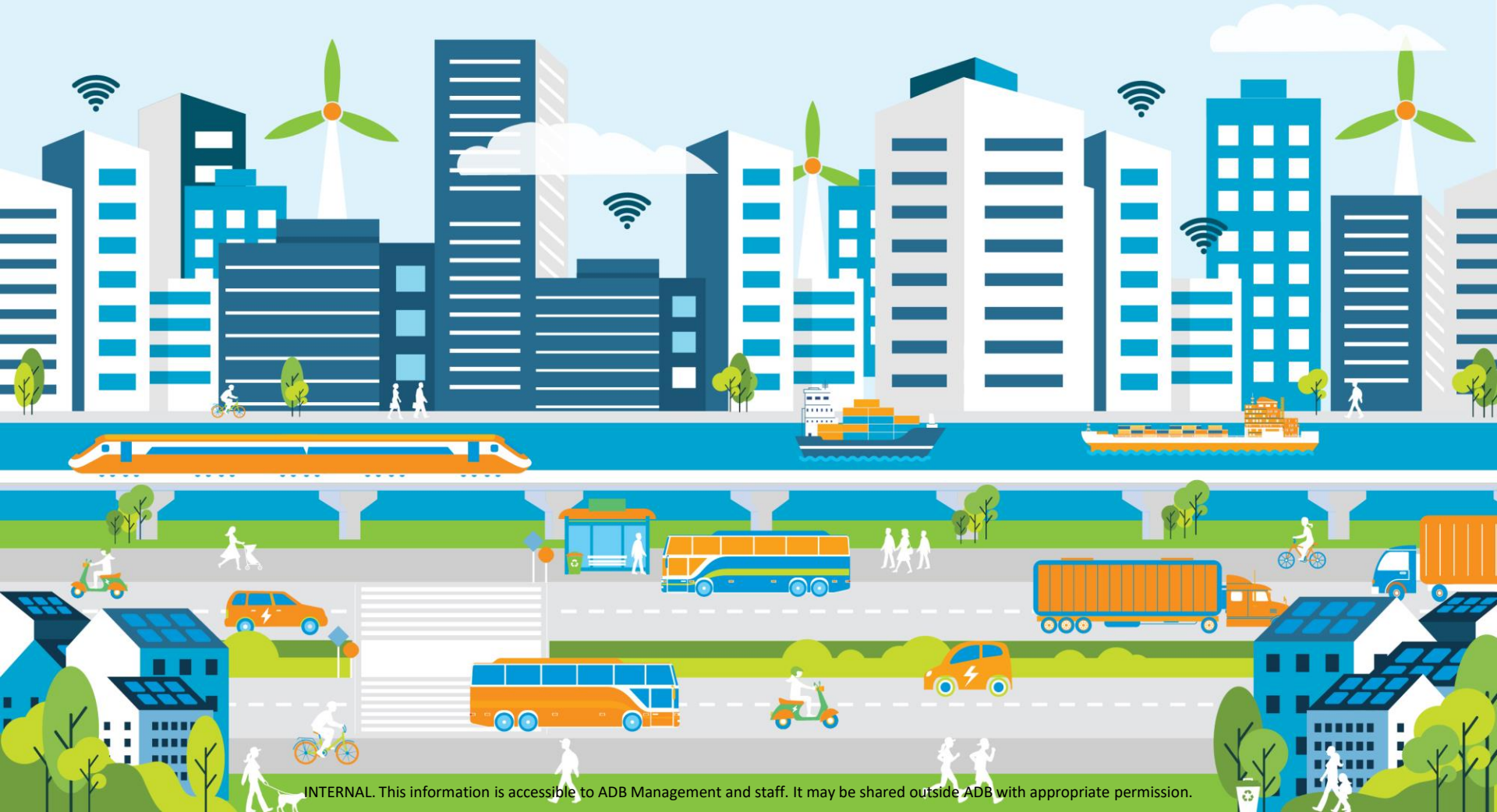
ASIA AND THE PACIFIC TRANSPORT FORUM 2024

CLEAN TRANSPORT FOR ALL

14–17 May 2024 | ADB Headquarters, Manila, Philippines



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Upcoming Trends and Tech's in e-Mobility

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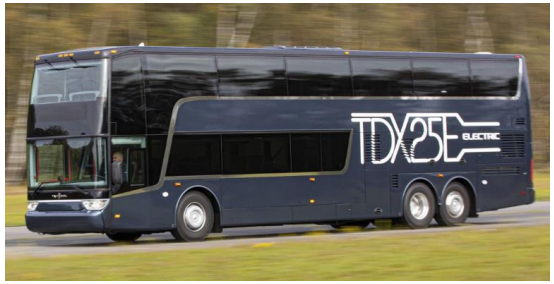
General enabling factors

- Promote cooperation and coordination among involved public and private stakeholders
- Create incentives (tax incentives, subsidies) and mandates (new registrations, metropolitan emission zones, etc.) for interurban vehicle transition



Trucks

- Urban trucks are already now cost-competitive
- Heavy trucks on fixed routes
- Non-fixed routes requires high powered charging infra or H2 trucks

Example Thailand:

- CM CGM & CEVA
- 110 km fixed route (1-way)
- 2 -3 round-trips per day (440-660km/d)
- Initial solution uses to low powered chargers (150 kW); better 600 kW to allow for 15 minute re-charge
- Electric highly cost competitive

Critical point: Batteries with high C-rate and high powered chargers are required; appropriate system design is core

Trucks

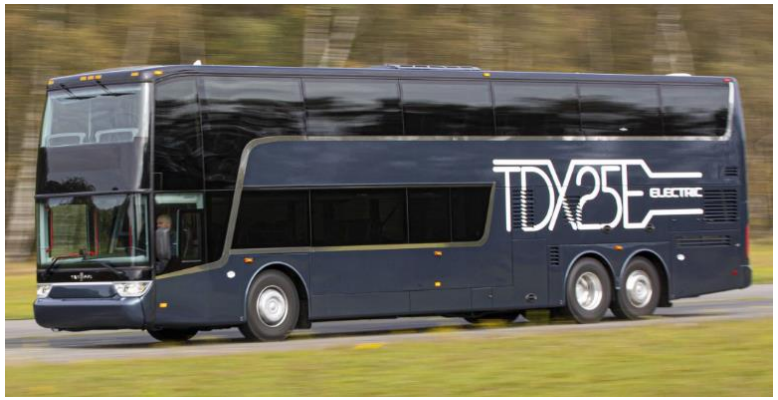
- Urban trucks are already now cost-competitive
- Heavy trucks on fixed routes
- Non-fixed routes requires high powered charging infra or H2 trucks

Enabling factors:

- Optimize policy & planning across relevant corridors and/or for specific zones and across time
- Mandate distance (e.g. EUs 60km rule or power-equivalent) between CPs/refuelling points
- Integrate CP/refuelling into road planning and road/service business models (Dig Once)

Inter-Urban Buses

- Inter-urban buses on routes <300km can be cost-competitive
- Core issue: you need fast-charging infrastructure



Example Almaty-Bishkek:

- 240 km fixed route (1-way)
- 1 round-trip per day (480km/d)
- Optimal: fast charging at both ends (600kW – 30 minute stop is sufficient)
- Practical issues with overloaded grids

Critical point: Batteries with high C-rate and high powered chargers are required; appropriate system design is core

Inter-Urban Buses

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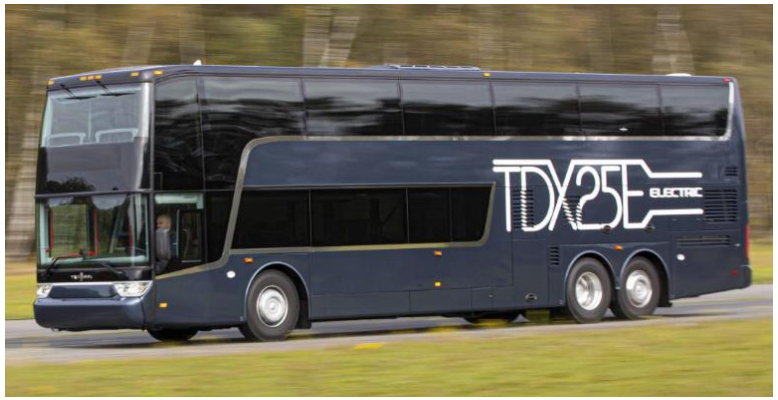
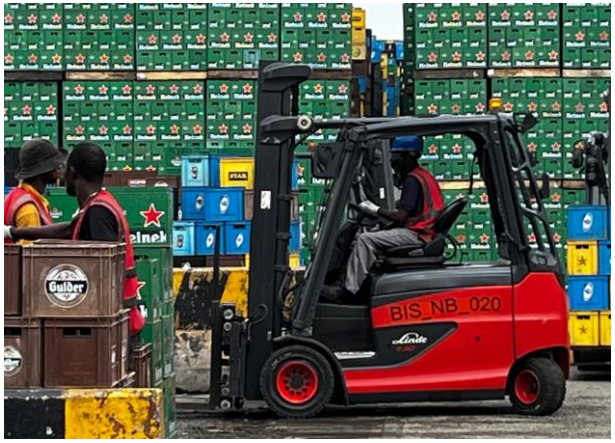


Enabling factors:

- (as before)
- Mandate/regulation for route concessions

Mobile Machinery

- Building / construction machinery
- Warehouse equipment e.g. forklifts



Example Nigeria:

- Bisedge as service company for warehouses
- Traditional LPG and diesel
- Move to electric lead-acid and then Li-Ion batteries
- Project being registered as carbon credit project

Critical point: Good battery management especially for lead-acid batteries to ensure appropriate life-time

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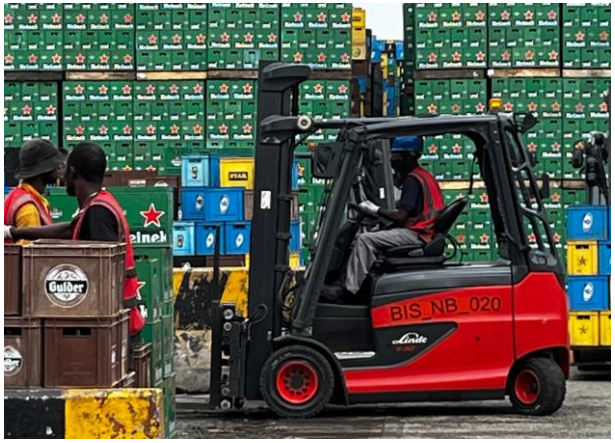
- Warehouse equipment e.g. forklifts



Enabling factors:

- Ensure grid capacity to connect, enhance grid if needed
- Mandates/regulations for import, OEM
- Promote market-based solutions (carbon credits, scope 2/3 ESG aspects, etc.)

Mining Equipment

- Mines employ many support vehicles like buses for staff transport, pick-ups, standard trucks
- Core mining equipment is also being electrified
- Especially multinational companies have corporate goals to reduce carbon footprint

Examples Vigier, Switzerland and MiskyMayo, Peru:

- MiskyMayo invested in electric buses, pickups and 40t trucks
- Integration in ITMO project planned
- Vigier 110t e-dumper

Core issue: reliability of equipment is critical and support vehicles are in general outsourced

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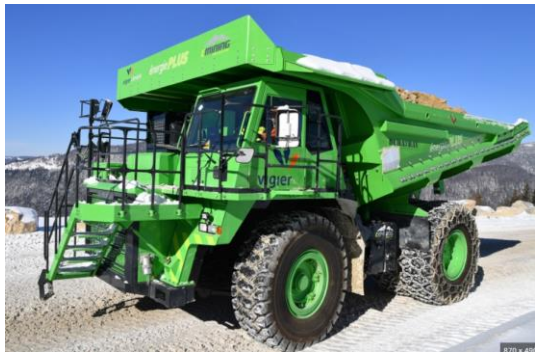

Enabling factors:

- Program-based cooperation and coordination among involved public and private stakeholders
- Again promote mandates/regulation for import, OEM (example of Chile)

Special Vehicles

- Refuse trucks and cleaning equipment;
- Port and airport vehicles and mobile machinery;
- Good options for green port and green airport projects

Example Brazil:

- Corpus, a private company operating in Sao Paulo
- Acquired 200 electric refuse trucks 2018-2023
- High energy use for compression

Critical argument: low noise emissions as refuse trucks often operate during the night

Special Vehicles

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- Port and airport vehicles and mobile machinery;
- Good options for green port and green airport projects

Enabling factors:

- Requirements in concession contracts

Ferries

- Battery electric ferries good for distance up to 100km
- Small low-speed electric vessels for tourists
- High GHG impact; cost-effective

Example Bangkok, Thailand:

- Energy Absolute, private sector
- 27 200 passenger vessels
- Re-charge during the day
- 16 knot speed
- Projects with electric ferries also under discussion for Dhaka, for the Philippines, for Lagos/Nigeria or Cartagena/Colombia

Critical points: system is very speed sensitive and charging infrastructure is a critical and high cost component

THANK YOU!

Jurg Grutter

Koen van Baekel