IGES
Institute for Global Environmental Strategies

Climate Change Webinar

Commentary on IPCC AR6 Working Group III
Part 2: Summary for Policy Makers (SPM) & Chapter 10 (Transport)

Dr. Eng. Sudarmanto B Nugroho

Drafting Authors of SPM
Lead Author – Chapter 10 (Transport)

Contents

Summary for Policy Makers (SPM) – 64 pages

A. Introduction and Framing.

There are several 5 bullet points on (i) International policy process; (ii) Diversity of actors and approaches to mitigation; (iii) Linkage between climate mitigation, adaptation and SDGs; (iv) new approaches; and (v) increasing diversity of analytical framework from multiple disciplines including social sciences

B. Recent Development and current trends. *There are seven (7) headline statements*

C. System Transformations to Limit Global Warming. *There are twelve (12) headlines statements*

D. Linkages between mitigation, adaptation and SDGs. *There are three (3) headlines statements*

E. Strengthening the Response. *There are 6 headlines statements*

Several key important Figures in the SPM

Figure SPM2 Regional GHG emissions, and the regional proportion of total cumulative production-based CO2 emissions from 1850–2019

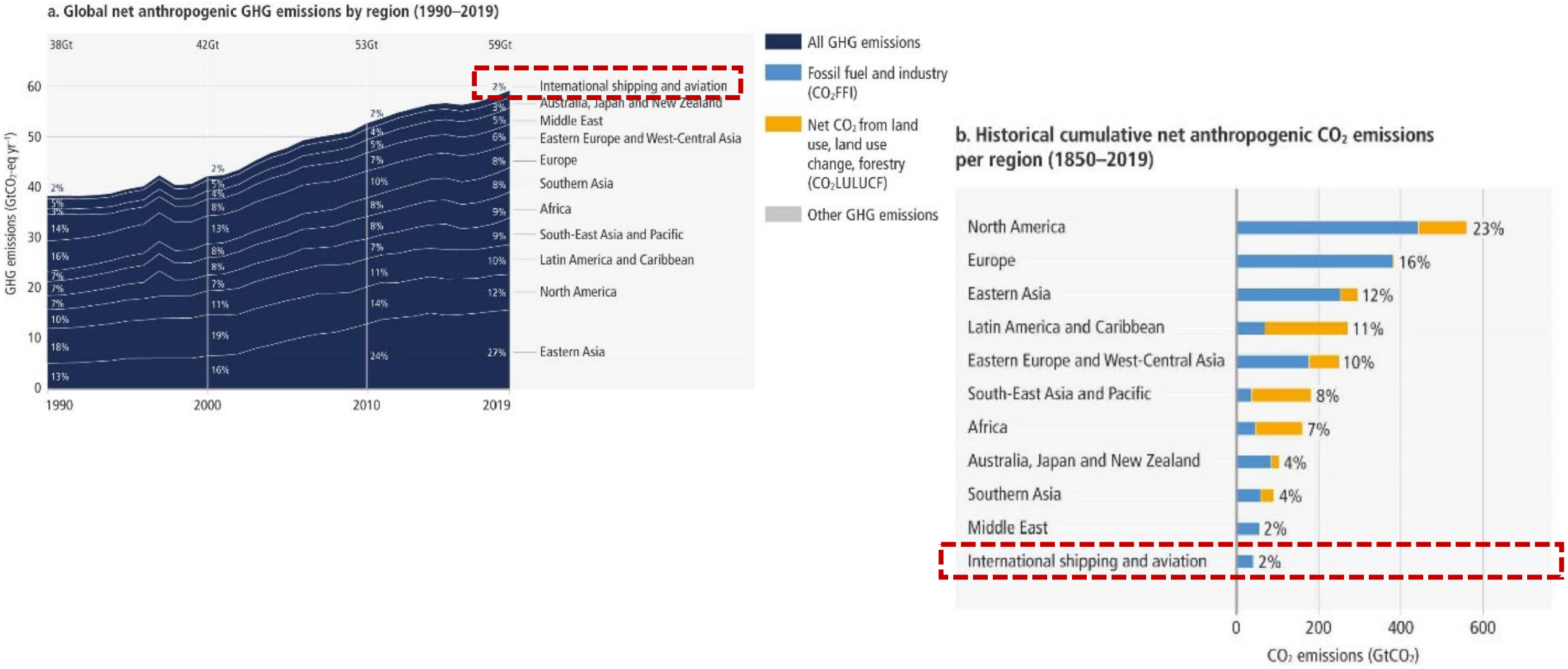


Figure SPM3 Unit cost reductions and use in some rapidly changing mitigation technologies

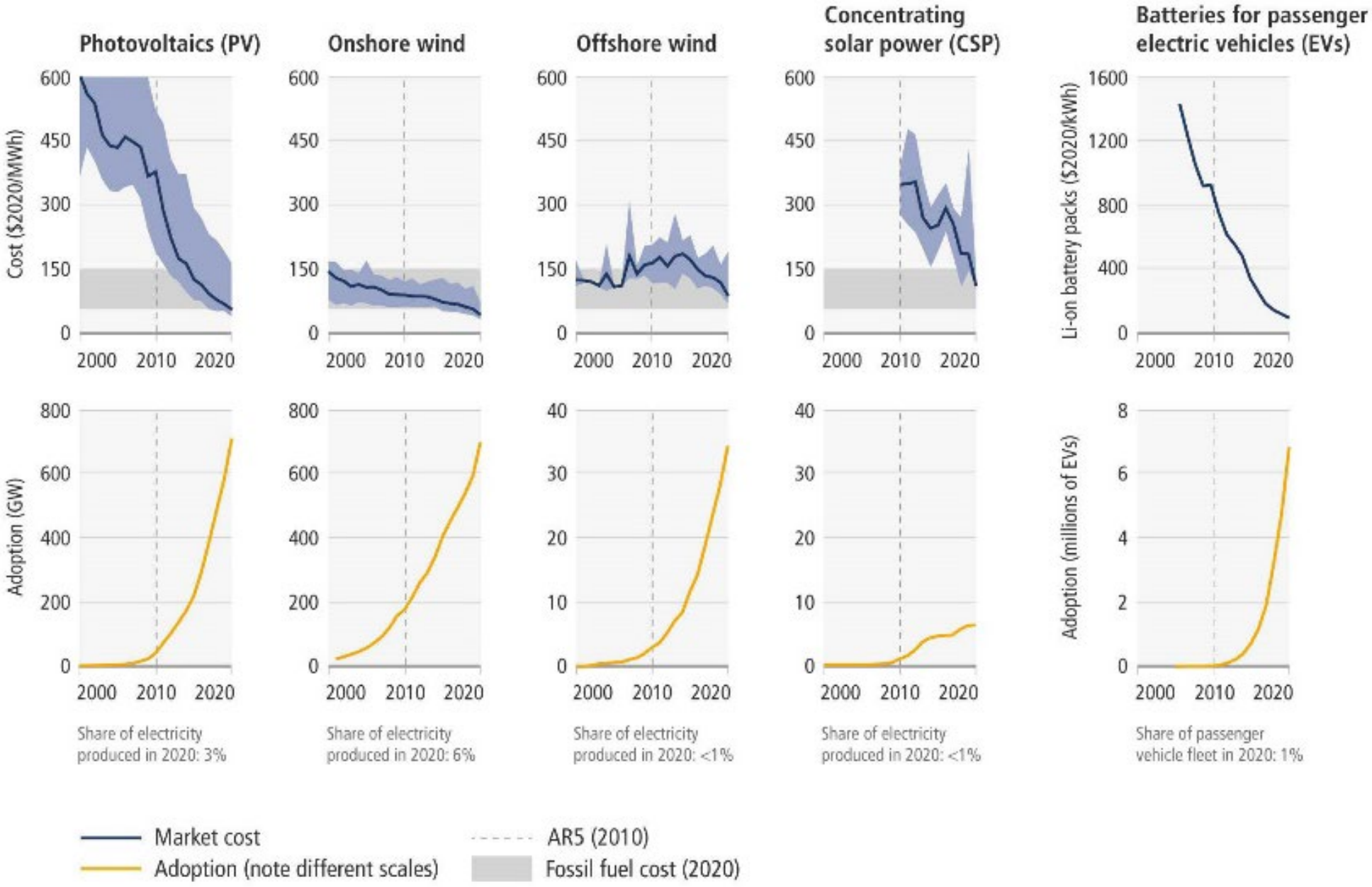


Figure SPM6 Indicative potential of demand-side mitigation options on Transport Sector by 2050

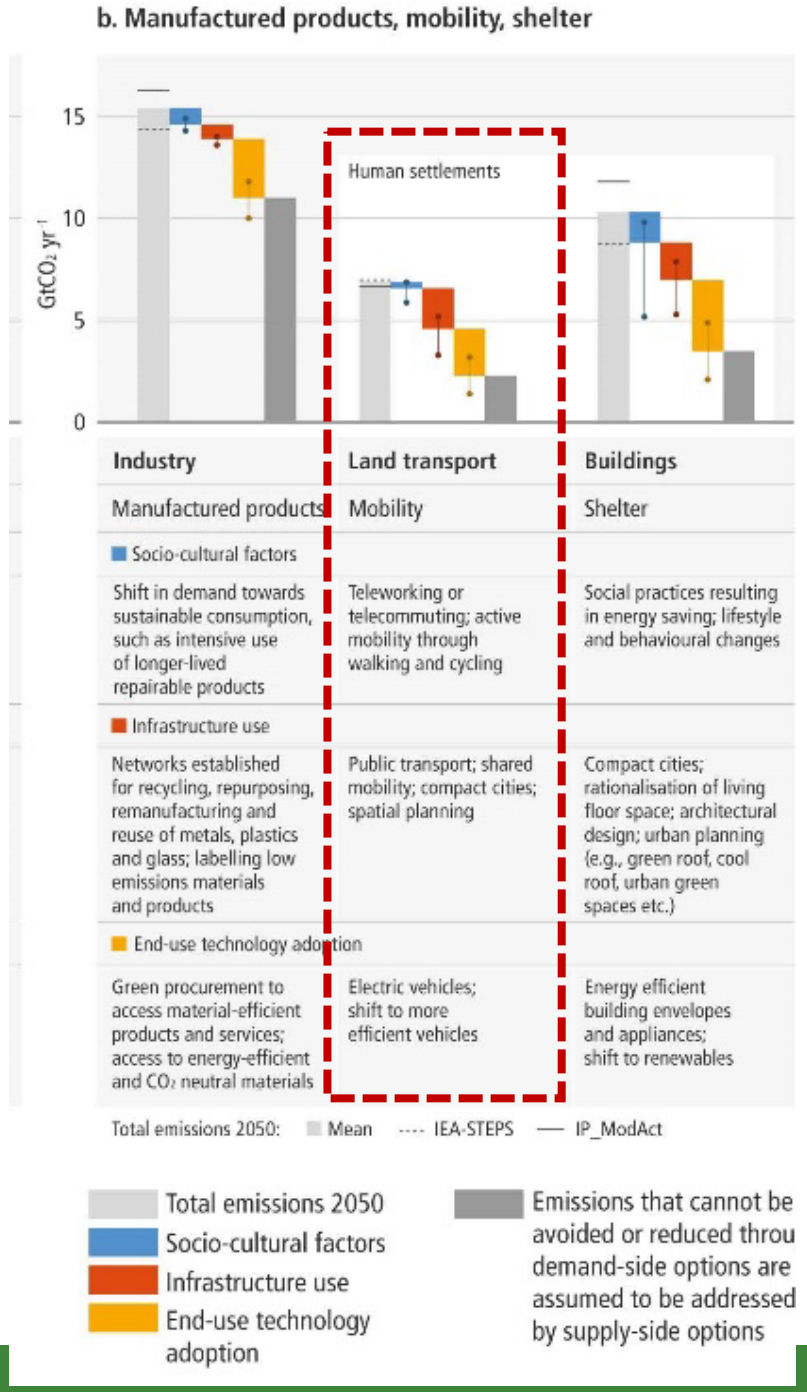


Figure SPM7 Overview of mitigation options and their estimated ranges of costs and potentials in 2030.

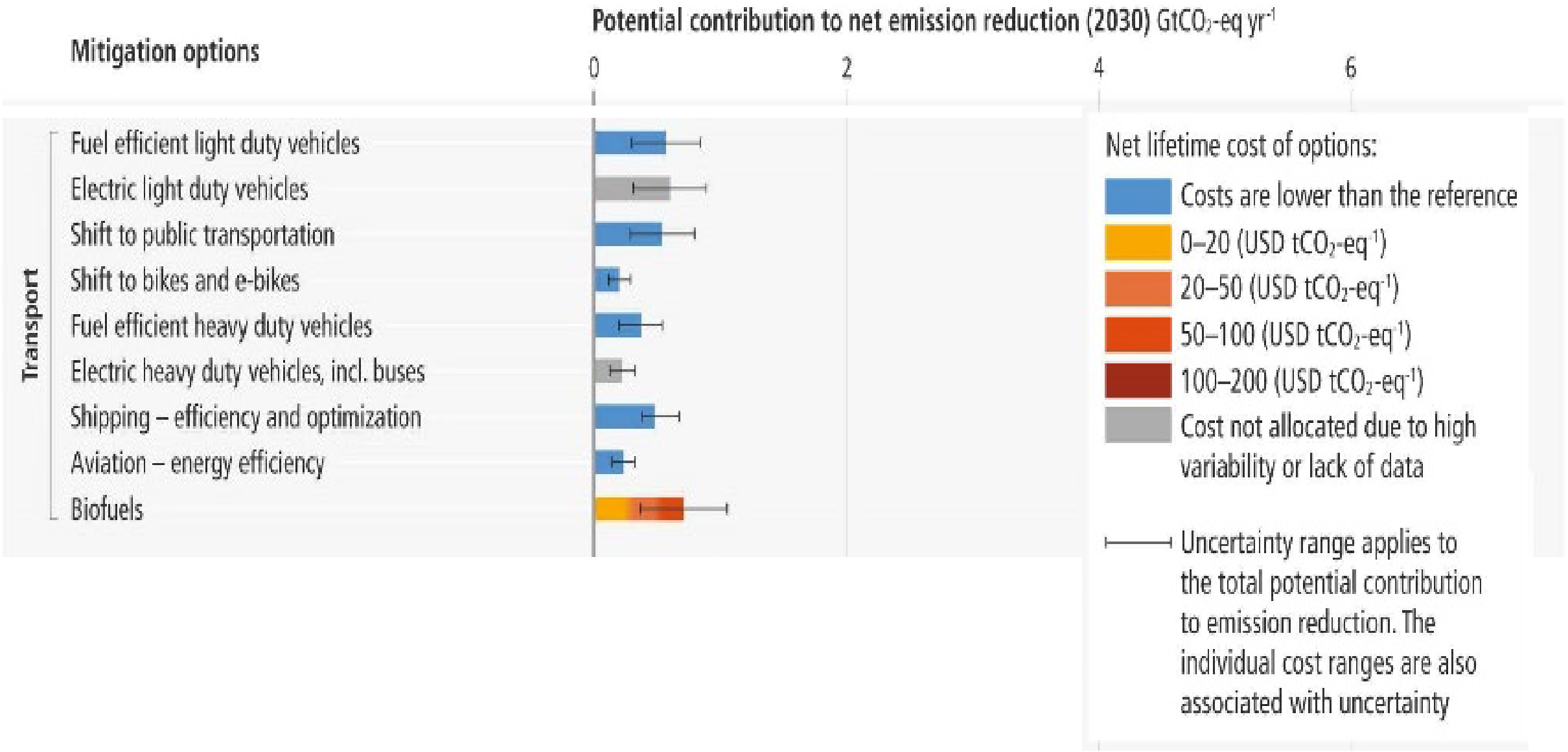
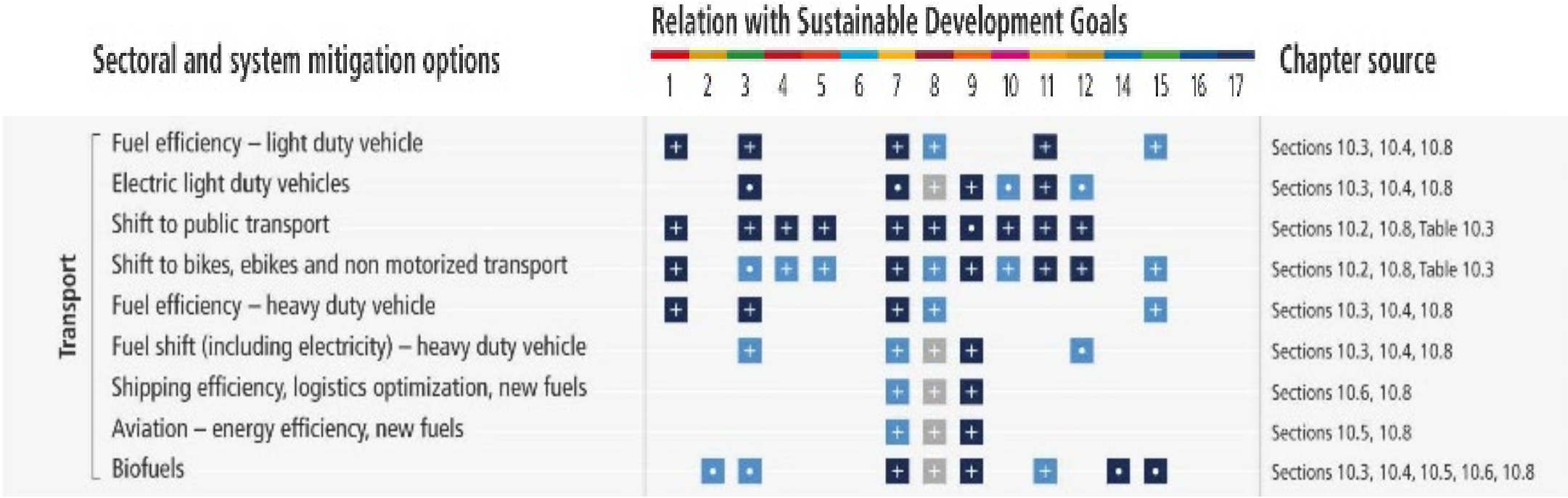


Figure SPM8 Synergies and Trade-offs between sectoral and system mitigation options and the SDGs



Type of relations:
- Synergies
- Trade-offs
- Both synergies and trade-offs[4]

Blanks represent no assessment[5]

Confidence level:
- High confidence
- Medium confidence
- Low confidence

Related Sustainable Development Goals:
- 1 No poverty
- 2 Zero hunger
- 3 Good health and wellbeing
- 4 Quality education
- 5 Gender equality
- 6 Clean water and sanitation
- 7 Affordable and clean energy
- 8 Decent work and economic growth
- 9 Industry, innovation and infrastructure
- 10 Reduced inequalities
- 11 Sustainable cities and communities
- 12 Responsible consumption and production
- 13 Climate action
- 14 Life below water
- 15 Life on land
- 16 Peace, justice and strong institutions
- 17 Partnership for the goals

Executive Summary of Chapter Transport (10)

Global GHG Emissions on Transport Sector

- ***Meeting climate mitigation goals would require transformative changes in the transport sector (High Confidence).***
- In 2019, ***Direct emissions from the transport sector were 8.7 4 Gt CO2-eq & accounted for 23% of global energy-related CO2 emissions.***
- ***70% of direct transport emissions came from road vehicles***, while 1%, 11%, and 12% came from rail, shipping, and aviation.
- Emissions from ***shipping and aviation continue to grow rapidly***.
- Transport-related emissions in ***developing regions of the world have increased more rapidly than others*** and it is likely to continue in coming decades (high confidence).

Executive Summary of Chapter Transport (10) & Chapter 5 (Demand)

The importance of demand management solutions combined with new technologies. (exec Summary chapter 10).

- Indicative potential GHG emission reduction from the demand side up to ***6.5 $GtCO_2eq$ for Land Transport*** (exec summary chapter 5)

- Needs for ***systemic changes*** in urban form, behaviour programs, the circular economy, the shared economy, and digitalisation trends can to enable behavioural changes and reduction on transport demand or more efficient transport modes (exec summary chapter 10).

- The response to the COVID-19 pandemic: ***behavioural interventions at a massive scale and in a short time is possible & can reduce transport-related GHG emissions*** (exec summary chapter 5 & Chapter 10)

- ***Cities*** can reduce their transport-related fuel consumption by around ***25% through combinations*** of more compact land use and the provision of less car-dependent transport infrastructure.

- ***Transport demand management incentives*** are expected to be necessary to support these systemic changes (high confidence) (exec summary chapter 10).

Executive Summary of Chapter Transport (10)

- ***Battery-electric vehicles (BEVs)*** have lower life cycle GHG emissions than ICEVs when supported with ***low carbon electricity*** (high confidence).

- The electro mobility for land transport requires ***investments in electric charging and related grid infrastructure*** (high confidence)

- ***Electro mobility powered by low-carbon electricity*** has the potential to rapidly reduce transport GHG and can be applied with multiple co-benefits in the ***developing world's growing cities*** (high confidence)

- ***Land-based, long-range, heavy-duty trucks*** can be decarbonised through battery-electric haulage (including the use of Electric Road Systems), ***complemented by hydrogen- and biofuel-based fuels*** in some contexts (medium confidence). It also can support ***rail decarbonisation*** (medium confidence).

- ***Decarbonisation options for shipping and aviation still require R&D***, though advanced biofuels, ammonia, and synthetic fuels are emerging as viable options (medium confidence).

Executive Summary of Chapter Transport (10)

- Future Scenarios from indicates CO2 ***emissions from transport could grow in the range of 16% and 50% by 2050*** (medium confidence).

- There is a ***growth in demand for freight and passenger services, particularly in developing countries in Africa and Asia*** (high confidence).

- Scenarios that limit warming to 1.5°C degree ***suggest that a 59% reduction*** by 2050, compared to modelled 2020 levels ***is required***. However, It ***may not happen uniformly across regions***.

- ***Electrification tends to play the key role in land-based transport***, but ***biofuels and hydrogen (and derivatives) could play a role in decarbonisation of freight*** (high confidence). Biofuels and hydrogen (and derivatives) are likely more prominent in shipping and aviation (high confidence).

- Integration and expansions on ***low-carbon energy infrastructure, including low-carbon power generation and hydrogen production***, are necessary to support GHG emissions from transport sector (high confidence).

Executive Summary of Chapter Transport (10)

- Decarbonisation ***aviation and shipping*** require changes to ***national and international governance structures*** (medium confidence).

- ***The standardisation of battery modules and packaging within and across vehicle platforms, as well as increased focus on design for recyclability are important***

- Legislated climate strategies are emerging at all levels of government could spur the deployment of demand and supply-side transport mitigation strategies (medium confidence).

- ***At the local level***, legislation can support local transport plans that include behavioural changes.

- ***At the regional and national levels***, legislation can include vehicle and fuel efficiency standards, R&D support, and large-scale investments in low-carbon transport infrastructure

New Approaches – Life Cycle Assessment on Transport (10)

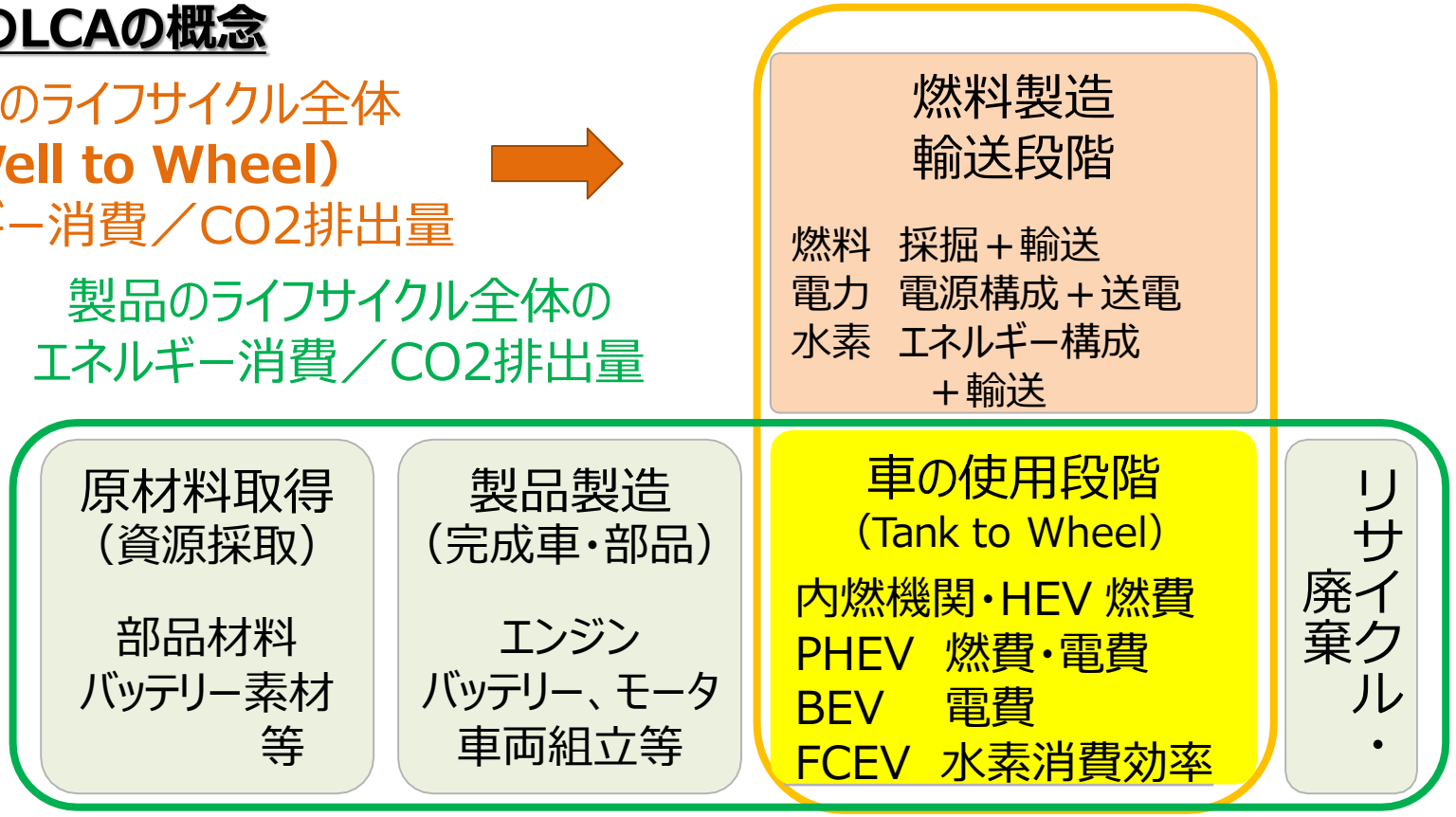
自動車のライフサイクルでの重要性

- 2050年カーボンニュートラルの実現に向けては、従来の燃費（Tank to Wheel）のみならず、 原材料の採取から製造、使用、廃棄に至る**ライフサイクル全体を通じた環境負荷について検討 することが重要**。

自動車のLCAの概念

燃料のライフサイクル全体
(Well to Wheel)
エネルギー消費／CO2排出量

製品のライフサイクル全体の
エネルギー消費／CO2排出量

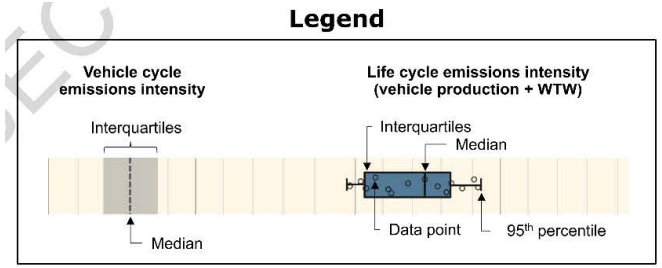


各国の動向

日本：Well to Wheelでの燃費規制導入（2030年～）
欧州：バッテリーのLCAラベル制度検討（2024年頃～）、CO2排出評価をTank to WheelベースからLCAベースに変更検討
中国：LCA規制導入検討（2025年頃～）

Source: https://www.meti.go.jp/shingikai/mono_info_service/mobility_kozo_henka/pdf/003_03_00.pdf

Figure 10.4 Life cycle GHG emissions intensities for mid-sized light duty vehicle and fuel technologies from the literature



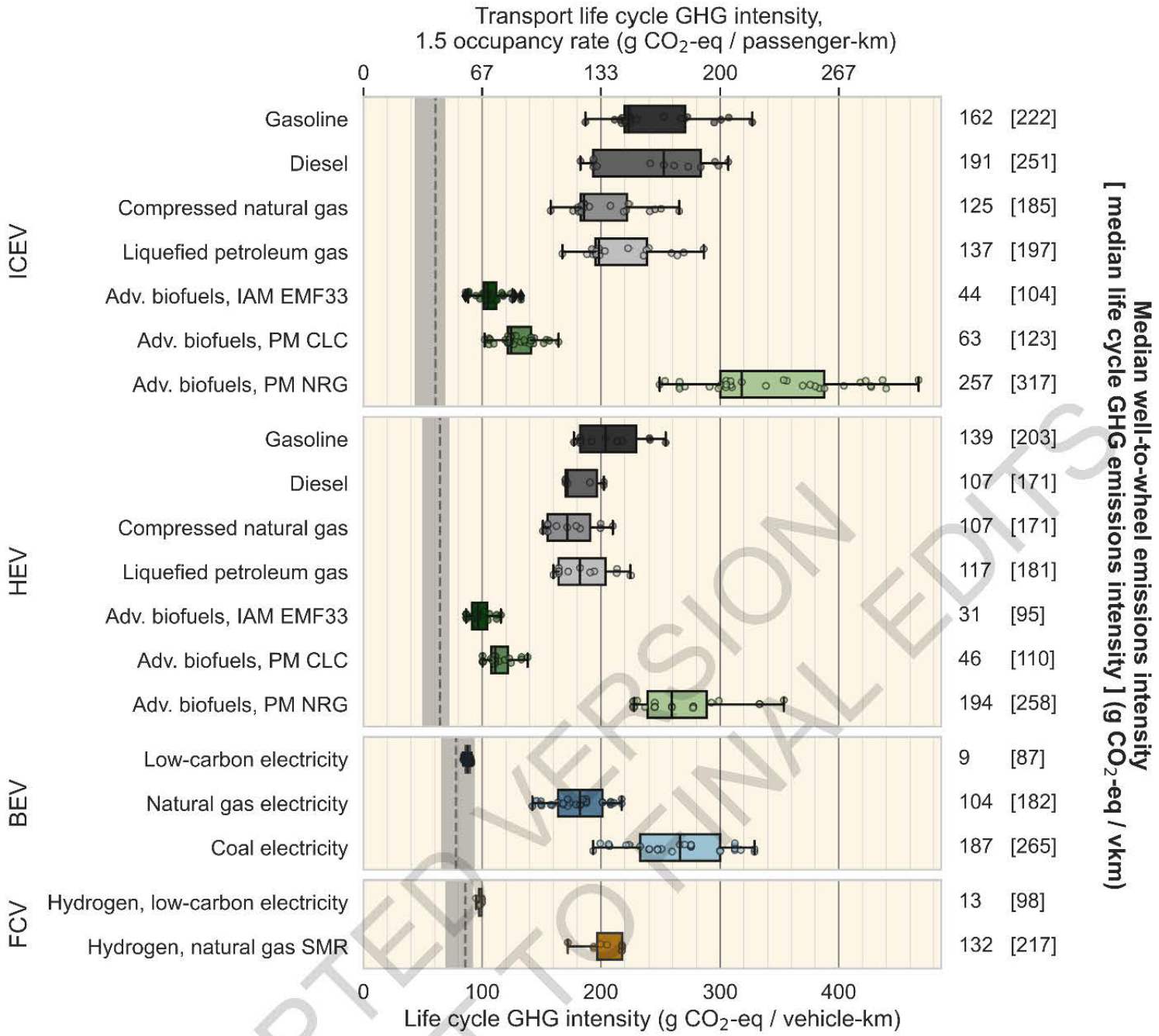


Figure 10.6 Life cycle GHG intensity of land-based bus and rail technologies

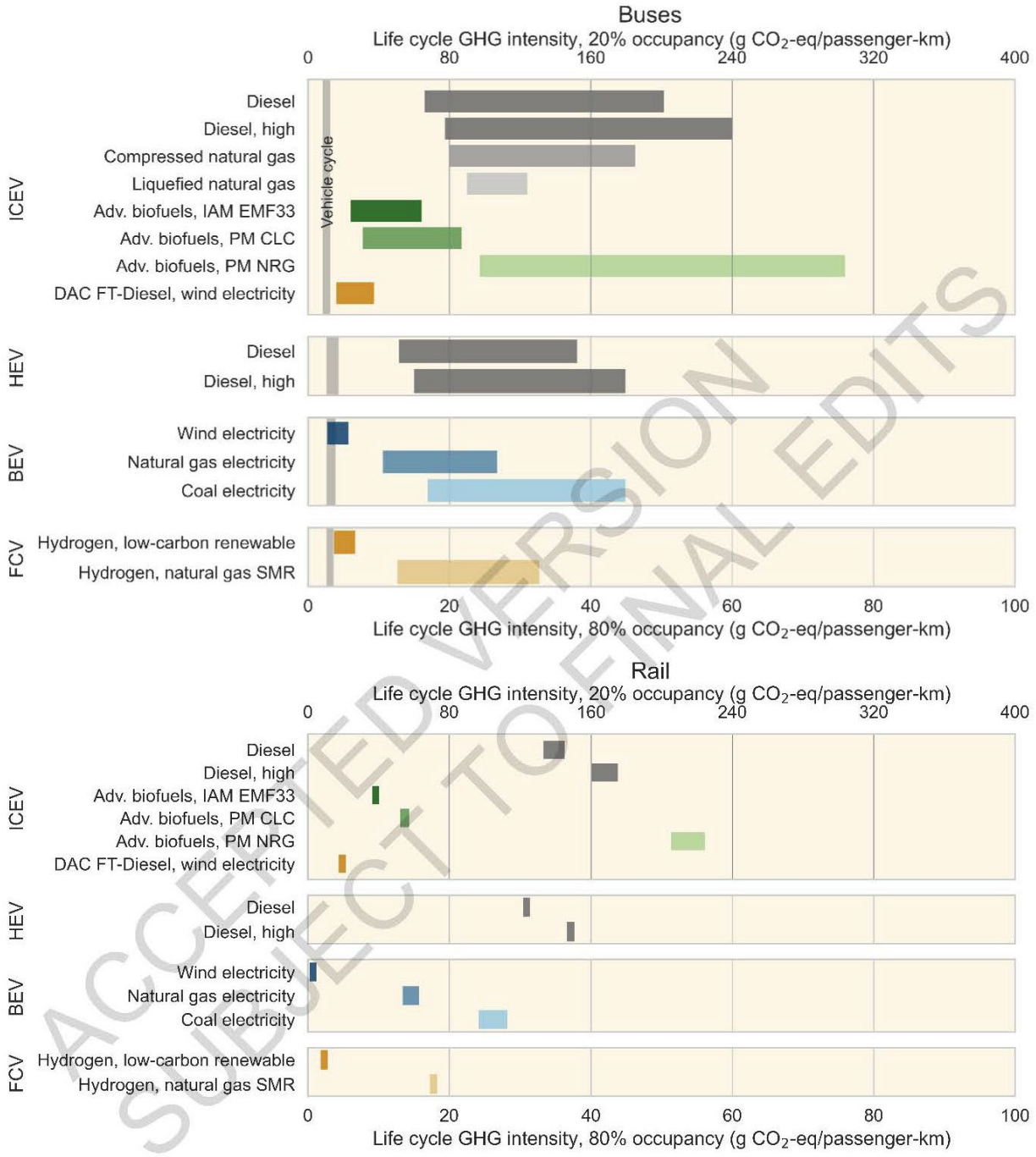
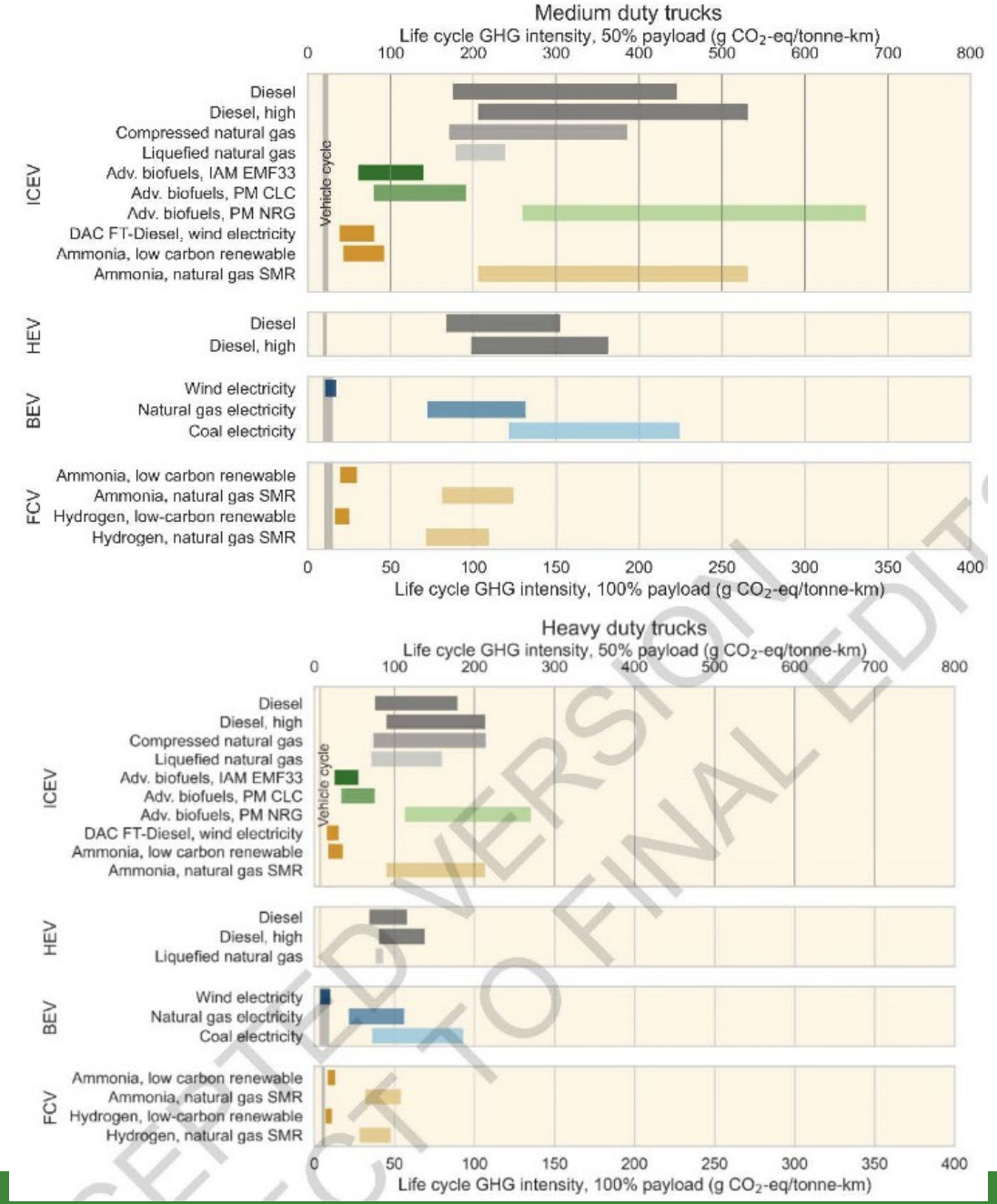
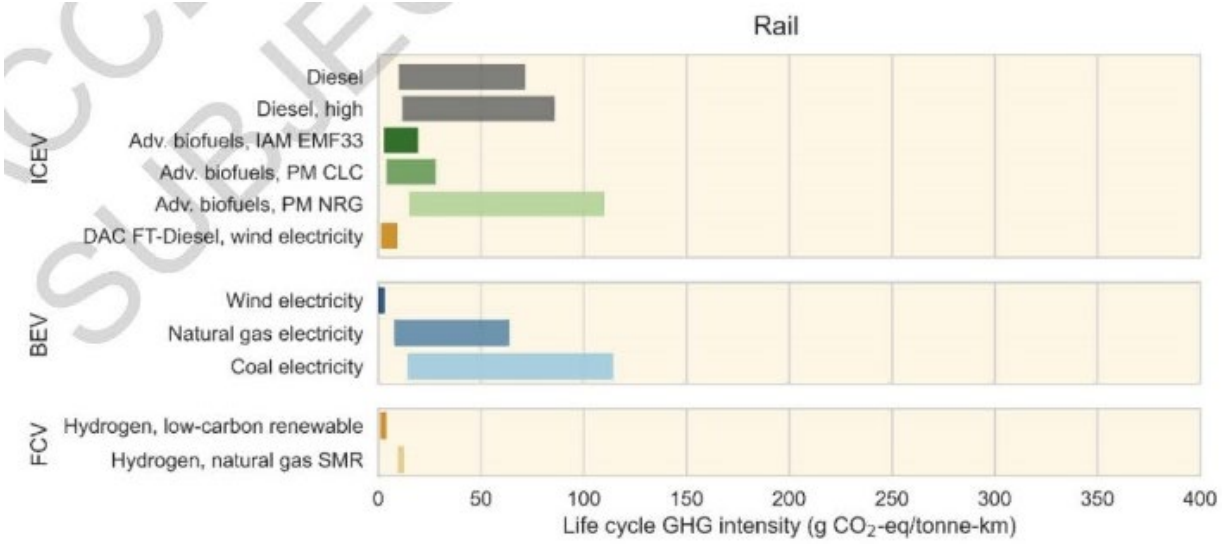


Figure 10.8 Life cycle GHG Intensity of land-based freight technologies and fuel types





Chapter 10: Cross-Chapter Box 7 Urban Form : Simultaneously reducing urban transport emissions, avoiding infrastructure lock-in, and providing accessible services

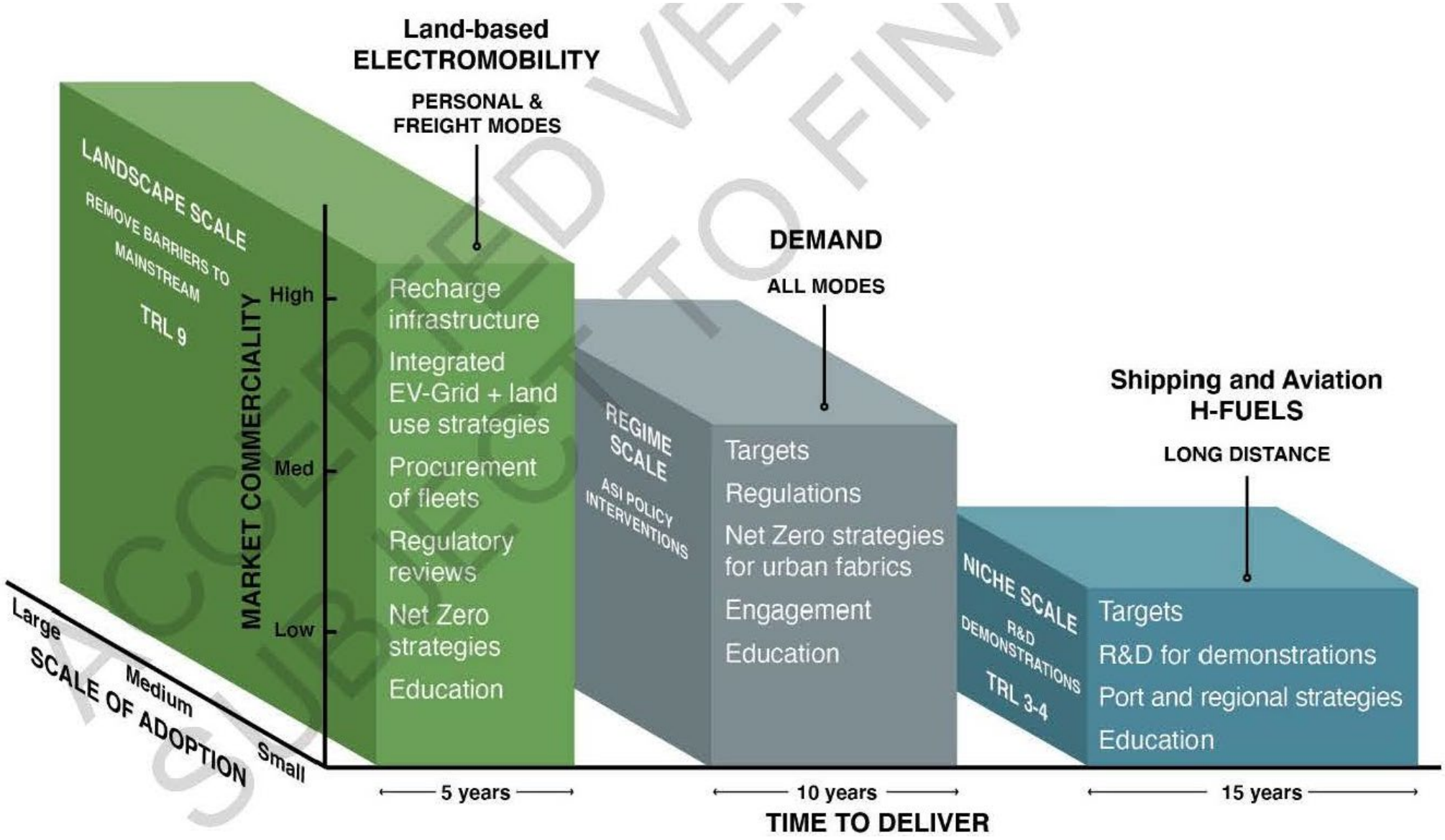
- ***Urban planning and design of cities*** are central to reduce GHG emissions ***without relying simply on technologies***. It will influence the ability to overcome the ***lock-in around automobile use***.

- Urban infrastructures can make a difference in energy use and induced GHG emissions. Ongoing urbanisation patterns risk future lock-in of induced demand on GHG emissions, constraining lifestyles to energy intensive and high CO2-related technologies

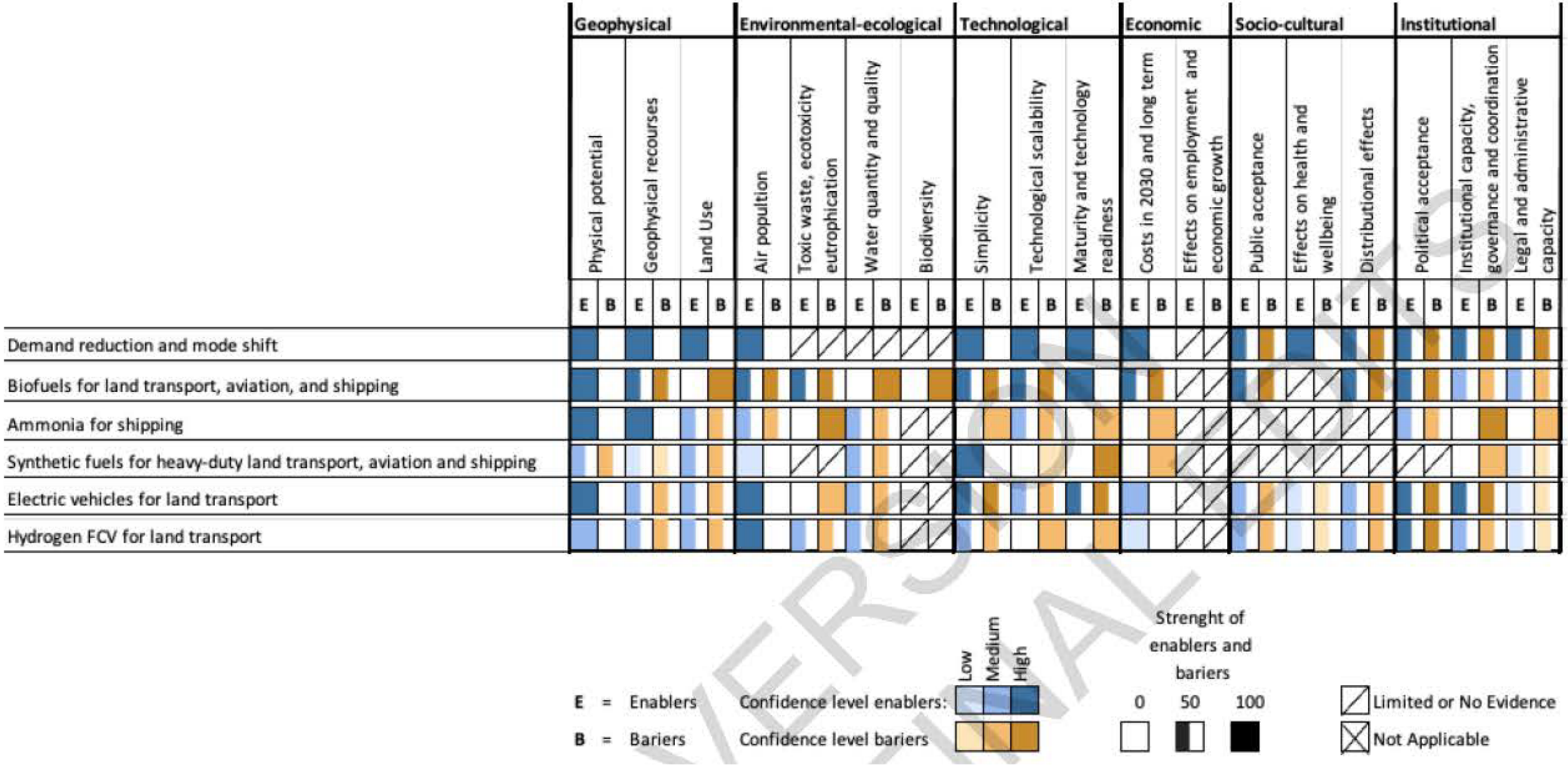
- ***Low-carbon highly accessible urban design*** could reduce GHG emission and provides more inclusive city services related to wellbeing.

- ***Solutions involve planning cities around walkable sub-centres, where multiple destinations, such as shopping, jobs, leisure activities, and others, can be accessed within a 10 minute walk or bicycle ride.***

Transport Mitigation Options and Enabling Conditions



Feasibility Assessment of several mitigation options on Transport Sector



Thank you very much!

nugroho@iges.or.jp