

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)

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1. General Overview of SPM
2. Key important Figures in SPM (Fig 3, Fig 6, Fig 7, Fig 8)
3. Executive Summary of Chapter Transport
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5. Highlights from Chapter Transport

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*

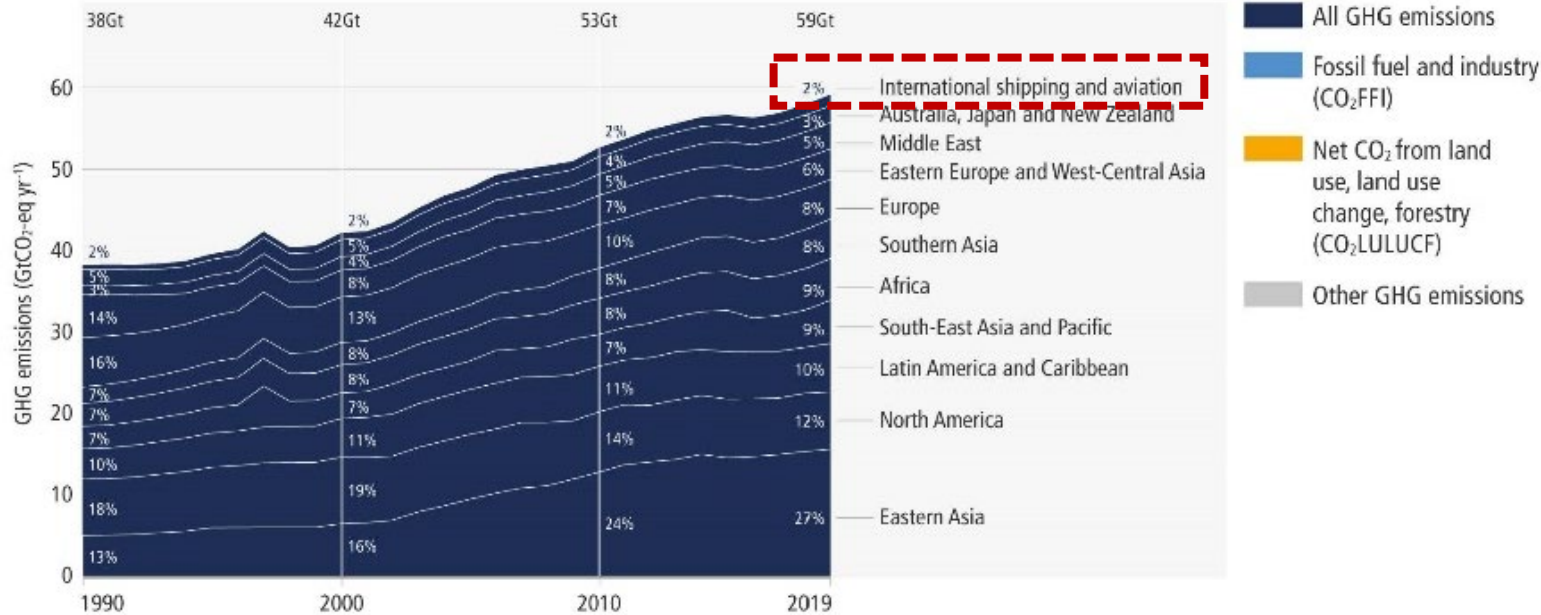
D. Linkages between mitigation, adaptation and SDGs. *There are three (3) headlines statements*

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

a. Global net anthropogenic GHG emissions by region (1990–2019)



b. Historical cumulative net anthropogenic CO₂ emissions per region (1850–2019)

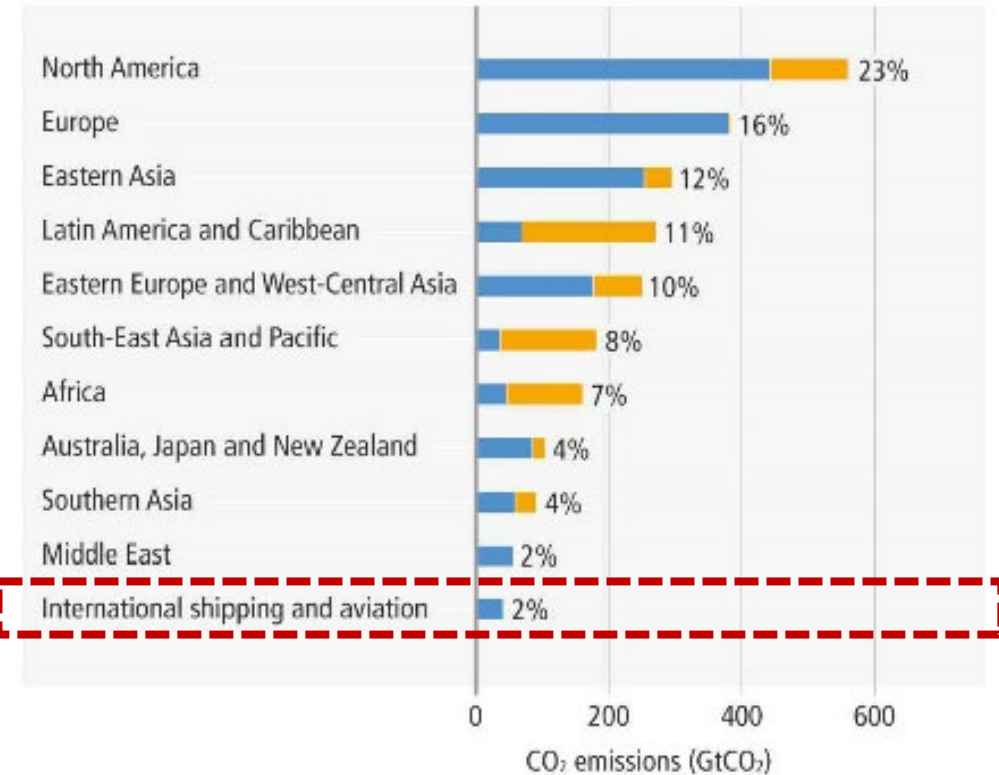


Figure SPM3 Unit cost reductions and use in some rapidly changing mitigation technologies

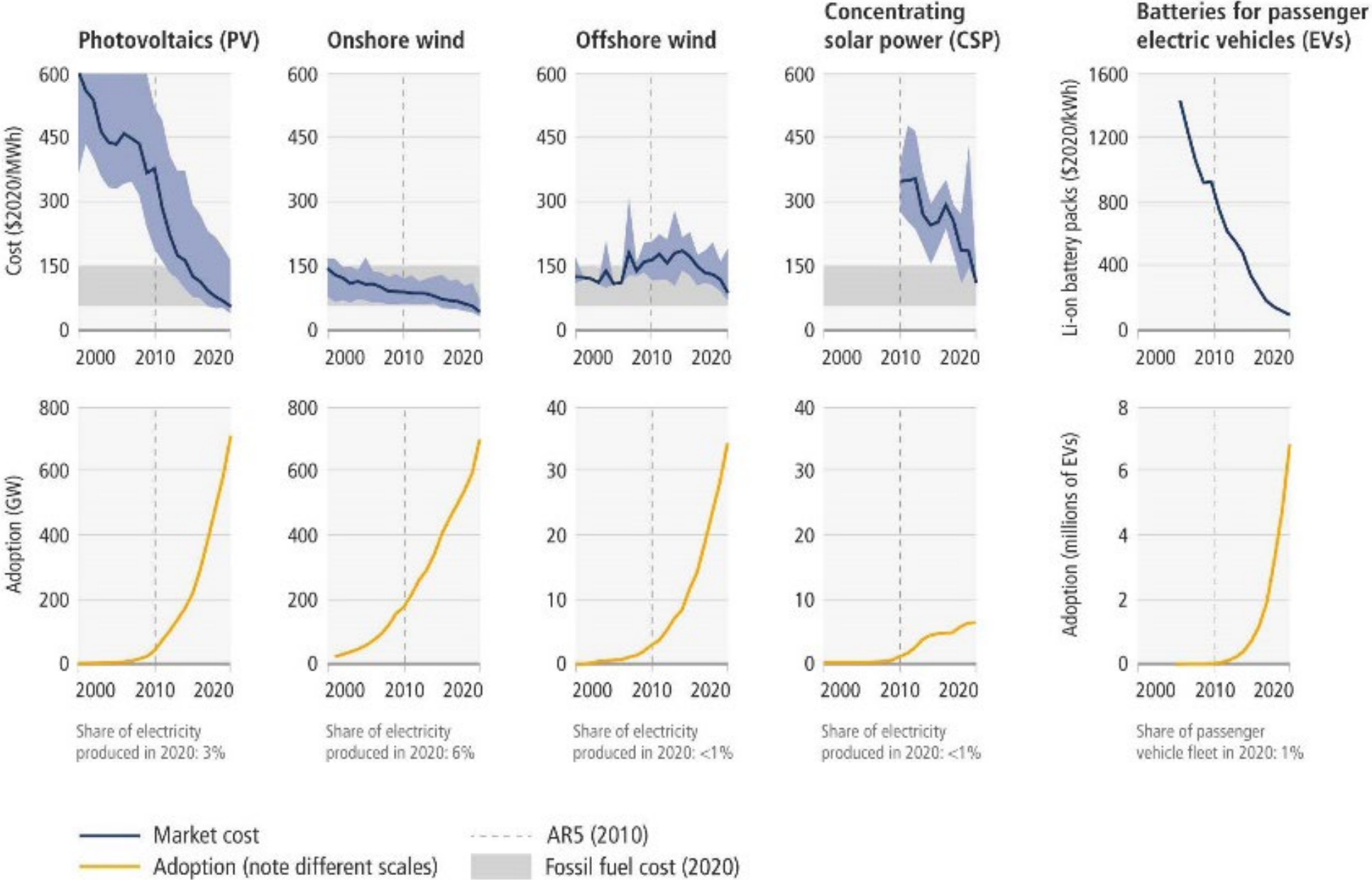


Figure SPM6 Indicative potential of demand-side mitigation options on Transport Sector by 2050

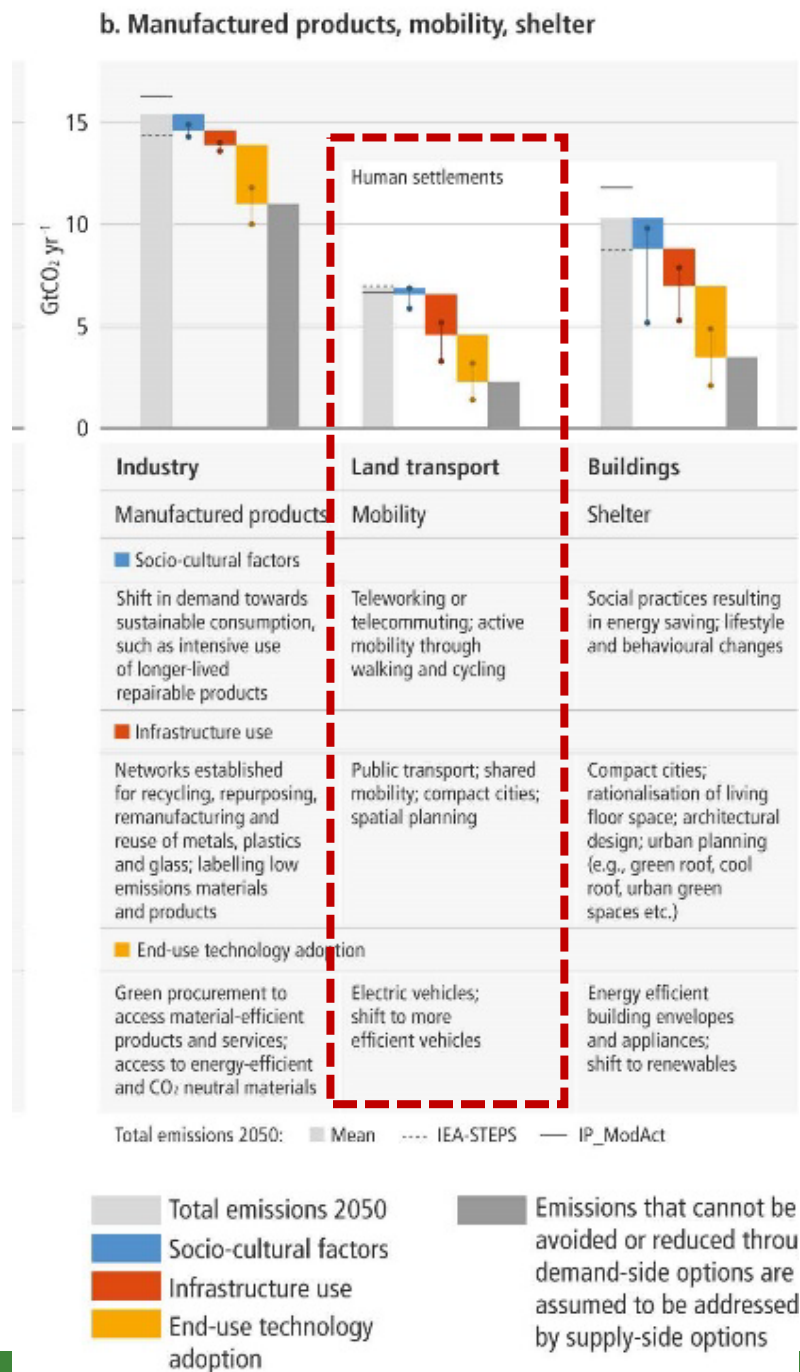


Figure SPM7 Overview of mitigation options and their estimated ranges of costs and potentials in 2030.

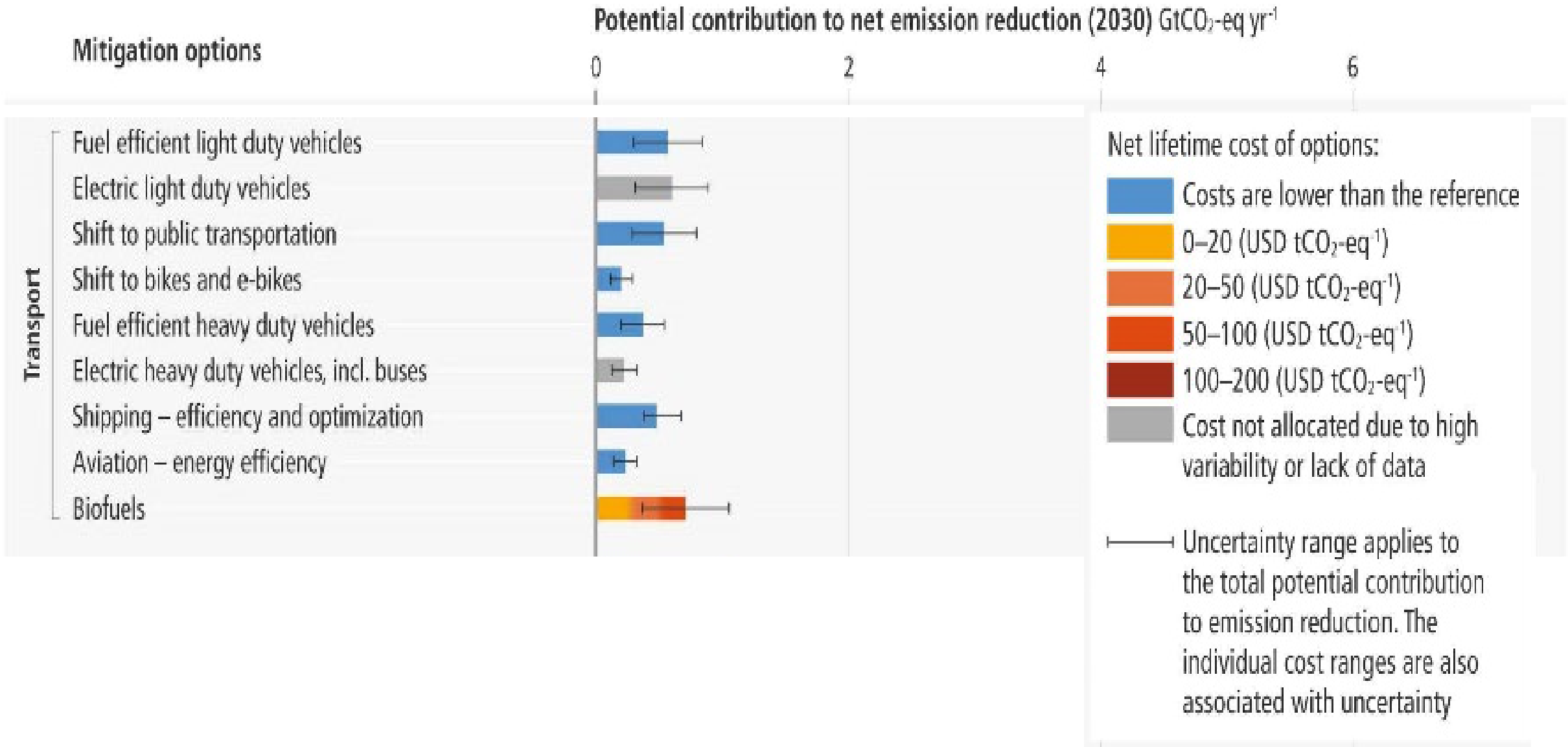
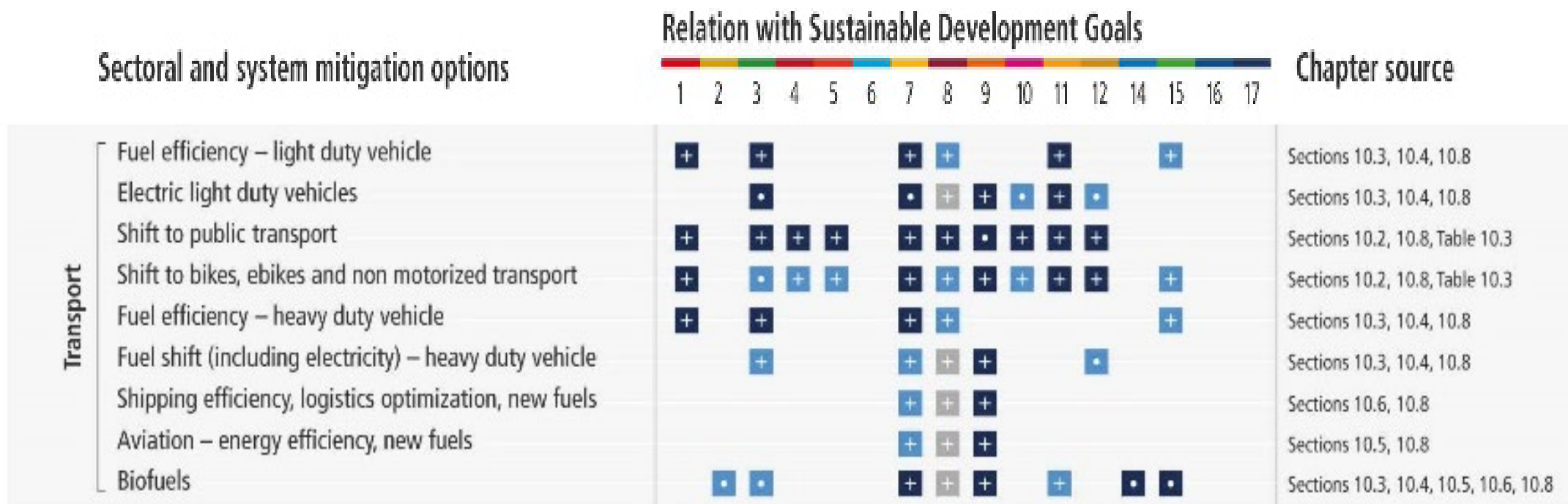


Figure SPM8 Synergies and Trade-offs between sectoral and system mitigation options and the SDGs



Type of relations:

- + Synergies
- Trade-offs
- Both synergies and trade-offs¹
- Blanks represent no assessment⁵

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 GtCO₂eq 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)

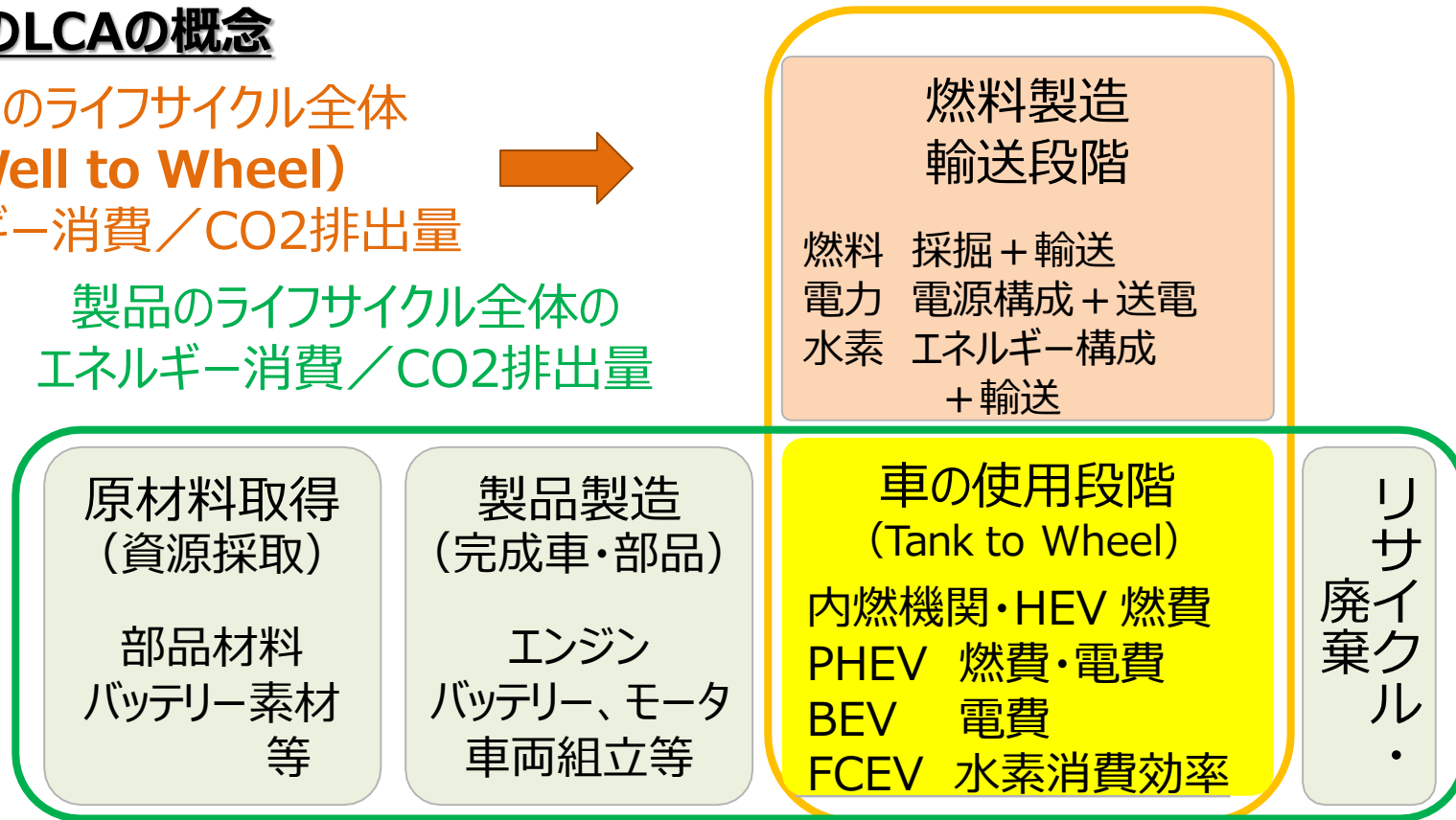
自動車のライフサイクルでの重要性

- 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

製品全体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

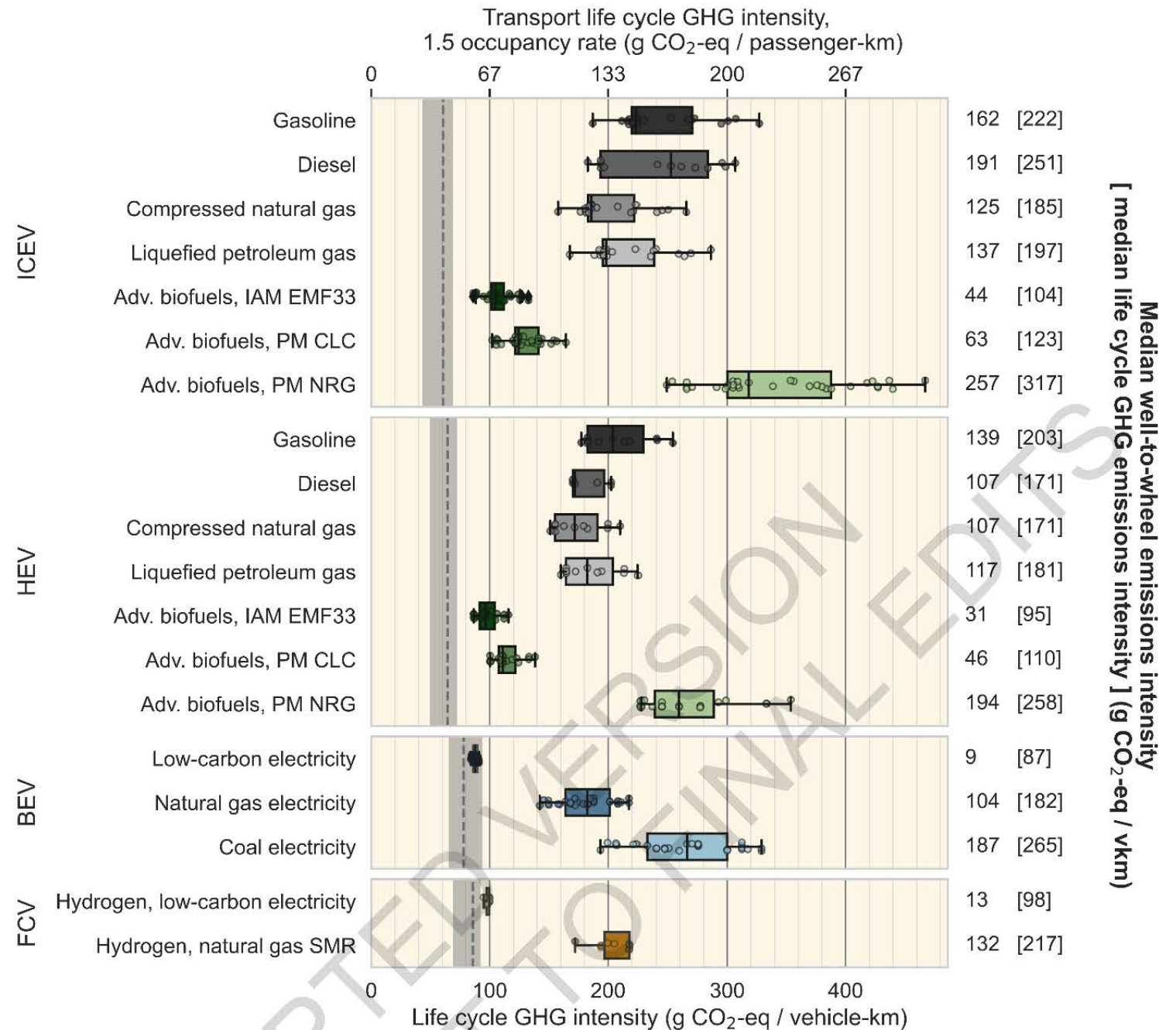
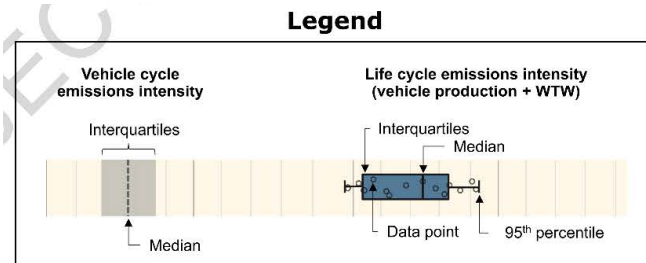


Figure 10.6 Life cycle GHG intensity of land-based bus and rail technologies

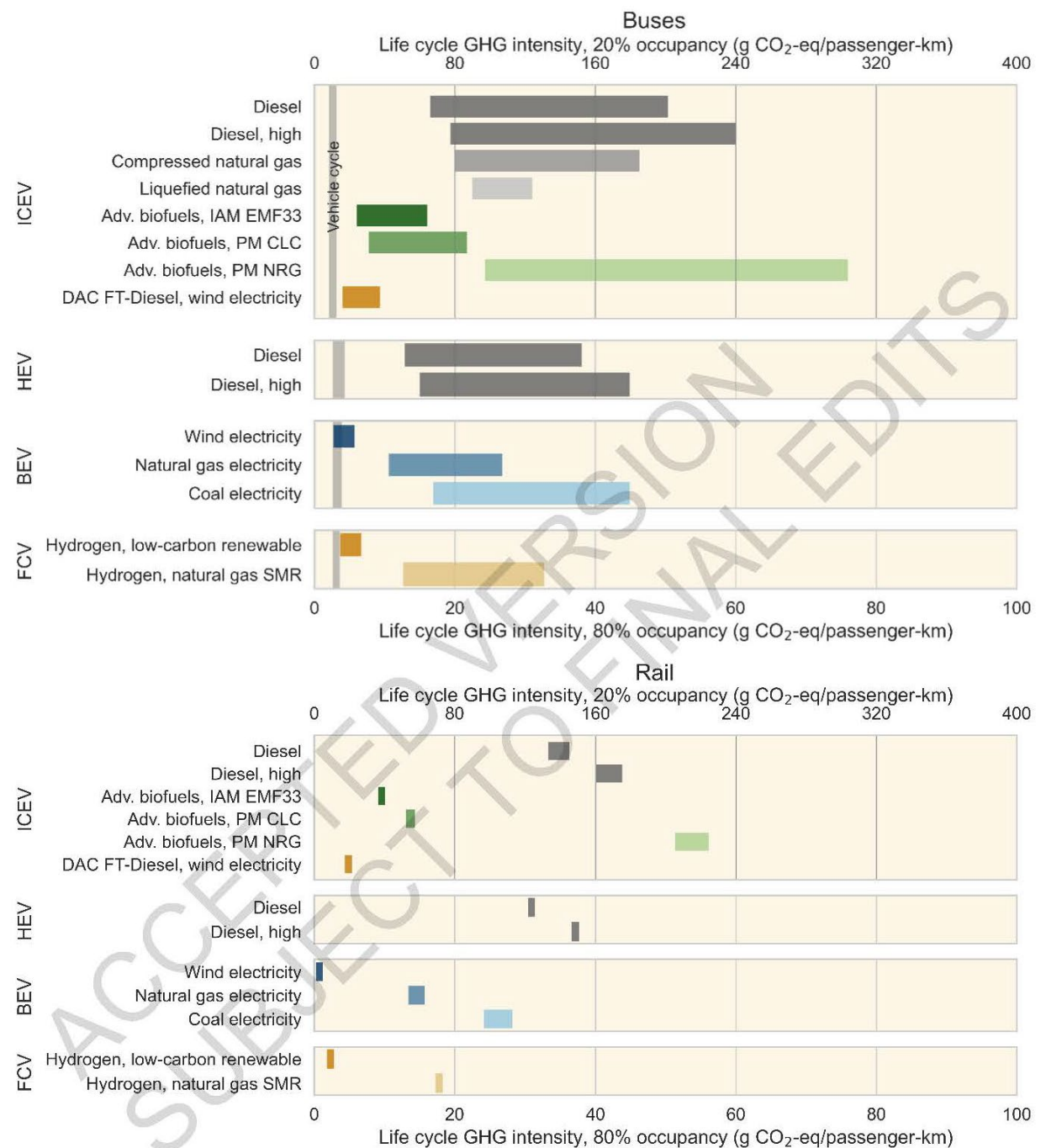
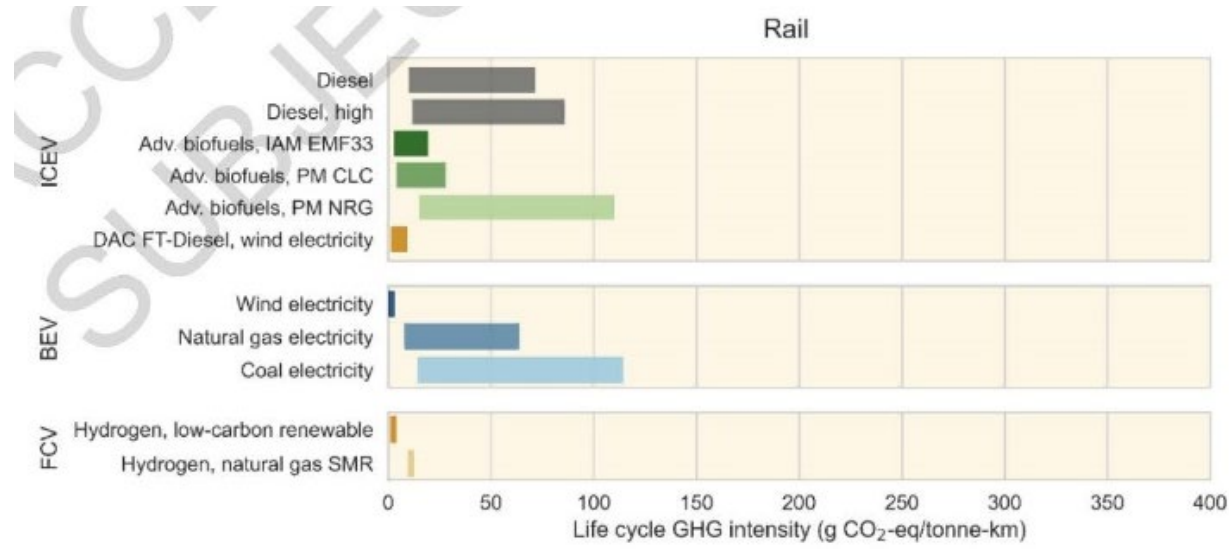


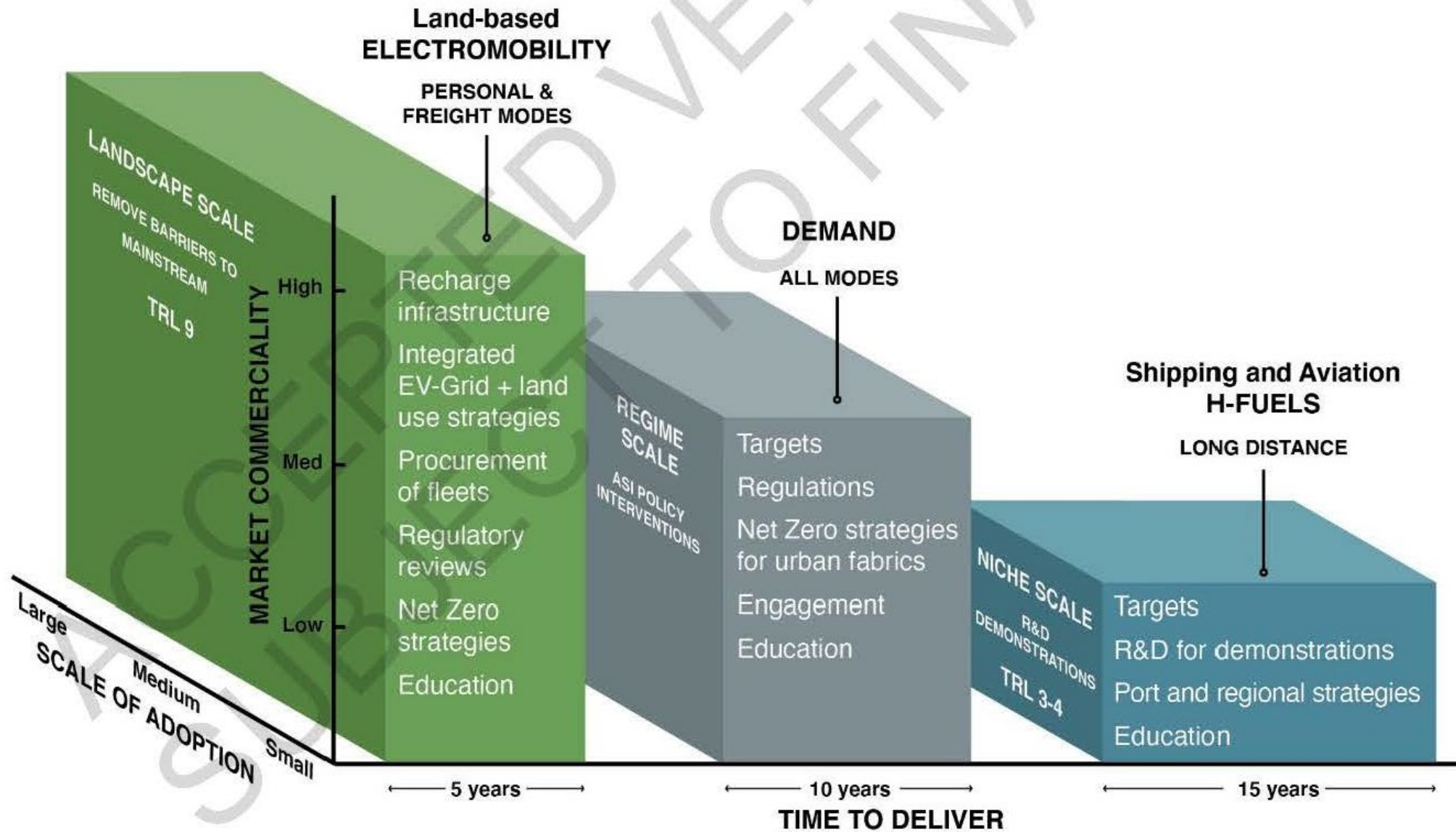
Figure 10.8 Life cycle GHG Intensity of land-based freight technologies and fuel types



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

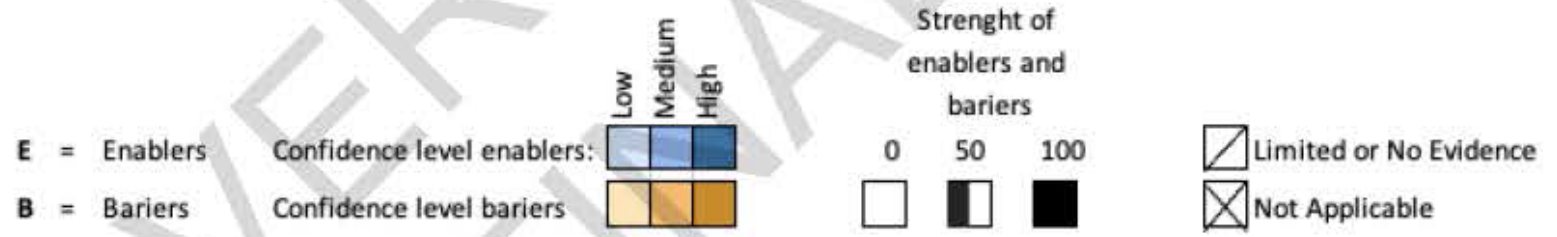
- ***Urban planning and design of cities*** are central to reduce GHG emissions ***without relying simply on technologies***. It will influence the ability to overcome the ***lock-in around automobile use***.
- Urban infrastructures can make a difference in energy use and induced GHG emissions. Ongoing 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

	Geophysical						Environmental-ecological						Technological			Economic		Socio-cultural			Institutional													
	Physical potential		Geophysical recourses		Land Use		Air popultion		Toxic waste, ecotoxicity eutrophication		Water quantity and quality		Biodiversity		Simplicity	Technological scalability		Maturity and technology readiness	Costs in 2030 and long term		Effects on employment and economic growth		Public acceptance	Effects on health and wellbeing		Distributional effects		Political acceptance	Institutional capacity, governance and coordination		Legal and administrative capacity			
	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
Demand reduction and mode shift	Blue		Blue		Blue		Blue		Diagonal	Diagonal	Diagonal	Diagonal	Blue		Blue		Blue		Blue		Blue		Blue		Blue		Blue		Blue		Blue		Blue	
Biofuels for land transport, aviation, and shipping	Blue		Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange
Ammonia for shipping	Blue		Blue		Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange
Synthetic fuels for heavy-duty land transport, aviation and shipping	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange
Electric vehicles for land transport	Blue		Blue	Orange	Blue	Orange	Blue		Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange
Hydrogen FCV for land transport	Blue		Blue	Orange	Blue	Orange	Blue		Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange	Blue	Orange



Summary

- The recent development and current trends shows the emissions from urban sectors was increased; there is regional differences in term of GHG emissions per capita while emission from shipping and aviation are cross countries and regions, there was a cost reduction for low-carbon Technologies.
- To limit the global warming from transport sector need system transformation across energy system, urban sectors, demand-side management and low-carbon technology interventions
- Climate mitigation on transport sector also has linkage with adaptation or transport resilient and also Sustainable Development Goals (SDGs). Strengthening the mitigation actions on transport sector need the feasibility assessment at near term; shift development pathways and accelerate transitions; Governance and stakeholder engagement; Regulatory and Economic Instruments; and International Cooperation as critical enablers for achieving ambitious targets in the future.

Thank you very much!

nugroho@iges.or.jp