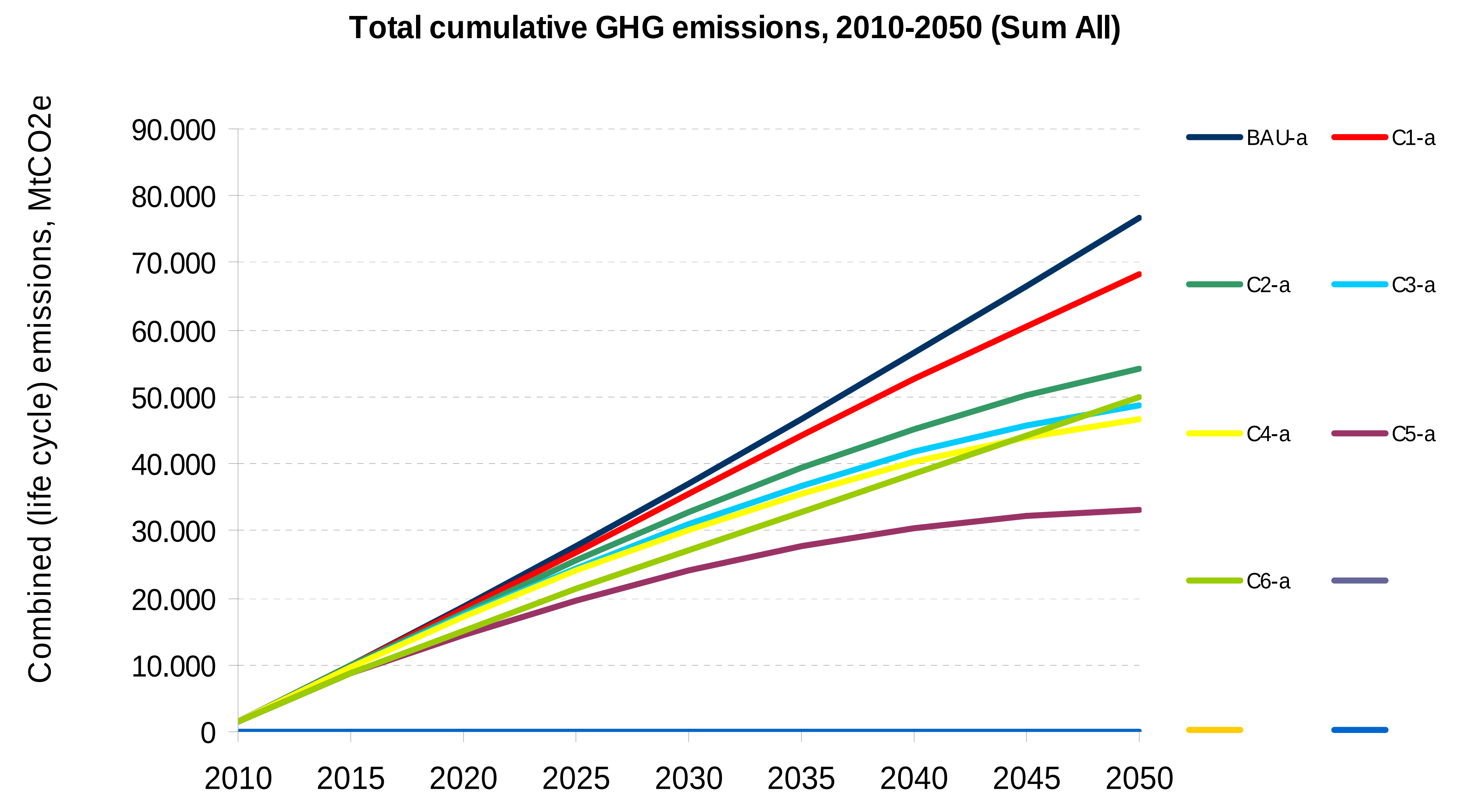
Cumulative GHG comparison



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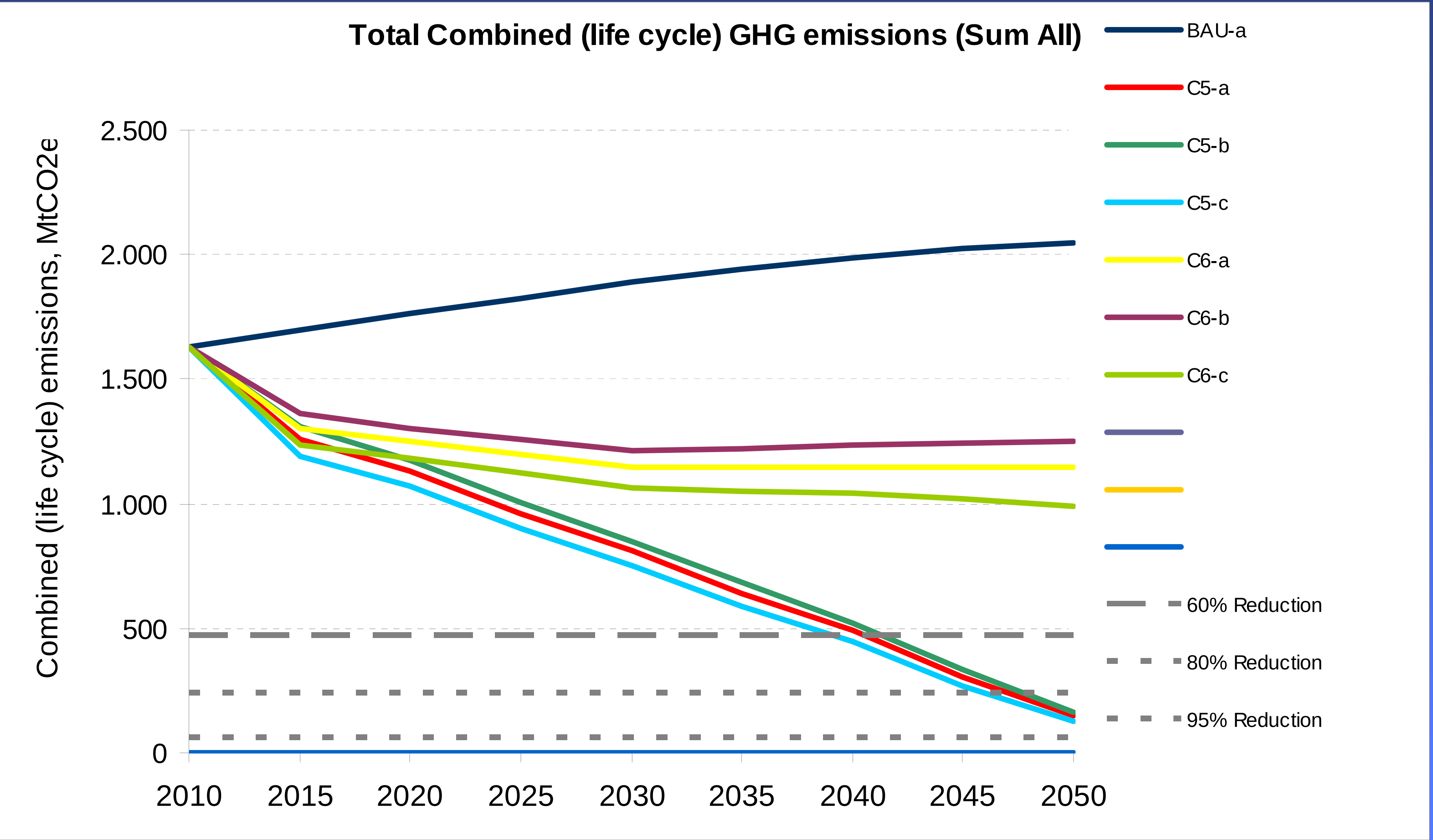
Impact of CO_2 price



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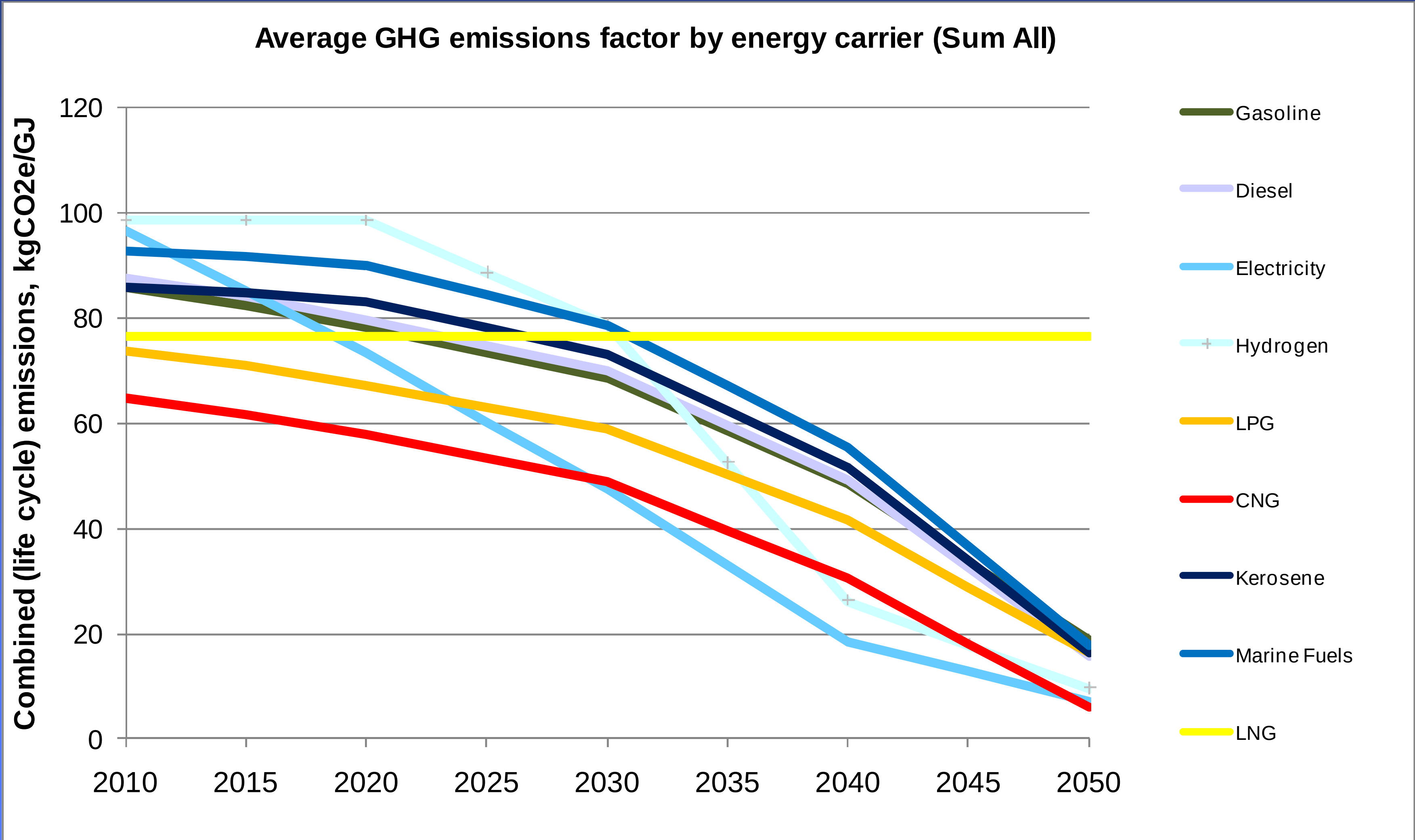
Energy assumptions – scenario C5



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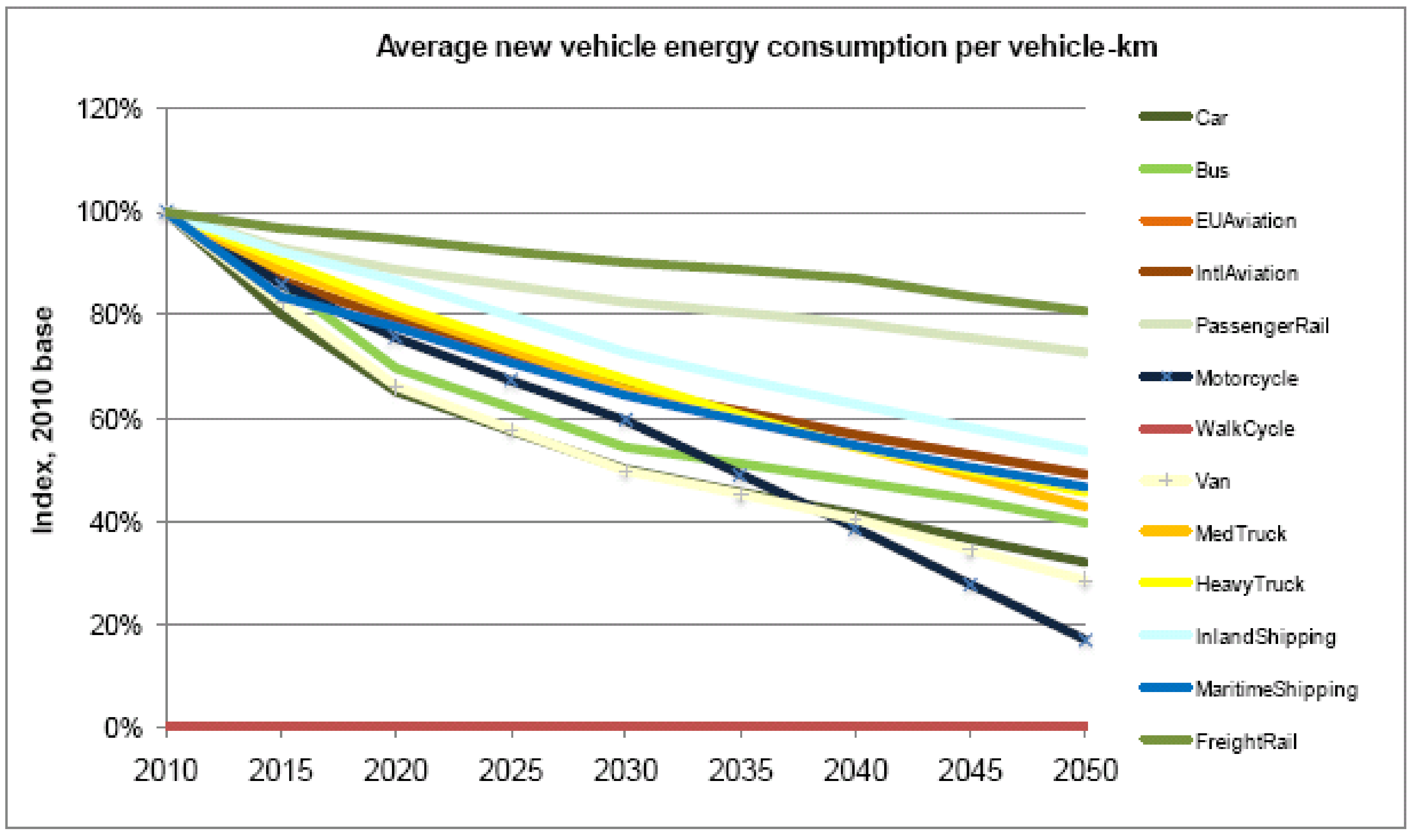
Efficiency assumptions – scenario C5



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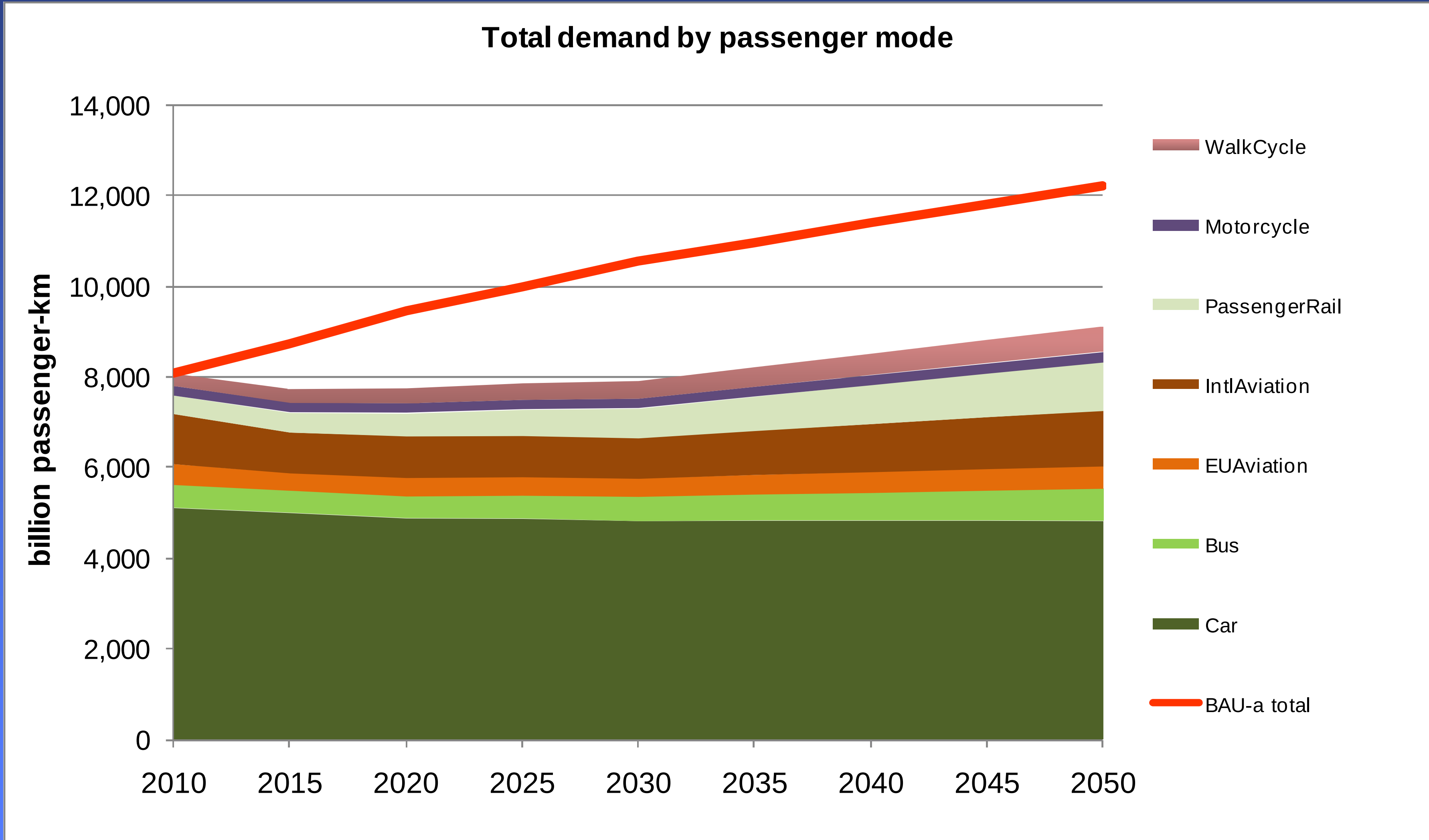
Passenger demand – scenario C5



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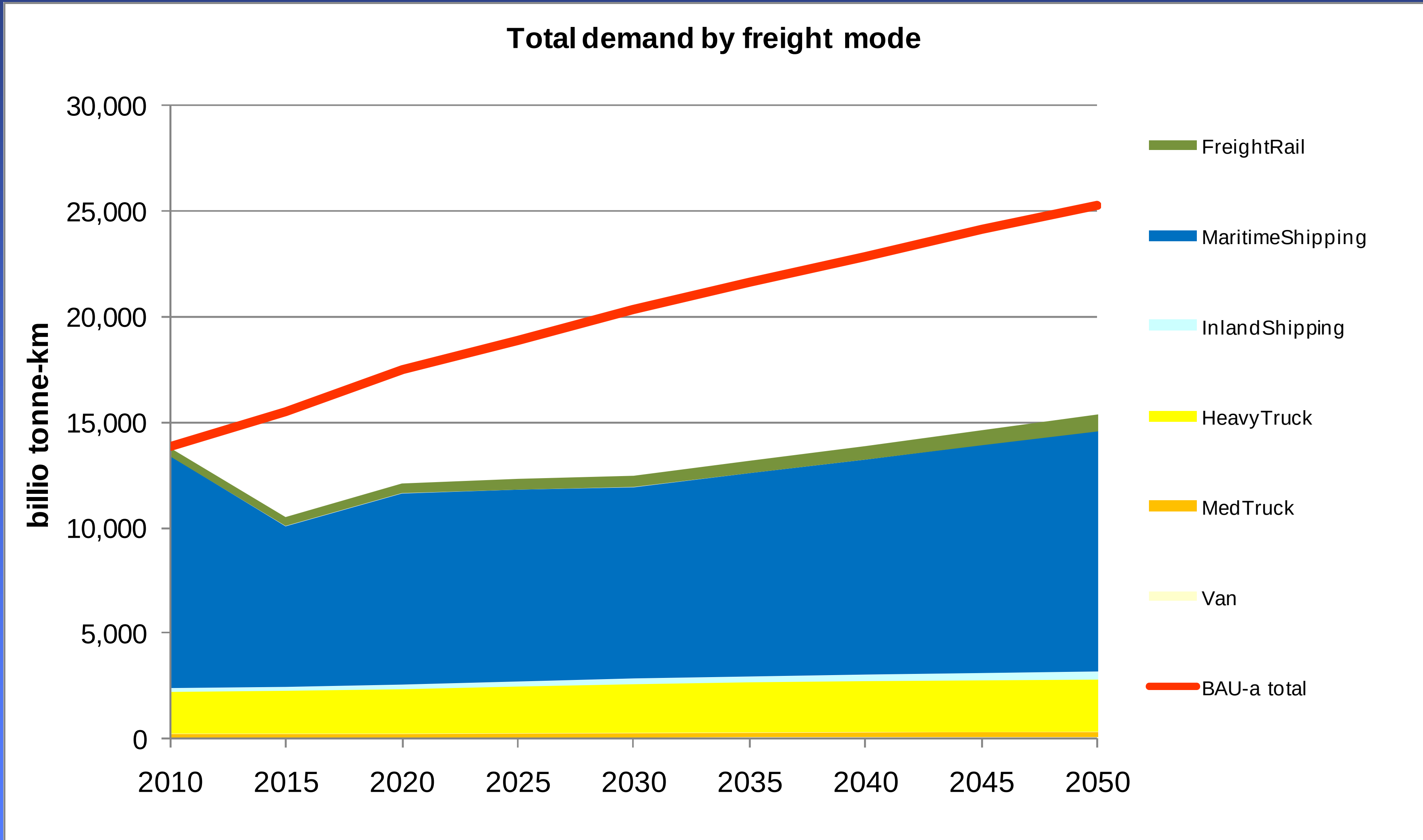
Freight demand – scenario C5



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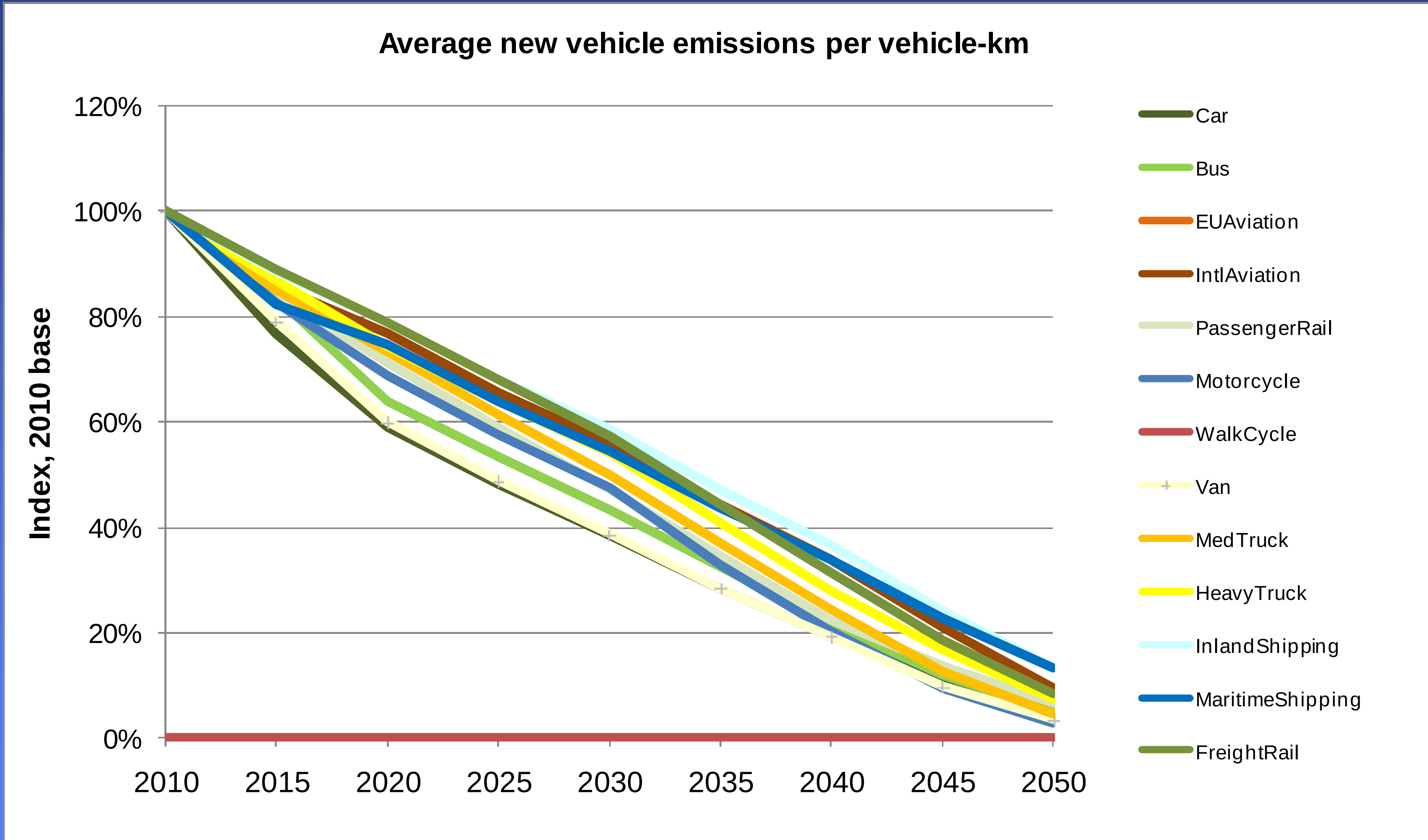
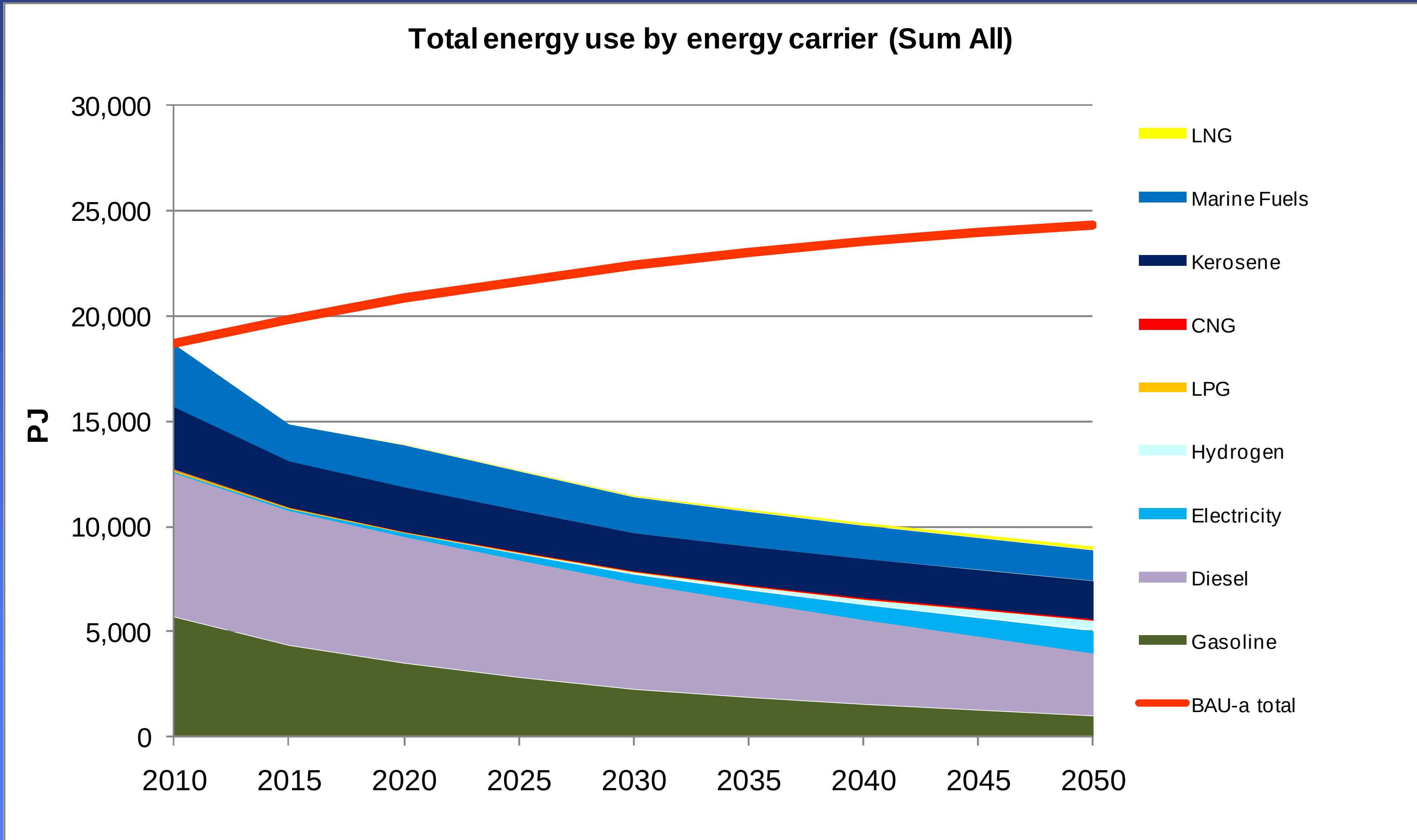
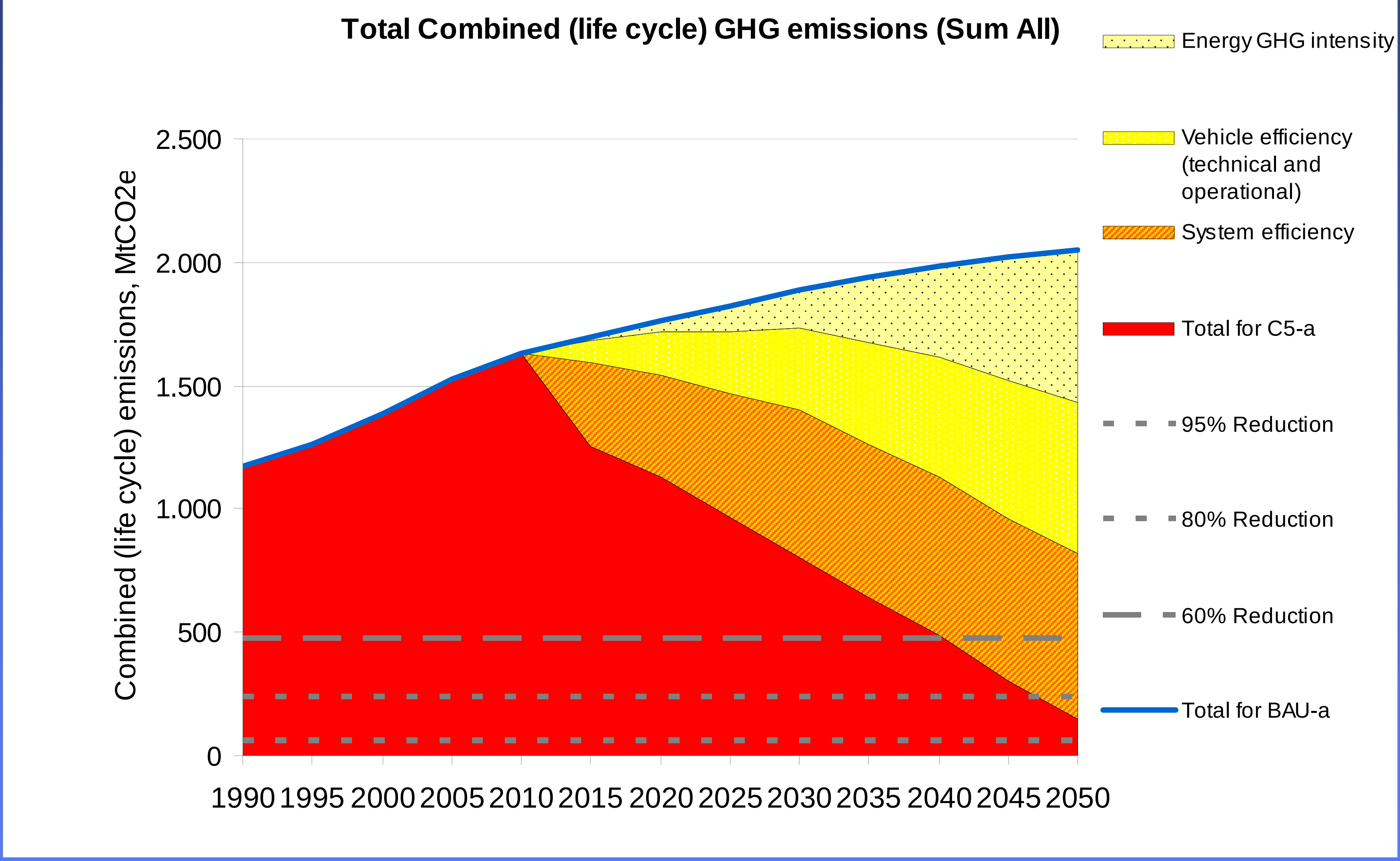
Indications from scenario C5



“EU Transport GHG: Routes to 2050?” Indications from scenario C5



“EU Transport GHG: Routes to 2050?” Decomposition of impacts C5



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Possible long term policy actions (1)

- **Regulation of energy or GHG efficiency of vehicles**
  - For all modes
  - Stepwise tightening
  - Test cycles reflecting real life emissions
- **Regulation of energy carriers:**
  - Shift to low-carbon alternatives for current fuels
  - Strong interaction with other sectors (energy, food)
  - Broad facilitation and standardization needed for major shift
- **Spatial, infrastructure, speed and traffic management policy at all levels and abolishment of subsidies to:**
  - encourage slow modes
  - influence demand/system efficicency
  - put higher weight to GHG reduction in EIA, SEA and CBA
- **Non-transport policy for transition to transport extensive economic growth (e.g. development of Green GDP)**

“EU Transport GHG: Routes to 2050?”
Possible long term policy actions (2)

- **Set of pricing policies at all levels to:**
  - Support uptake of low-carbon technology
  - Influence demand
  - Improve efficiency of the transport system
- **Generic pricing instrument:**
  - Carbon tax on fuel
  - Transport in ETS or separate emission trading scheme for transport
- **Other key pricing instruments:**
  - Kilometre-charging
  - Vehicle taxation (differentiated to fuel efficiency)
  - Company car taxation (50% of new cars is bought by companies!)
  - Remove tax exemption for travel expense declaration
  - Same VAT regime for all transport modes
  - Land use taxation
  - Parking fees and permits

Follow up:

- "Transport GHG: Routes to 2050" follow-on project to provide further insights :
  - Co-benefits
  - Embedded emissions (vehicles and infrastructure)
  - Knock-on consequences
  - Less transport intensive structures
  - Major risks and uncertainties
  - SULTAN further development
  - Interaction between pre and post 2020 policies
  - Cost effectiveness of packages

"EU Transport GHG: Routes to 2050?"
Key Conclusions (1)

- **Transport demand and GHG emissions expected to keep on growing without policy intervention**
- **To meet long term goals requires transport GHG emission reductions of the order of 60% compared to 1990**
- **Broad range of ambitious options required: technical, structural and improved system efficiency**
- **Under-achievement in one area implies more effort in others**
- **No policy silver bullet exists - mix of policy instruments needed**

"EU Transport GHG: Routes to 2050?"
Key Conclusions (2)

- **Over half potential reduction is due to technical measures (mainly decarbonisation of fuels and vehicle efficiency), with the remainder due to non-technical measures**
- **All government levels need to take action:**
  - **Energy efficient vehicles and low carbon energy: particularly national and international level**
  - **More efficient transport system and transport system efficiency: action at all levels required**
- **Urgent need for action because of long lead times and risks of policies achieving less than expected**

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www.eutransportghg2050.eu

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