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Sustainable Freight Transport Systems: Opportunities for Developing Countries

14-16 October 2015

TOWARDS AN ENVIRONMENTALLY-SUSTAINABLE FREIGHT TRANSPORT SYSTEM: SETTING THE SCENE

by

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Towards an Environmentally-Sustainable Freight Transport System: Setting the Scene

Professor Alan McKinnon

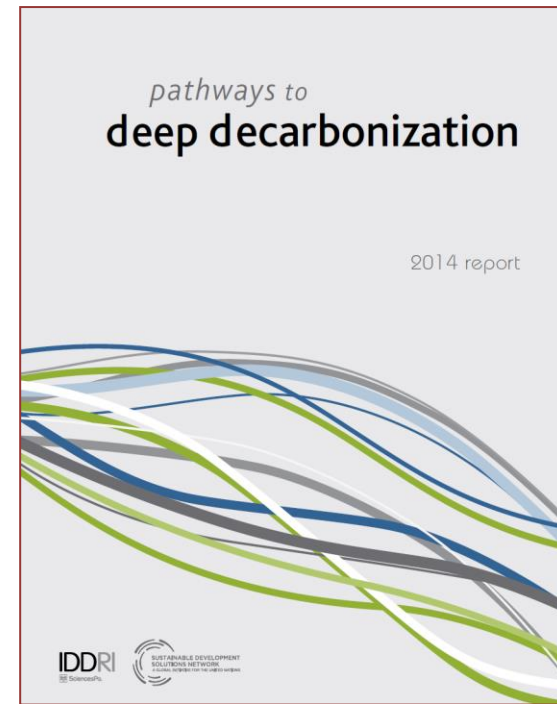
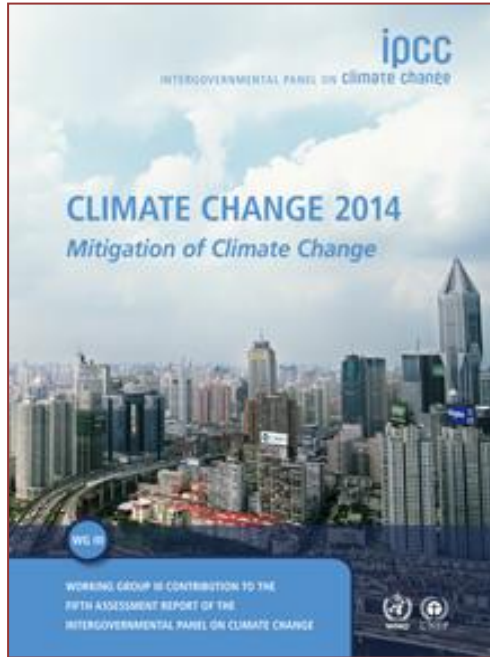
Kuehne Logistics University

Sustainable Freight Transport Systems Meeting
UNCTAD

Geneva
October 2015

Climate Challenge for the Freight Transport Sector

5th Assessment Report of the IPCC



Transport:

2010: 7 billion tonnes of CO₂
2050: 12 billion tonnes of CO₂

2050 limit on CO₂ emissions from all activity:
20 billion tonnes

To retain its 14% share transport must
reduce CO₂ emissions to

2.8 billion tonnes by 2050

freight transport = one of the hardest
sectors to decarbonise

On a BAU basis, freight share of total
carbon emissions likely to rise from

7% (2010) to 16% (2050)

Potential for Decarbonising Freight Transport in 15 Countries: 2010 - 2050

decoupling of freight
tonne-km from GDP



freight transport intensity

Decoupling energy
use from freight t-km



energy intensity of freight transport

Decoupling freight energy
use from related emissions

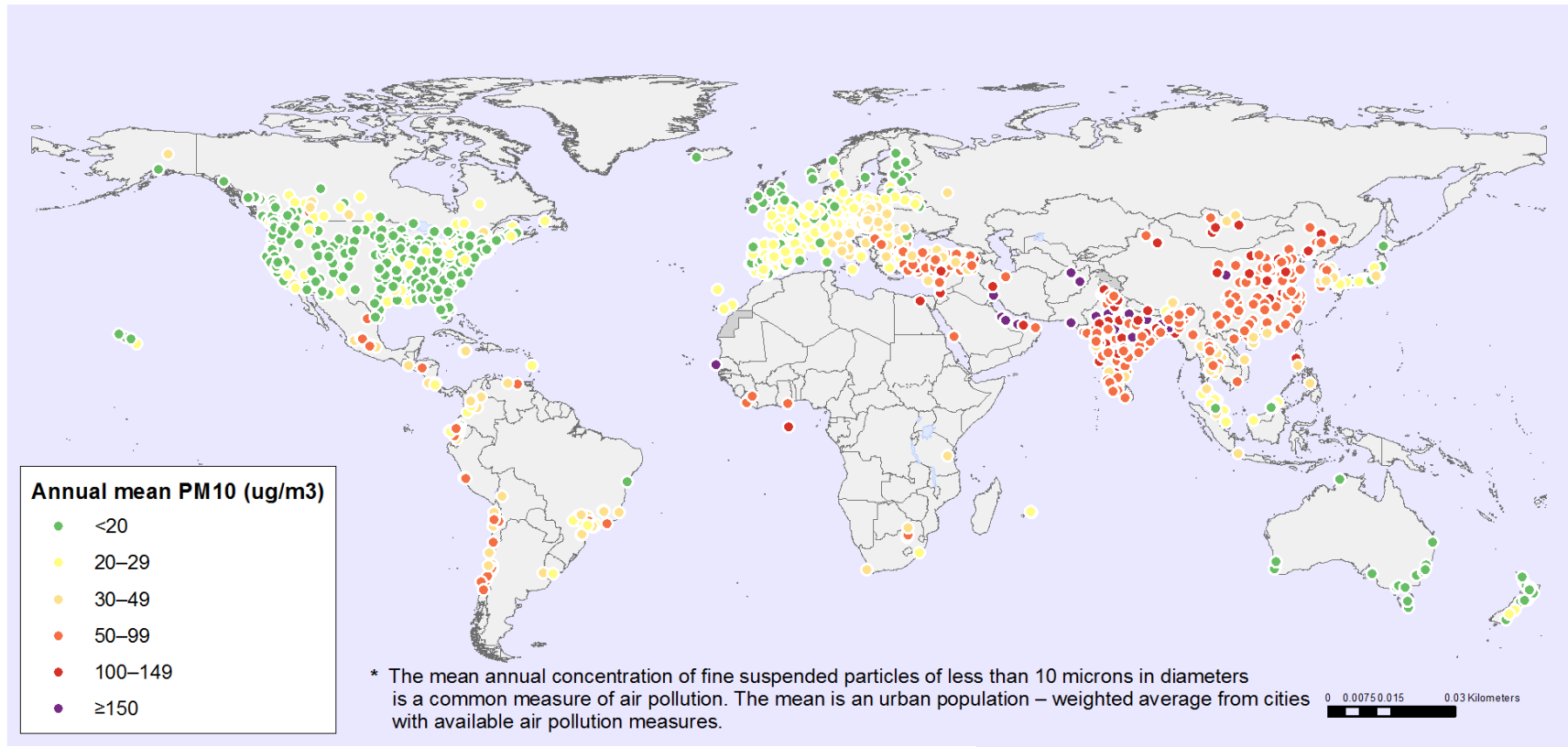


carbon intensity of freight energy



Other Freight Transport Pollutants

Average Exposure to PM₁₀ in 1600 Urban Areas (2008-2013)



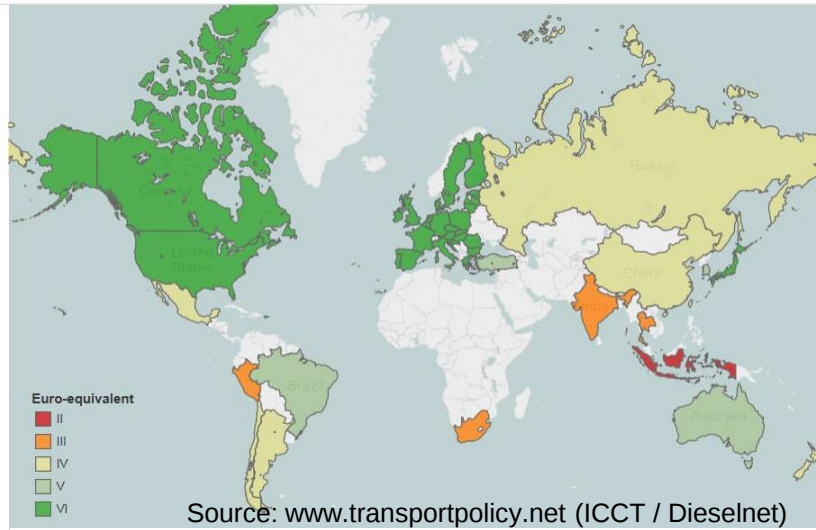
Data Source: World Health Organization
Map Production: Health Statistics and
Information Systems (HSI)
World Health Organization



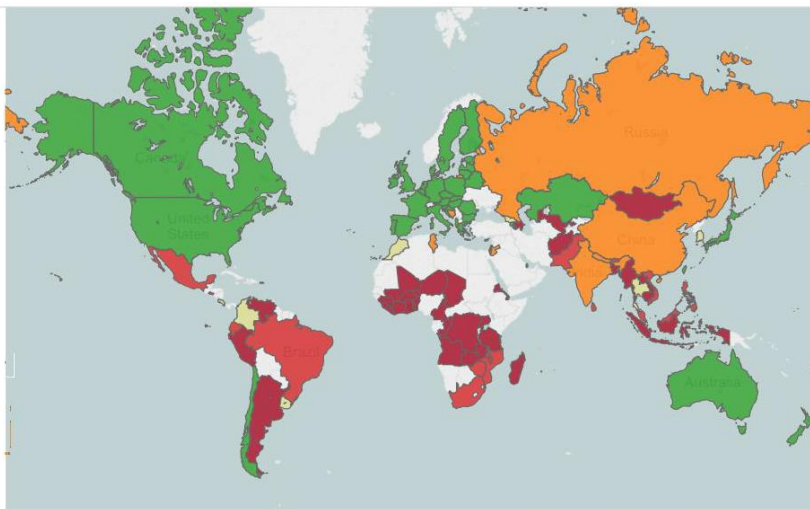
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Transfer of Green Freight best practice from
developed to developing countries?

International Variations in Green Freight Parameters

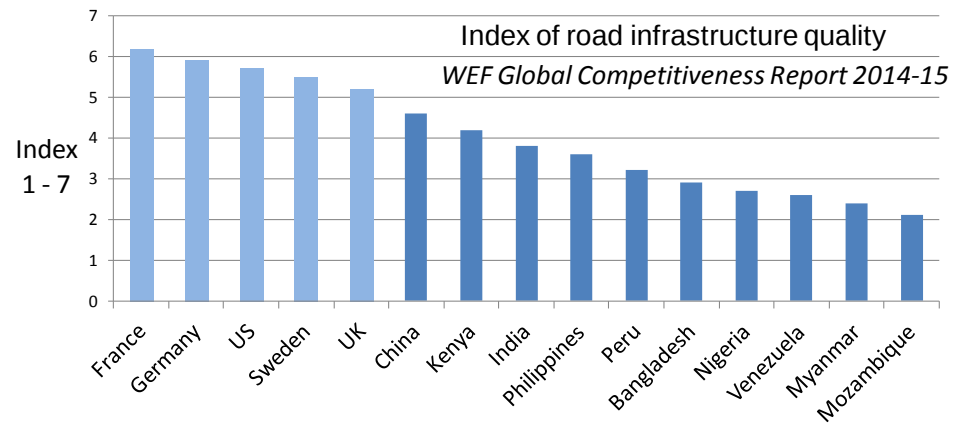
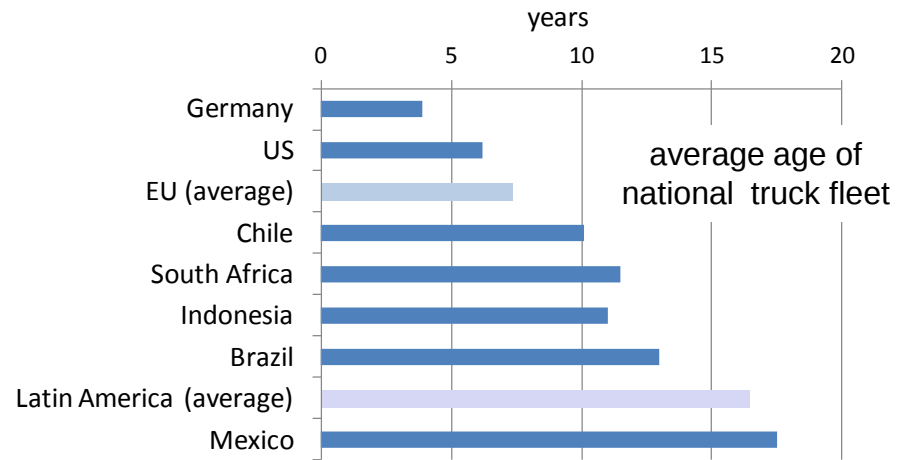


National emissions standards for diesel trucks (2014)



Sulphur content in Diesel Fuel (2014)

subsidisation vs taxation of diesel fuel



Truck design and capacity

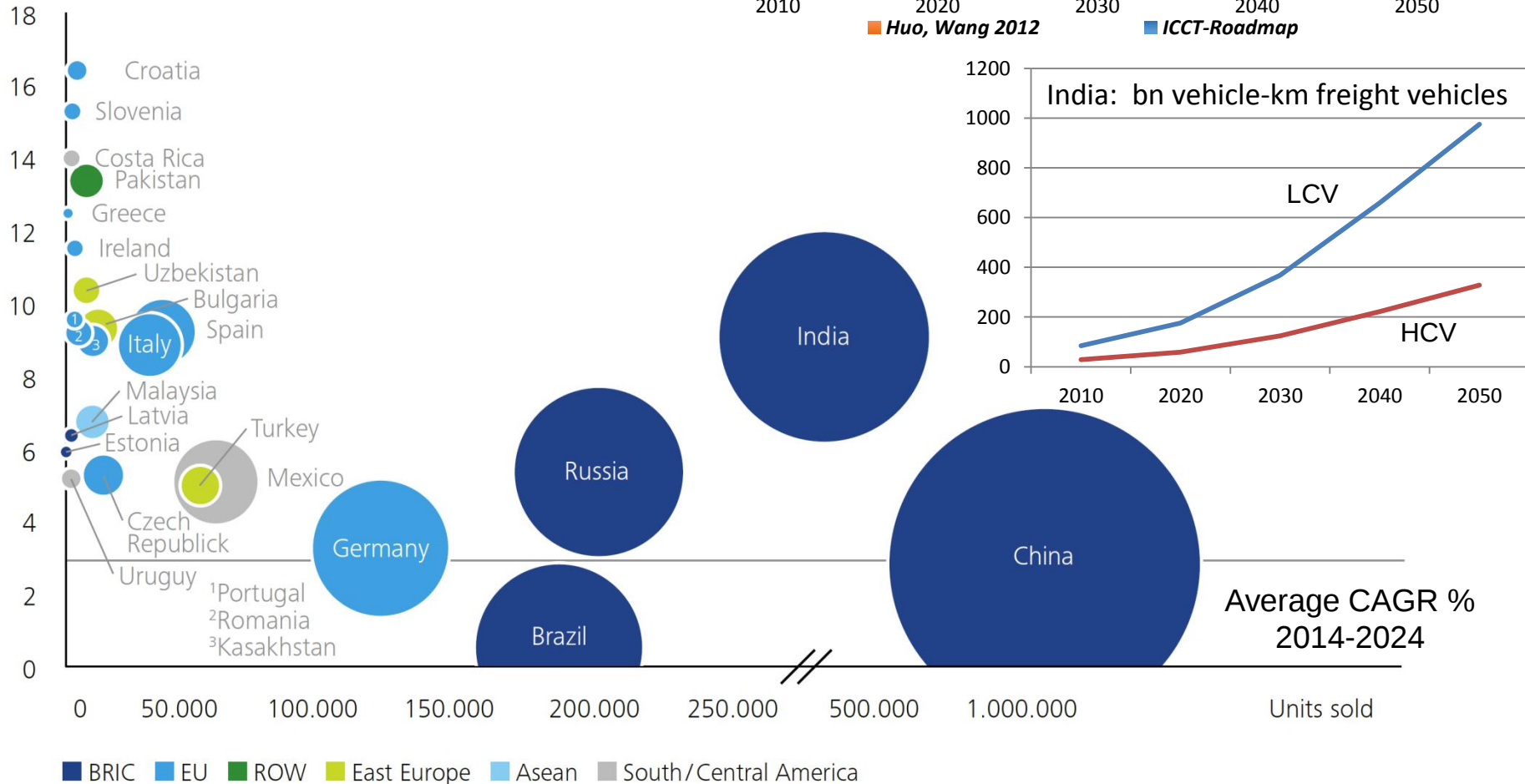


Tyres



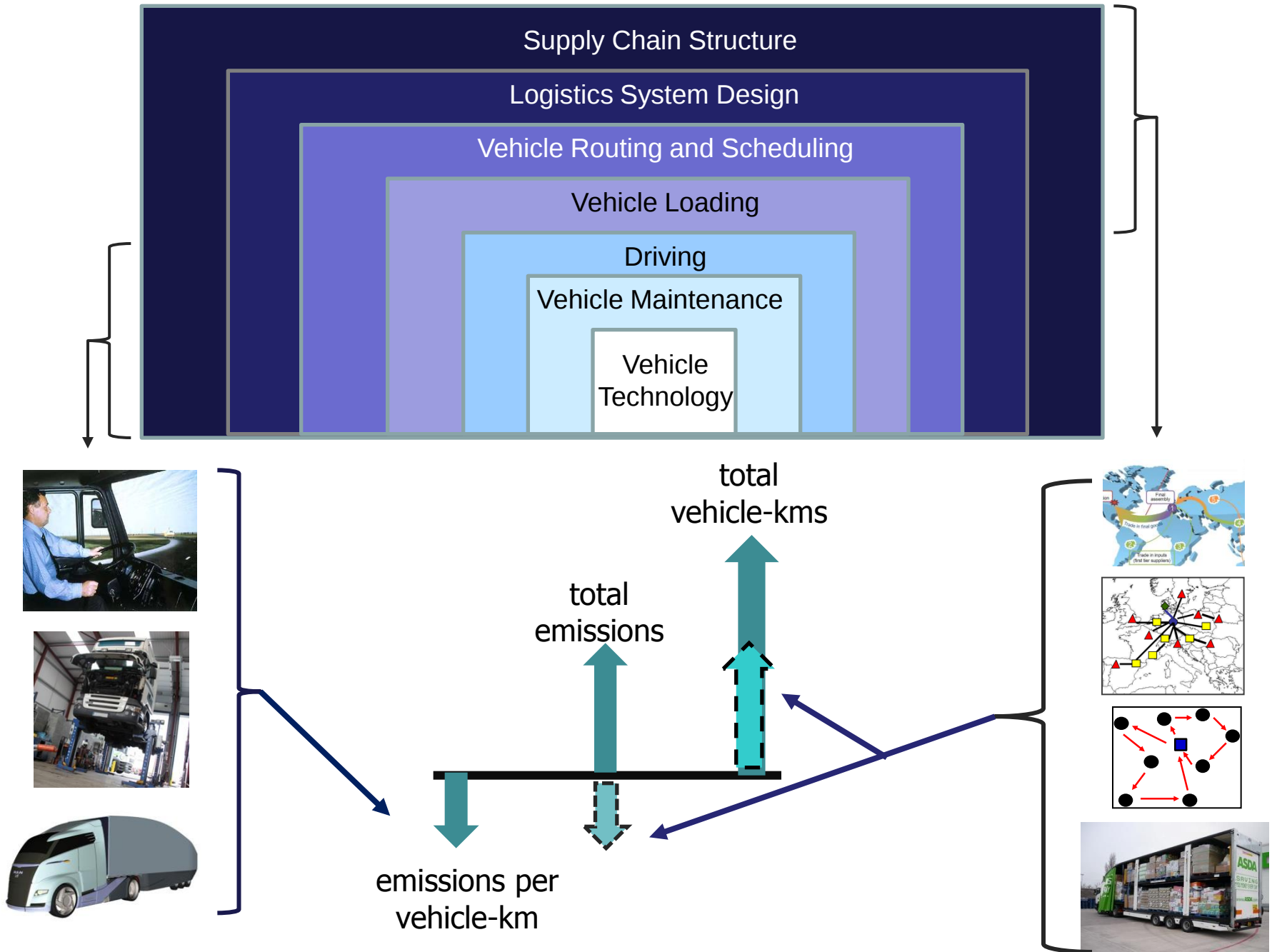
Forecast growth of global truck market: 2014-2024

% growth 2014-2024

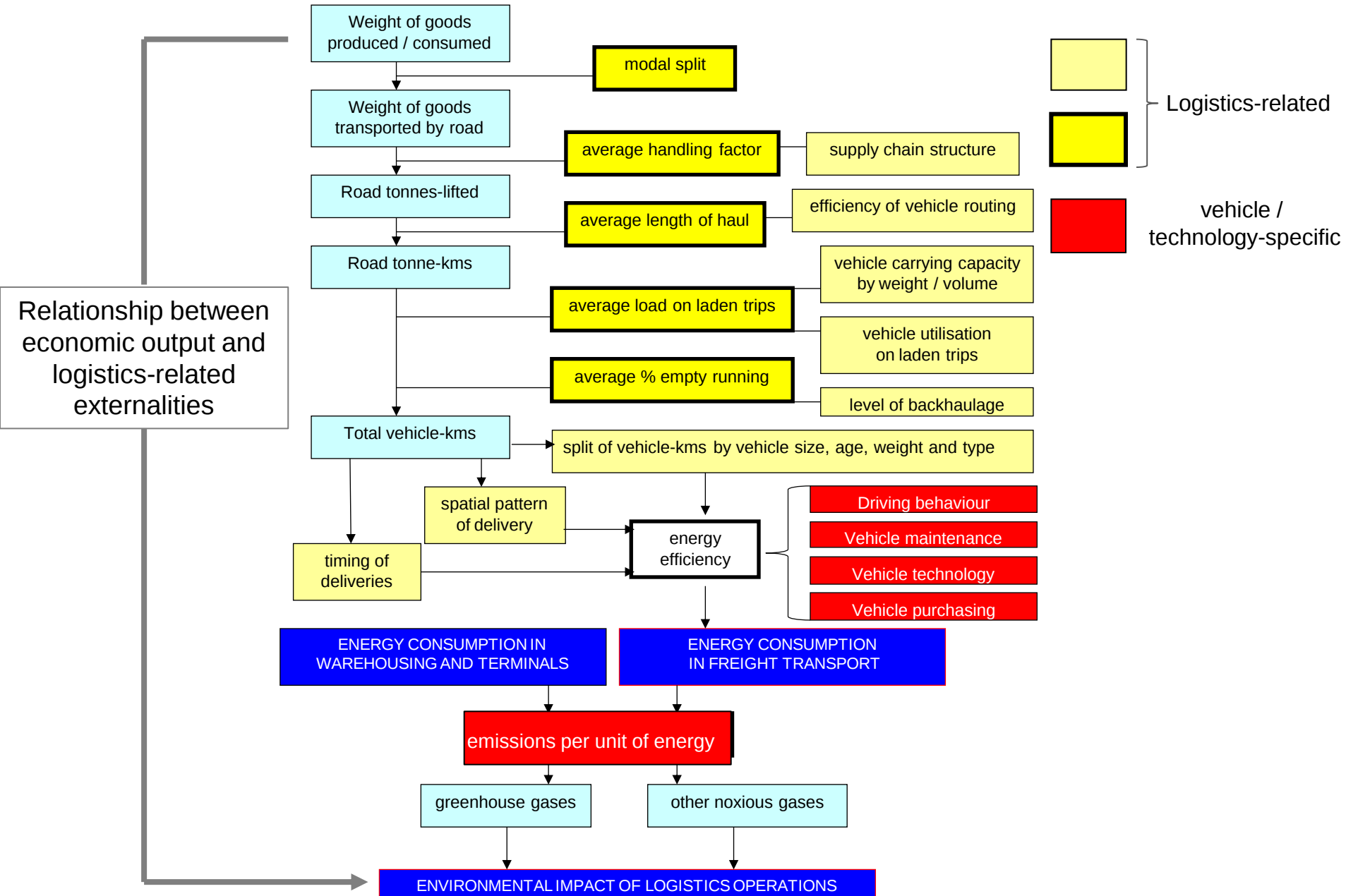


Source: Deloitte – 'Truck Market 2024'

Scope of a Green Logistics Programme



Analytical Framework for Green Logistics



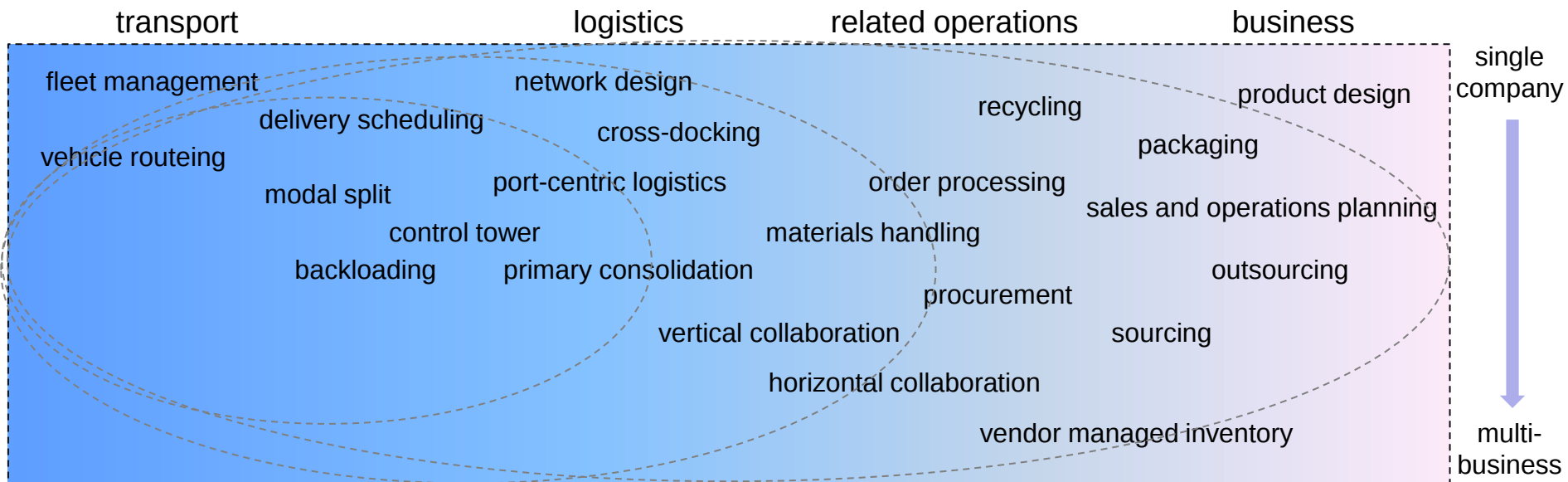
Scoping of Logistics Interventions



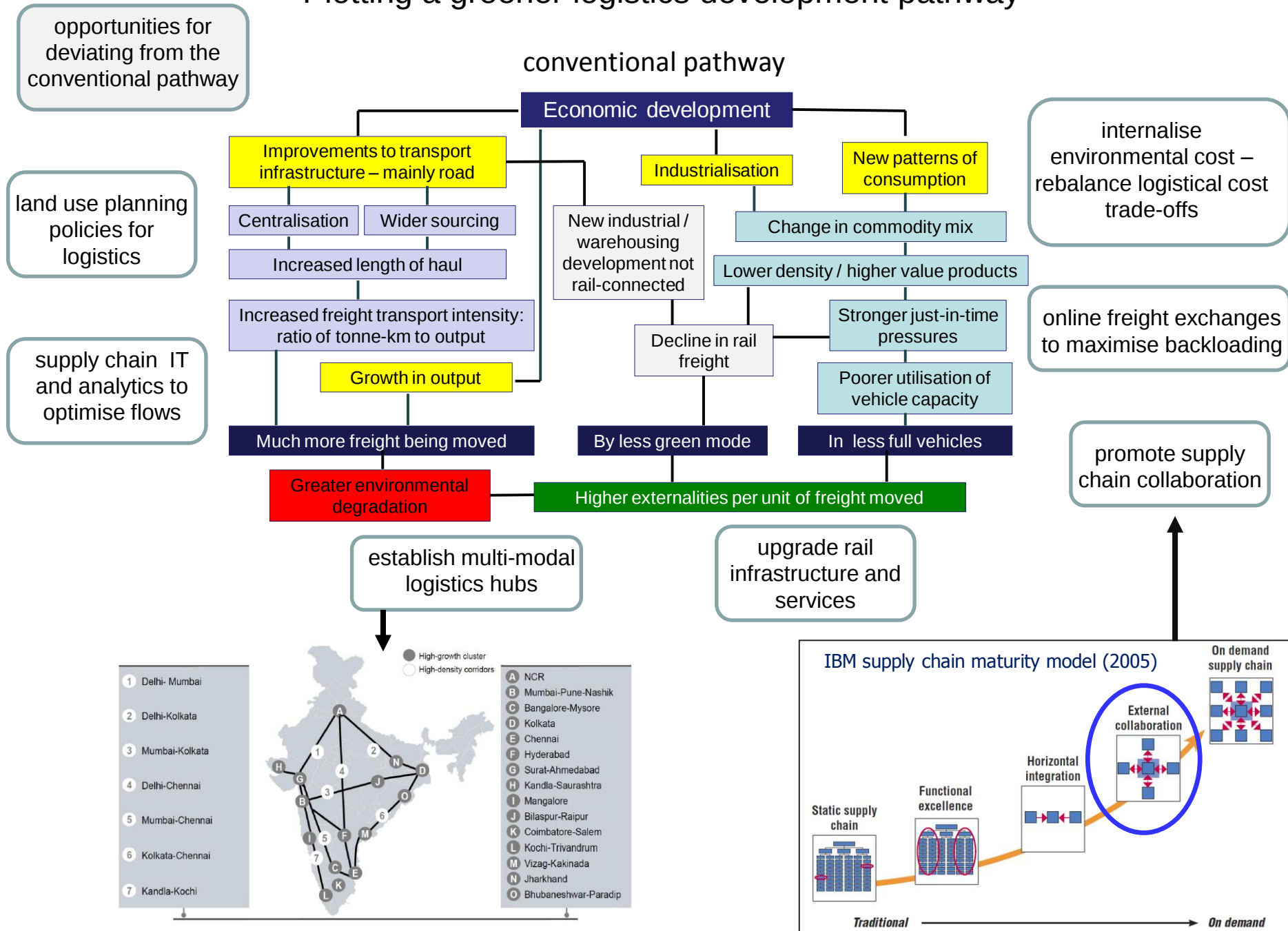
logistics $\neq$ transport



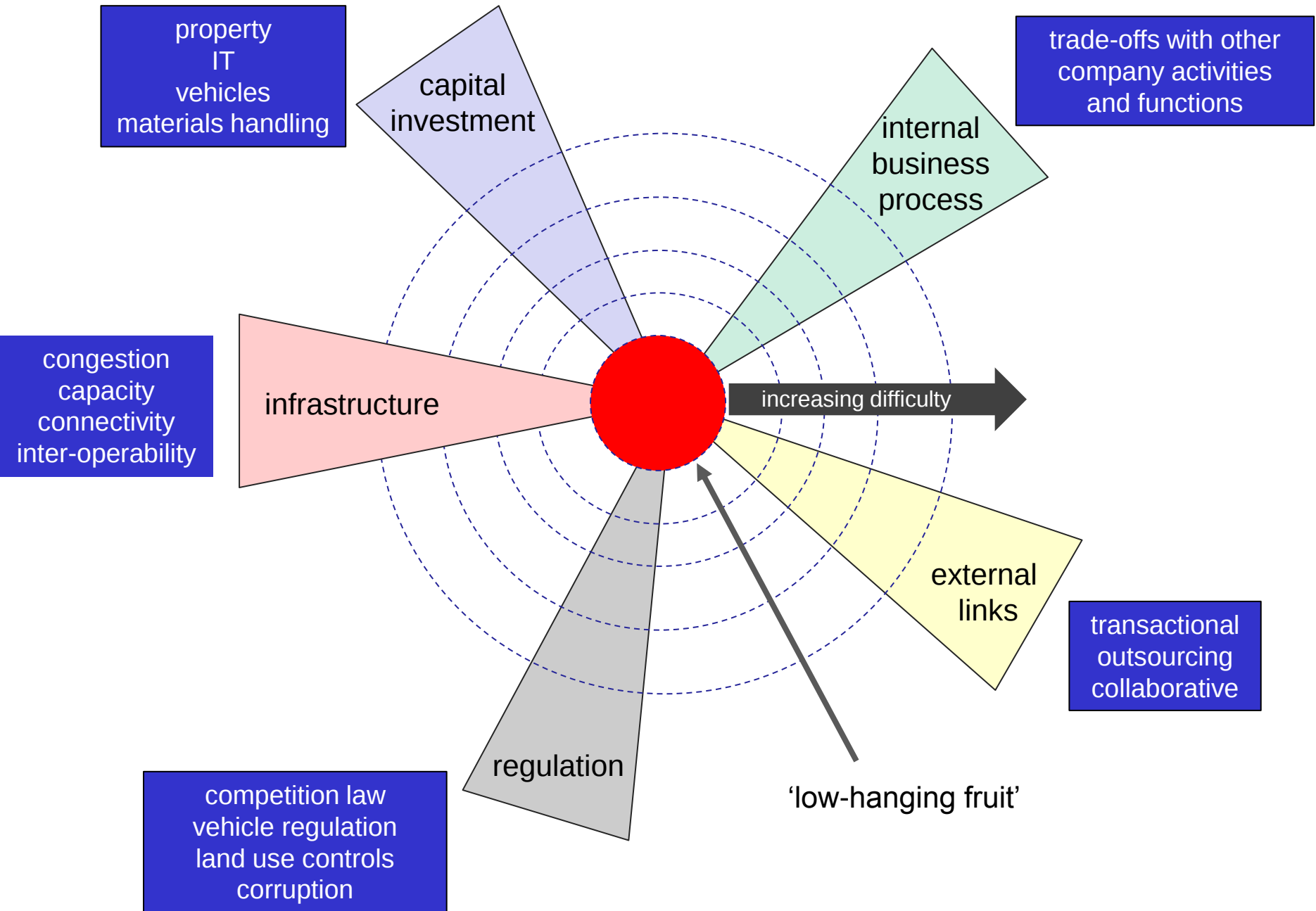
delimiting the boundary around logistics initiatives



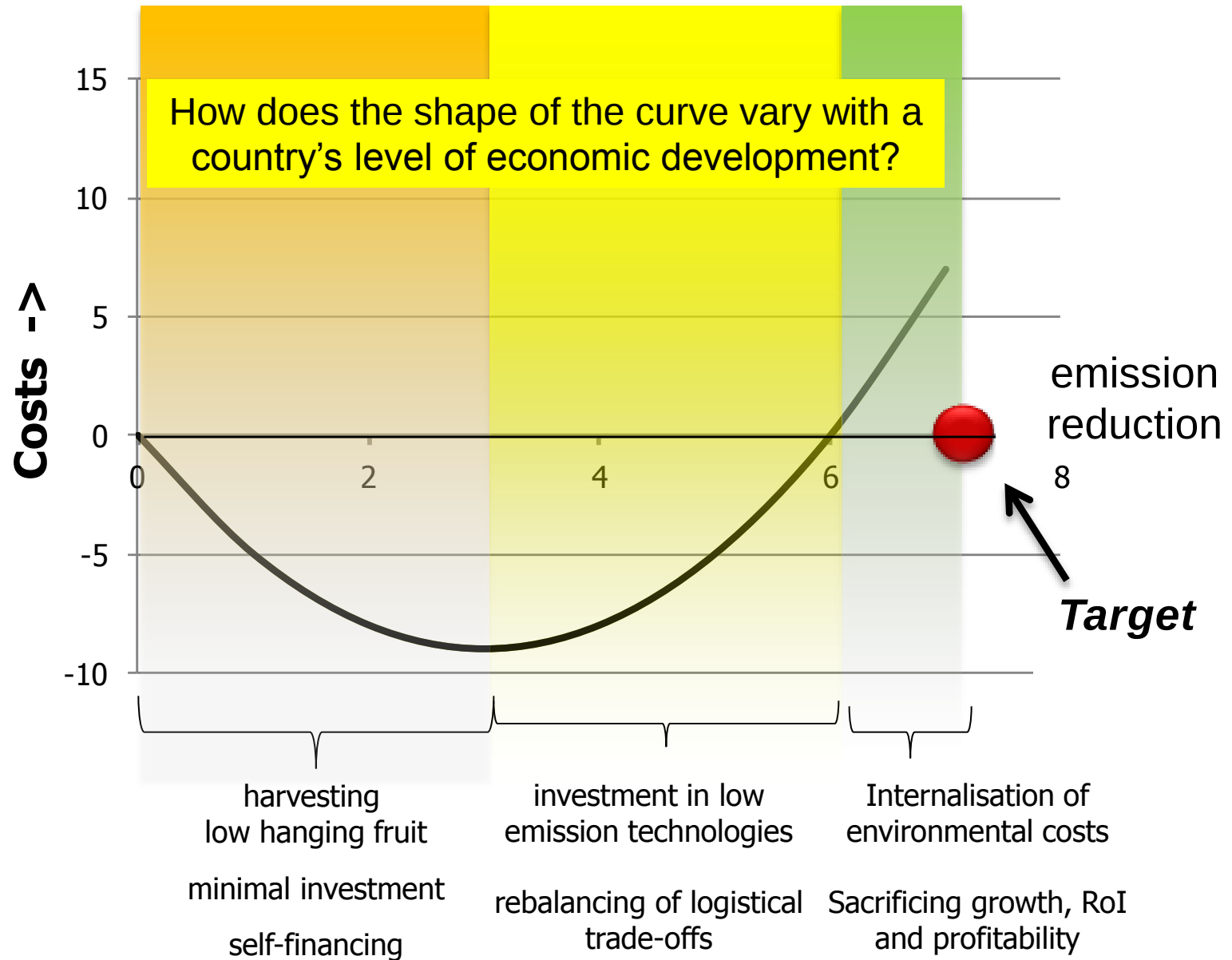
Plotting a greener logistics development pathway



Logistics interventions: *challenges and constraints*



Future economics of greening logistics activities?



Company targets to reduce the carbon intensity of logistics



company	normaliser	time period	% carbon reduction target
Deutsche Post/ DHL	<i>'every letter and parcel delivered, every tonne of cargo transported and every sq.m. of warehouse space'</i>	2007-2020	30%
DB-Schenker	Tonne-km	2006-2020	At least 20%
UPS	UPS Transportation Index	2010-2017	5%
UPS Airlines –Global	Pounds of CO ₂ emitted for every ton of capacity transported on nautical mile	2005-2020	20%
Fedex (aircraft)	available ton mile (ATM)	2005-2020	20%
TNT (Mail and Express)	not specified	2007-2020	45%
Maersk Line	not specified	2007-2020	25%
NYK	<i>'unit of transportation from vessels'</i>	2006-2013	10%

Source: McKinnon and Piecyk, 2012

40% improvement in carbon intensity of global logistics between 2010 and 2020

Reconciling corporate carbon intensity targets with absolute targets of governments

EU 2011 Transport White Paper target: 60% reduction in **TOTAL** CO₂ from transport by 2050

Assessing the effect of **external** factors on the decarbonisation of logistics

TIMBER framework

categories of external factor

Technology

Infrastructure

Market

Behaviour

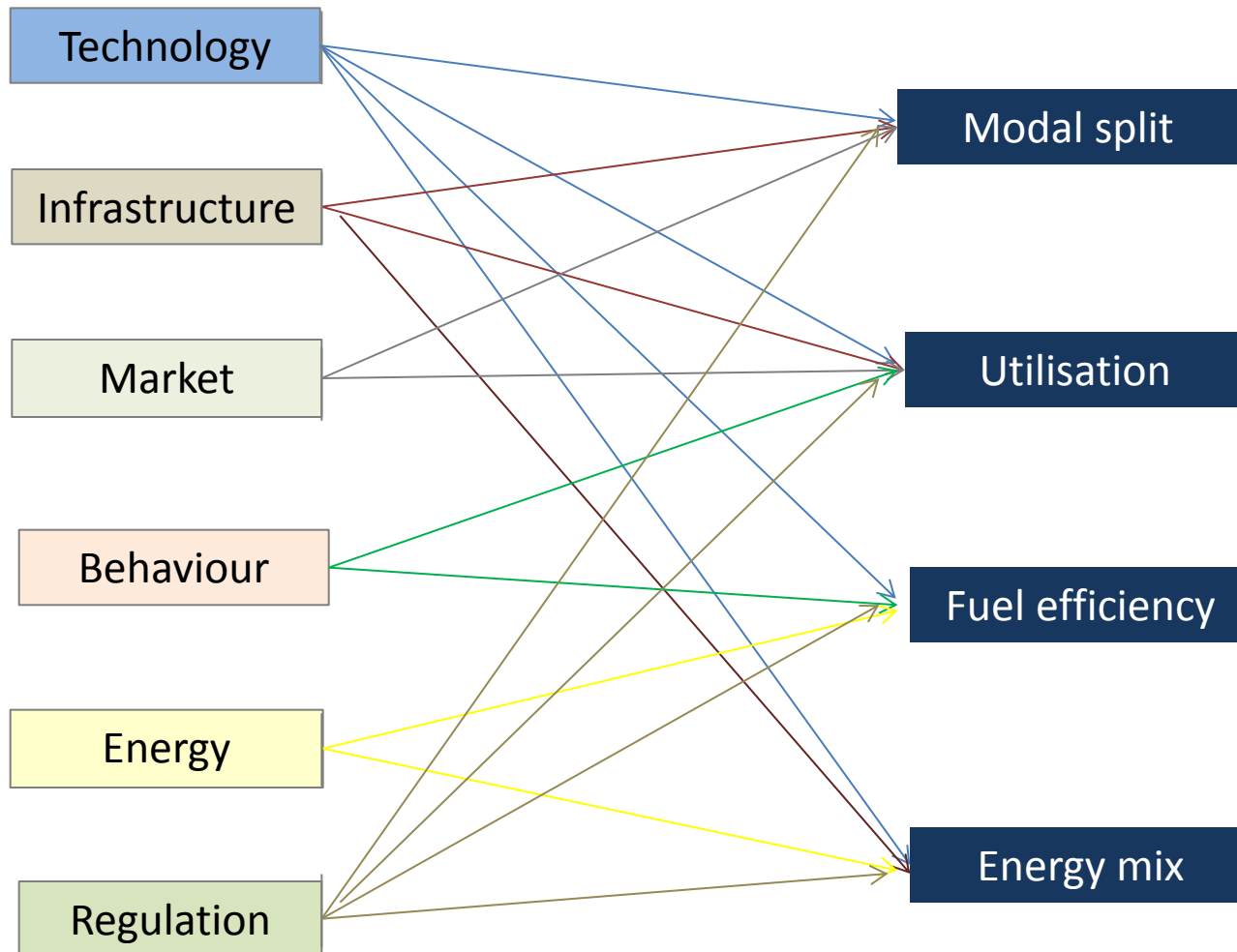
Energy

Regulation

Assessing the effect of **external** factors on the decarbonisation of logistics

TIMBER framework

categories of external factor



Assessment of the Influence of **External** Factors on Logistics Decarbonisation



Europe: *Germany / Austria / Switzerland, UK, Netherlands, France, Italy*
North America: *US, Mexico*
Asia: *China, India, Indonesia*
Africa: *South Africa*

Professor Cees Ruijgrok
(Netherlands)

Dr Jacques Leonardi
(France)



Clean Air Asia
(China)

University of Stellenbosch
(South Africa)

Mr. Sudhir Gota
(India and Indonesia)

Publication of final report in November 2015

Professor Alan McKinnon

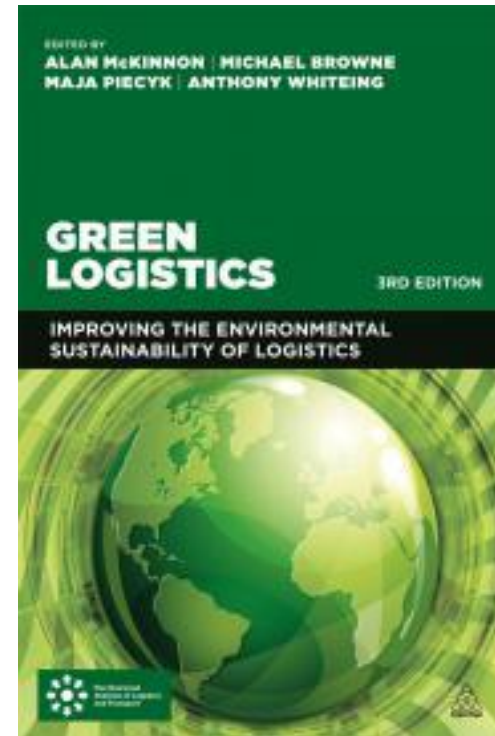
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Examples of General Recommendations to Companies

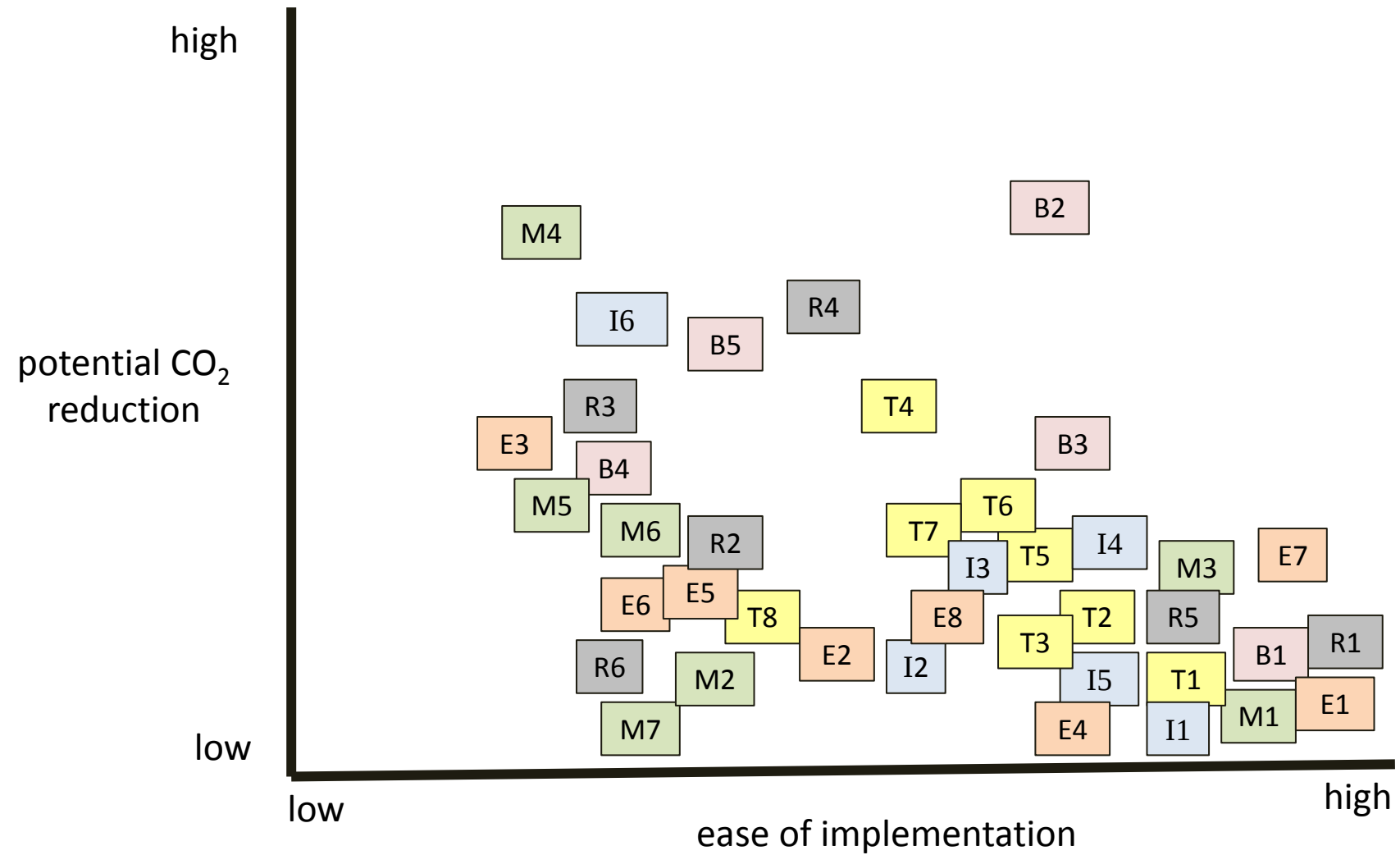
TECHNOLOGY (T1-8)

1. Review available data (in main report) on potential carbon savings from truck technologies, future trajectories, uptake rates and cost effectiveness
2. Assess client expectations of future level of carbon emissions from their logistics operations and willingness to pay for low carbon technologies (LCTs)
3. Regularly recalibrate carbon modelling tools to reflect impact of LCTs, especially in countries with tightening fuel economy standards
4. Take advantage of any government schemes for vehicle scrappage and / or incentivising the purchase of lower CO₂ vehicles
5. Partner with vehicle and equipment manufacturers to pilot new LCTs in logistics
6. Exchange information with shippers / clients on new logistics-related LCTs , either directly or through green freight organisations
7. Establish joint initiatives with larger shippers / clients to develop / trial of new LCTs
8. Assess options for switching to alternative fuels: systematic reviews of the cost, quality, availability and carbon intensity of alternative fuels

INFRASTRUCTURE (I 1-6)

1. Review available data (in main report) on infrastructural trends and developments and their likely impact on carbon intensity
2. Take full account of planned road improvements in the planning of DC locations and delimitation of their service areas
3. Assess the effect of planned changes in rail / water-borne / intermodal infrastructures on the relative attractiveness of a shift to lower CO₂ modes
4. Ensure that vehicle routeing systems are sensitive to changes in the quality / reliability of road and rail networks
5. Take account of fuel consumption and CO₂ emissions when planning vehicle routes and schedules
6. Work with shippers / clients to find ways of rescheduling deliveries into off-peak periods to minimise impact of congestion on CO₂ emissions

Rating of TIMBER recommendations by ease of implementation and potential CO₂ saving



TIMBER Scenario 1: OPTIMISTIC

Technology

- Rate of technology advance and uptake in the logistics sector at upper end of projections
- More rapid diffusion of low carbon technologies (LCTs) to developing countries / emerging markets
- IT advances (e.g. analytics, big data and cloud computing) translate into much greater CO₂ efficiency

Infrastructure

- Congestion minimised by capacity increases, improved infrastructure management and road pricing
- Prioritised investment in rail, inland waterways and ports promotes significant shift to these alternative modes
- Extensive gas refuelling and battery-recharging networks in place

Market

- Large increase in horizontal and vertical collaboration in FMCG supply chains
- Full harmonization of carbon auditing and reporting by logistics providers and carriers
- Load fill and minimization of transport CO₂ prioritised over inventory reductions
- Competitiveness of rail-freight services enhanced by liberalization / privatization and corridor planning

Energy

- Rate of decarbonisation of grid electricity at upper end of projections
- 2nd and 3rd generation biofuels shown to yield significant net GHG savings at affordable cost
- Extensive use of micro-generation at logistics facilities where climatic conditions are favourable

Behaviour

- Eco-driving is standardised by compulsory training
- Electronic monitoring of driver behaviour becomes universal
- In-cab guidance systems, smart cruise control and ultimately automation over-ride deficiencies in driver behaviour

Regulation

- Truck size and weight limits are relaxed with measures to minimise adverse effect on rail's market share
- More governments introduce vehicle scrappage schemes to accelerate adoption of LCT across the truck fleet
- Proliferation and harmonization of national fuel economy standards for trucks

TIMBER Scenario 2: PESSIMISTIC

Technology

- Rate of technology advance and uptake in the logistics sector at the lower end of projections
- Diffusion of low carbon technologies (LCTs) to emerging markets restricted by cost factors, import controls etc
- Business practices and corporate governance prevent IT innovations from being fully exploited

Infrastructure

- Traffic growth exceeds additional infrastructural capacity increasing congestion and related CO₂ emissions
- Limited improvement to rail and water-borne infrastructures as investment in passenger rail, highways and aviation are prioritised
- Gas refuelling and battery-recharging networks are slow and expensive to develop

Market

- Collaborative initiatives in the FMCG sector stabilise at a low level because of corporate inertia, managerial scepticism, legal constraints etc
- Comparing the carbon / environmental performance of carriers remains inconsistent and difficult
- JIT pressures intensify in the FMCG sector forcing reductions in load fill and transport-CO₂ increases
- Modal shift to rail continues to be inhibited by a lack of competitiveness in the rail / intermodal sectors

Energy

- Rate of decarbonisation of grid electricity at the lower end of projections
- Transport usage of biofuels remains low due to concerns about net GHG impacts, land use effects etc
- Low 'feed-in' tariffs and poor rates of return discourage micro-generation at logistics facilities

Behaviour

- Eco-driving remains patchy, particularly in the developing world
- Adoption electronic monitoring of driver behaviour proceeds at a slow rate
- Use of technology to control vehicle operation is resisted by trade unions and owner drivers in many countries.

Regulation

- Strong resistance from the railways and environmental organisations discourages governments and EU from relaxing truck size and weight limits
- Governments are reluctant to commit the large sums required to rejuvenate national truck fleets
- National fuel economy standards for trucks remain confined to the US, China and Japan