ENHANCING ENERGY EFFICIENCY OF THE FREIGHT TRANSPORT SECTOR IN ASIA AND THE PACIFIC

POLICY FRAMEWORKS FOR PROMOTING ELECTRIFICATION IN FREIGHT SECTOR AND FINANCING GREEN TRANSPORT

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NATIONAL CAPACITY BUILDING WORKSHOP
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INTRODUCTION

TRANSPORT AS MAIN SOURCE OF GHG EMISSIONS • THE IMPACT OF TRANSPORT ON CLIMATE CHANGE
"Climate change is here, it is terrifying, and it is just the beginning. The era of global warming has ended; the era of global boiling has arrived." – UN Secretary General Antonio Guterres, July 2023

- Global temperatures in July 2023 month have shattered records, according to the World Meteorological Organization (WMO) and the EU's Copernicus Earth observation programme
According to 'Our World in Data,' the transport sector was the second-largest emitter of greenhouse gases (GHG) in 2019 (over 8 bn t), underscoring its significant contribution to global climate change.

Road transport accounts for approximately 72% of GHG emissions from the global transportation sector (Axsen et al., 2020). Freight transport is responsible for about 40% of CO₂ emissions from road transport globally.

Energy efficiency in transport is a critical component in the collective global effort to combat climate change and create a sustainable future.
ADVANTAGES OF FREIGHT TRANSPORT ELECTRIFICATION

KEY ADVANTAGES • COUNTRY EXAMPLES OF RAIL AND FREIGHT ELECTRIFICATION ACTIONS
ELECTRIFICATION IN FREIGHT TRANSPORT

- Enhances overall energy efficiency:
  - Electric trains: up to 95% efficiency
  - Diesel trains: 30-35% efficiency

- Reduces operational costs:
  - Electric: 40-60% cheaper per km

- Lowers environmental impact:
  - CO$_2$ emissions reduced by 50-70% vs. diesel
  - Elimination of NO$_X$ and PM pollutants

- Improves operational reliability and speed:
  - 10-20% higher speeds for electric trains
  - Lower maintenance, less downtime
  - 10-20% more freight weight per trip
  - Track utilization increased by 15-25%
RAIL ELECTRIFICATION: COUNTRY EXAMPLES

- **Switzerland**
  - Swiss rail freight almost entirely electrified
  - Energy efficiency: 0.01 kWh/ton-km vs. 0.03 kWh/ton-km (diesel)

- **India**
  - 100% electrification by 2023
  - Annual savings: $1.5 billion
  - CO₂ reduction: 2.83 million tons annually

- **China**
  - Over 70% of rail network electrified by 2020
  - Energy consumption: 10-15% lower than diesel

- **Japan**
  - Nearly 100% of rail network electrified
  - Efficiency improvements: ~20%
  - Reduced emissions and noise pollution

- **Republic of Korea**
  - Approximately 73% of rail network electrified
  - Reduced energy costs: ~30%
ROAD FREIGHT TRANSPORT ELECTRIFICATION: COUNTRY EXAMPLES

**EU**
- 30 million zero-emission vehicles on European roads by 2030
- Banning sale of new petrol and diesel cars from 2035
- 45% reduction in CO2 emissions from HDVs by 2030; 65% reduction by 2035, and 90% reduction by 2040 compared to the 2019/2020 baseline

**India**
- 100% of road vehicles to be electric by 2030
- Blend 20% ethanol in petrol by 2025

**Japan**
- Reduce HDV average fuel consumption by 12% by 2025 compared to 2015 baseline

**Russian Federation**
- EVs to reach 10% of all cars built by the end of 2030

**South Korea**
- 1.13 million EVs, 500,000 EV charging stations and 200,000 hydrogen vehicles on the roads by 2025
- 6.2 million fuel cell vehicles and 1,200 hydrogen refueling stations by 2040

**Thailand**
- 1.2 million EVs on the roads by 2036
- Reduce energy intensity by 25% by 2030, compared to 2005 levels

**USA**
- 50% of new vehicles sold be electric by 2030
POLICY AND REGULATORY MEASURES

STANDARDS ● FINANCIAL INCENTIVES ● NATIONAL STRATEGIES ● GLOBAL CLIMATE INITIATIVES
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<tr>
<th>Incentive</th>
<th>Description</th>
<th>Examples of application</th>
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<tr>
<td><strong>Vehicle emission and fuel economy standards</strong></td>
<td>Emission standards are regulations set by governments to limit the amount of air pollutants, such as nitrogen oxides (NOx), particulate matter (PM), carbon monoxide (CO), and hydrocarbons (HC) emitted by vehicles. Similarly, enforcing stringent fuel efficiency standards pushes manufacturers to develop more energy-efficient vehicles.</td>
<td>Japan has established standards for HDVs, with the most recent standard (JP 2015) targeting a 13.4% reduction in fuel consumption compared to the 2005 levels. China VI-a emission standards enhance fuel efficiency of HDVs, with improvements ranging from 43.0 L/100 km for 40-ton long-haul tractors to 49.0 L/100 km for 13.7-meter coaches, driving significant advancements in engine technology and vehicle design.</td>
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<td><strong>Greenhouse gas emission pricing</strong></td>
<td>By implementing carbon pricing and emissions trading schemes, countries can create economic incentives for businesses to reduce their carbon footprint.</td>
<td>In EU, the cap on emissions under the Emissions Trading System (ETS) will be reduced by 2.2% annually between 2021 and 2030, leading to an overall reduction of 43% compared to 2005 levels.</td>
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<td><strong>Financial incentives and subsidies</strong></td>
<td>Governments can offer tax breaks, grants, import tax exemptions, or interest rate subsidies to promote the adoption of energy-efficient vehicles, rail fleet, and renewable energy sources. Contrarily, increasing respective taxes may be considered for the most polluting ICE vehicles and diesel locomotives.</td>
<td>India's FAME II scheme provides subsidies for electric vehicles, including electric trucks. In 2021 it provided incentives of INR 10,000 (approx. USD 133) per kWh of battery capacity for electric commercial vehicles. Subsidization of loan interest rates by export insurance and financing agencies can promote local manufacture of clean vehicles and allow borrowing countries renew their fleets.</td>
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### POLICY AND REGULATORY INCENTIVES (2/6)

<table>
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<td>Integration in national development policies</td>
<td>The integration typically involves setting specific goals for reducing emissions, promoting energy efficiency, and enhancing the accessibility and affordability of transport services. It can take various forms, such as legislative reforms, strategic planning, and investment in infrastructure that supports sustainable modes of transport like electric and alternative fuel vehicles, modal shift, public transit, etc.</td>
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Key components of integrating sustainable transport into national policies may include:

- **Policy Alignment.** Ensuring that transport policies complement other national policies, such as those related to urban development, energy, and environmental protection.
- **Investment in Sustainable Infrastructure.** Allocating resources to develop infrastructure that supports low-emission transport modes.
- **State Support and Incentives for Green Technology.** Implementing tax incentives, subsidies, or grants to encourage the adoption of energy-efficient vehicles and technologies.
- **Regulatory Measures.** Establishing standards and regulations that mandate or encourage sustainable practices within the transport sector.

*Country examples of the integration in national development policies are shown on the next slide.*
## POLICY AND REGULATORY INCENTIVES (3/6)

<table>
<thead>
<tr>
<th>Country</th>
<th>Policy Documents</th>
<th>Key Measures and Targets</th>
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</thead>
<tbody>
<tr>
<td>Pakistan</td>
<td>• Electric Vehicle Policy</td>
<td>• Aims to transition 30% of all new vehicles to electric by 2030</td>
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<td>Russia</td>
<td>• Concept for the Development of Production and Use of Electric Road Transport in</td>
<td>• Envisages electrification and gasification of public transport</td>
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<td>Federation</td>
<td>the Russian Federation to 2030</td>
<td>• Introduces automatic driving systems, automated control, monitoring and positioning</td>
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<td>• Energy and Environmental Development Strategy to 2030</td>
<td>systems</td>
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<td></td>
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<td>• Provides for transitioning road transport to hybrid modes and the development</td>
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<td>of charging infrastructure for EVs</td>
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<td>Republic of</td>
<td>• Electric Vehicle Promotion Plan</td>
<td>• Provides subsidies and tax breaks for the purchase of EVs</td>
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<td>Korea</td>
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<td>• Introduces mandatory fuel efficiency standards for HDVs, requiring a 15 %</td>
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<td>reduction in CO2 emissions by 2025 compared to 2012 levels</td>
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<td>Sri Lanka</td>
<td>• National Transport Policy 2019</td>
<td>• Reduces transport energy use by promoting &quot;avoid, shift, and improve&quot; strategies</td>
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<td></td>
<td>• National Environmental Policy</td>
<td>• Links vehicle taxation to fuel efficiency of vehicles</td>
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<td>• National Energy Policy 2019</td>
<td>• Aims to increase the distribution of oil by rail up to 40% of the total volume in</td>
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<td>2022</td>
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<td>Thailand</td>
<td>• Sustainable Transport Development Strategy</td>
<td>• Promotes green and environmentally friendly transport, as well as clean and</td>
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<td></td>
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<td>alternative fuels</td>
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<td></td>
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<td>• Encourages the adoption of environmental-friendly transport technology</td>
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<td>Turkey</td>
<td>• National Energy Efficiency Action Plan (NEEAP)</td>
<td>• Increases the share of environmentally friendly vehicles</td>
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<td>• Green Ports Initiative</td>
<td>• Improves energy efficiency in the freight sector</td>
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<td>• Minimizes the environmental impact of port operations, including the freight</td>
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<td>transport sector</td>
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<tr>
<td>Incentive</td>
<td>Description</td>
<td>Examples of application</td>
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<tr>
<td>Research and development support</td>
<td>Providing funding and support for research and development in energy-efficient technologies can foster innovation in the freight transport sector.</td>
<td>The US Department of Energy's SuperTruck initiative invests over $240 million targeting a 50% improvement in freight efficiency and a 30% reduction in fuel consumption vs. 2009 baseline.</td>
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<td>Green public procurement</td>
<td>Governments can lead by example by implementing green public procurement policies that prioritize the purchase of energy-efficient vehicles and renewable energy sources for public fleets.</td>
<td>In Japan, the government aims to increase the share of electric and fuel cell vehicles in public fleets to 10% for heavy-duty vehicles (HDVs) by 2030, promoting greener transportation.</td>
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<td>Vehicle scrappage schemes</td>
<td>By introducing vehicle scrappage schemes, governments can incentivize the replacement of older, less efficient vehicles with newer, more energy-efficient models</td>
<td>Turkey's vehicle scrappage program incentivizes the retirement of old HDVs by offering up to $25,000 in financial support, stimulating demand for environmentally-friendly transportation options.</td>
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<tr>
<td>Education and awareness campaigns</td>
<td>Promoting the benefits of energy-efficient vehicles and renewable energy sources through education and awareness campaigns can drive consumer demand in the freight sector.</td>
<td>In Australia, the Green Vehicle Guide provides information on vehicle emissions and fuel efficiency to help consumers make informed choices when buying new vehicles.</td>
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## POLICY AND REGULATORY INCENTIVES (5/6)

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<td>Liberalization of freight rail market</td>
<td>By providing regulated access to public rail infrastructure for private freight operators, governments can attract private investments into the modernization and development of rail infrastructure. This includes building new railway stations, logistics terminals, and the electrification of new and existing rail lines.</td>
<td>After the adoption of the Law on Rail Transport, which allows private freight operators to access the rail infrastructure owned by the national company KTZ, several initiatives have been launched by the private sector. These include the construction of cargo terminals, the construction of new rail lines under PPP schemes, the purchase of new locomotives and rolling stock, and the construction of railway industrial facilities producing locomotives, wagons, and rails.</td>
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<td>Long-term public railway infrastructure access contracts</td>
<td>Long-term commitments by national railway administrations, who own the mainline public railways, or by governments can provide a solid foundation for private investors and operators. These commitments offer long-term visibility, reduce risks, and secure investments in traction fleets, rolling stock, and infrastructure.</td>
<td>The introduction of long-term infrastructure access contracts in Kazakhstan's railway sector has driven fleet renewal, including the purchase of electric locomotives and container platforms. These contracts have also spurred investments in sustainable logistics solutions, such as building new cargo processing terminals.</td>
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## POLICY AND REGULATORY INCENTIVES (6/6)

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<tr>
<td>Low Emission Zones (LEZs) and congestion charges</td>
<td>Designation of specific areas with restricted access for high-emission vehicles, encouraging the use of low-emission and zero-emission vehicles in urban areas.</td>
<td>In London’s Ultra-LEZ, non-compliant vehicles face daily fees of $15.50 for cars, motorcycles, vans, and $124 for heavier vehicles like buses and trucks.</td>
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<td>Modernization of transport infrastructure and developing renewable energy sources</td>
<td>Governments, national railway administrations, and national road operators can invest in modernizing transport infrastructure to enhance the energy efficiency of freight transport. Policies may include incentivizing railway electrification and promoting the development of vehicle charging infrastructure, such as solar-powered charging stations, to expand the use of electric locomotives and trucks.</td>
<td>South Korea's government supports electric truck adoption by investing $665 million in charging infrastructure development from 2021 to 2025.</td>
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<td>Under its National Carbon Neutrality Strategy to 2060, Kazakhstan plans to electrify over 2,000 km of railways by 2030 to enhance rail cargo transport efficiency and reduce GHG emissions. A massive shift towards green and renewable energy is envisioned for all sectors of the economy.</td>
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EXAMPLES OF INTERNATIONAL CLIMATE FRAMEWORKS

UNFCCC ● PARIS AGREEMENT ● THE KYOTO PROTOCOL ● GLOBAL AND REGIONAL CLIMATE INITIATIVES
INTERNATIONAL CLIMATE INITIATIVES (1/2)

- United Nations Framework Convention on Climate Change (UNFCCC):
  - The UNFCCC, adopted in 1992, aims to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous human-induced interference with the climate system. The transport sector, including freight transport, is a significant contributor to GHG emissions, and therefore, the UNFCCC plays a crucial role in shaping policies to promote sustainable freight transport.

- The Paris Agreement:
  - Signed in 2015 under the UNFCCC, it is an international treaty that aims to limit global warming to well below 2 degrees Celsius above pre-industrial levels, with an aspirational goal of limiting the temperature increase to 1.5 degrees Celsius. The agreement requires countries to submit Nationally Determined Contributions (NDCs) outlining their plans for reducing GHG emissions, including those from the transport sector.

- The Kyoto Protocol:
  - Adopted in 1997 under the UNFCCC, it sets binding targets for industrialized countries to reduce their GHG emissions. Although the protocol does not specifically address the transport sector, the emission reduction targets have implications for freight transport and other sectors contributing to GHG emissions.
The United Nations Sustainable Development Goals (SDGs):
- The SDGs, adopted in 2015, are a set of 17 global goals aimed at achieving a more sustainable future by addressing various social, economic, and environmental challenges. Several of the SDGs have implications for sustainable freight transport, including Goal 7 (Affordable and Clean Energy), Goal 9 (Industry, Innovation, and Infrastructure), Goal 11 (Sustainable Cities and Communities), and Goal 13 (Climate Action).

The Energy Efficiency Design Index (EEDI) and Ship Energy Efficiency Management Plan (SEEMP):
- The EEDI and SEEMP are mandatory energy efficiency measures adopted by the IMO, aiming to reduce CO2 emissions from international shipping. The EEDI sets minimum energy efficiency requirements for new ships, while the SEEMP requires ships to implement a management plan for improving their energy efficiency.

International Maritime Organization (IMO) Conventions:
- The IMO has adopted several conventions related to sustainable shipping and maritime transport, including the International Convention for the Prevention of Pollution from Ships (MARPOL), which sets regulations to minimize pollution from ships, and the International Convention on the Control of Harmful Anti-fouling Systems on Ships, which aims to reduce the negative environmental impacts of anti-fouling coatings.
INTERGOVERNMENTAL ORGANIZATIONS AND INITIATIVES SUPPORTING GREEN TRANSITION PROJECTS AND RESEARCH IN TRANSPORT SECTOR

- The United Nations Environment Program’s (UNEP) Global Electric Mobility Program
- The United Nations Climate Change Conference (Conference of the Parties, COP)
- The United Nations Economic Commission for Europe (UNECE)
- The European Union's Clean Vehicles Directive (CVD)
- G20 Energy Efficiency Leading Program (EELP)
- The Smart Freight Centre's Global Logistics Emissions Council (GLEC) Framework
- The Transport Decarbonization Alliance (TDA)
- Central Asia Regional Economic Cooperation (CAREC)
EXAMPLES OF POLICY DOCUMENTS IN KAZAKHSTAN

CARBON NEUTRALITY STRATEGY - 2060 ● TRANSPORT AND LOGISTICS DEVELOPMENT CONCEPT - 2030
Strategy for Achieving Carbon Neutrality of Kazakhstan to 2060:

- Adopted in 2023, this Strategy outlines the low-carbon development of the transport sector based on the "avoid - shift - improve" concept. It focuses on:
  - Avoid: Reducing the need for travel.
  - Shift: Transitioning to more environmentally friendly transport modes through the use of alternative fuels and large-scale electrification.
  - Improve: Renewing the vehicle fleet to reduce emissions.

- The transition to transport using alternative and renewable energy sources will be encouraged by creating the necessary infrastructure and implementing incentive mechanisms. Developing domestic transport production that utilizes these energy sources will also play a significant role in decarbonization. The Strategy will adopt international best practices for decarbonizing the transport sector.
POLICY FRAMEWORK FOR GREEN TRANSPORT IN KAZAKHSTAN (2/3)

- **Transport and Logistics Development concept of Kazakhstan to 2030:**
  - Adopted in December 2022, this document outlines various policy measures to enhance the energy efficiency of all modes of transport, including freight road and rail. Key measures include:
    - Electrifying railway sections of several key routes
    - Implementing "green" and resource-saving technologies in rail transportation
    - Providing incentives to attract private investments in modernizing transport infrastructure
    - Introducing fiscal measures to stimulate the transition to electric vehicles (e.g., zero import tax until 2027)
    - Implementing PPP schemes and offering preferences to encourage investment in charging infrastructure
    - Integrating "road excise tax" in the fuel price; foundation of a dedicated “road fund”
    - Expanding public toll road network (11k km / 45% of republican network by 2030)
Decree of the Government of the Republic of Kazakhstan on the Classification of “Green” Projects to be Financed through “Green” Bonds and “Green” Loans.

Adopted in December 2021 and updated in 2024, this document considers "clean" transport (including low-carbon vehicles, low-carbon freight transport, clean transport infrastructure, and clean transport information and communication technologies) as eligible for financing through "green" bonds and "green" loans.

- Green Bonds: Fixed-income debt instruments issued to raise funds specifically for financing green projects
- Green Loans: Targeted loans designed to finance the implementation of green projects, as outlined in the Environmental Code of Kazakhstan
THANK YOU FOR YOUR ATTENTION!