Road Asset Management (RAM)

May 2023

Carbon Emission Modelling, Polices and Integrating Climate Change into RAM

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Agenda

- Carbon emission modelling – Ian

- Infrastructure resilience - Theuns

Some Context

- Kyrgyz's NDC's to the Paris Agreement
  - By 2025 greenhouse gas (GHG) emissions will be reduced by 16.63% of the level of GHG emissions under the "Business as usual" scenario, and subject to international support by 36.61%.
  - By 2030, GHG emissions will be reduced by 15.97% of the GHG emissions under the "Business as usual" scenario, and with international support, by 43.62%.

0.03%	#69	#118	43.62%
Share of global GHG emissions	Climate Vulnerability Index ranking	Human Development Index ranking	Conditional emissions reduction target by 2030 (compared to business as usual)

Some Context

- Tajikistan's NDC's to the Paris Agreement
  - 40-50% reduction in emissions by 2030 compared to 1990 levels, conditional on international support.
  - Unconditional emissions reduction target of 30-40% by 2030 compared to 1990 levels.

0.03%
Share of global GHG emissions

#103
Climate Vulnerability Index ranking

#122
Human Development Index ranking

40-50%
Conditional emissions reduction target by 2030
(compared to 1990 levels)

Modelling GHG Emissions

Modelled vs Reported Emissions

- Reporting rules for GHG emissions mean that not all modelled emissions are reported as may logically make sense

- Approach was to create a model that was universal
  - the user can always pick those elements that fit within their reporting framework

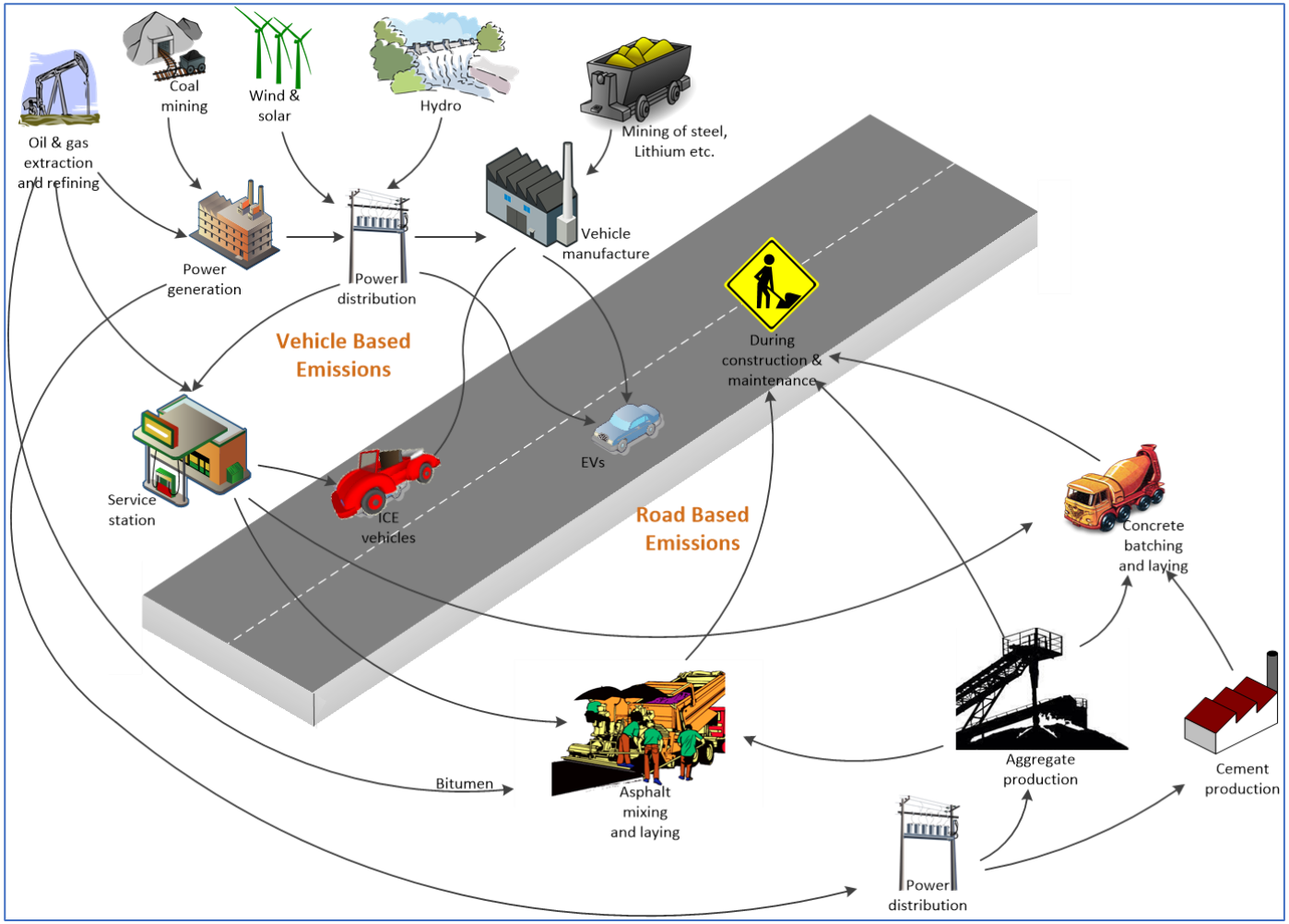
Objective - A Comprehensive GHG Model

- Has credibility in its predictions of the underlying inputs
- Is sensitive to investment and policy decisions
- Can predict over the short and long term
- Can work at both the project level and strategic level
- Covers the full life-cycle of treatment types (routine maintenance, periodic maintenance, rehabilitation etc.) and associated vehicle emissions

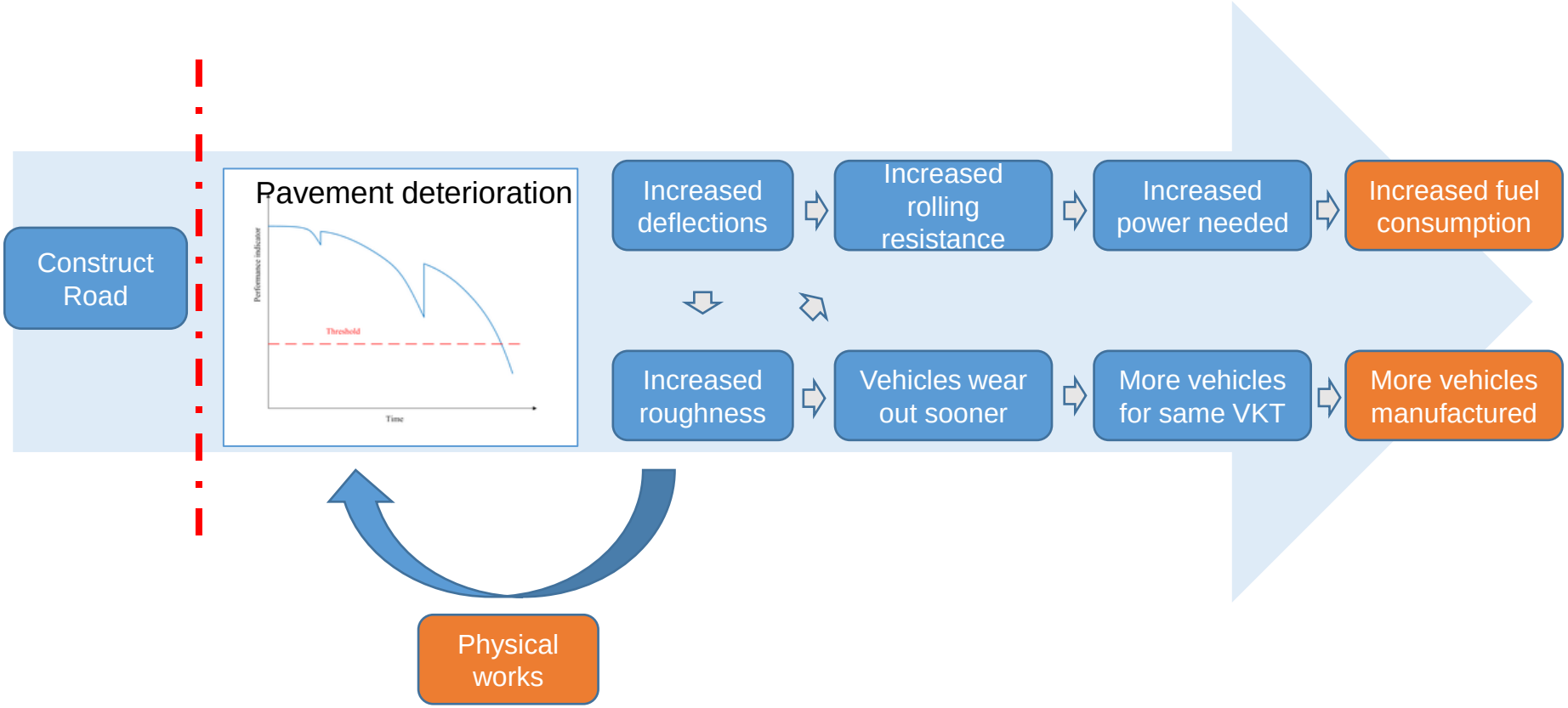
International Models

- HDM-4 has predicted vehicle emissions since mid-1990s
  - Works on 1st principles basis – predicting fuel consumption as a function of road and vehicle conditions, then emissions from that.
  - Just no-one bothered to look at the results for 25 years.
- Multilateral Development Banks (MDBs) such as ADB, World Bank and others have committed to not funding projects mis-aligned with Paris Agreement
- MDBs needed a comprehensive emission model that covers full spectrum of emissions
  - Pavement related over full life-cycle of roads
  - Vehicles – including tailpipe, power generation and vehicle manufacturing emissions

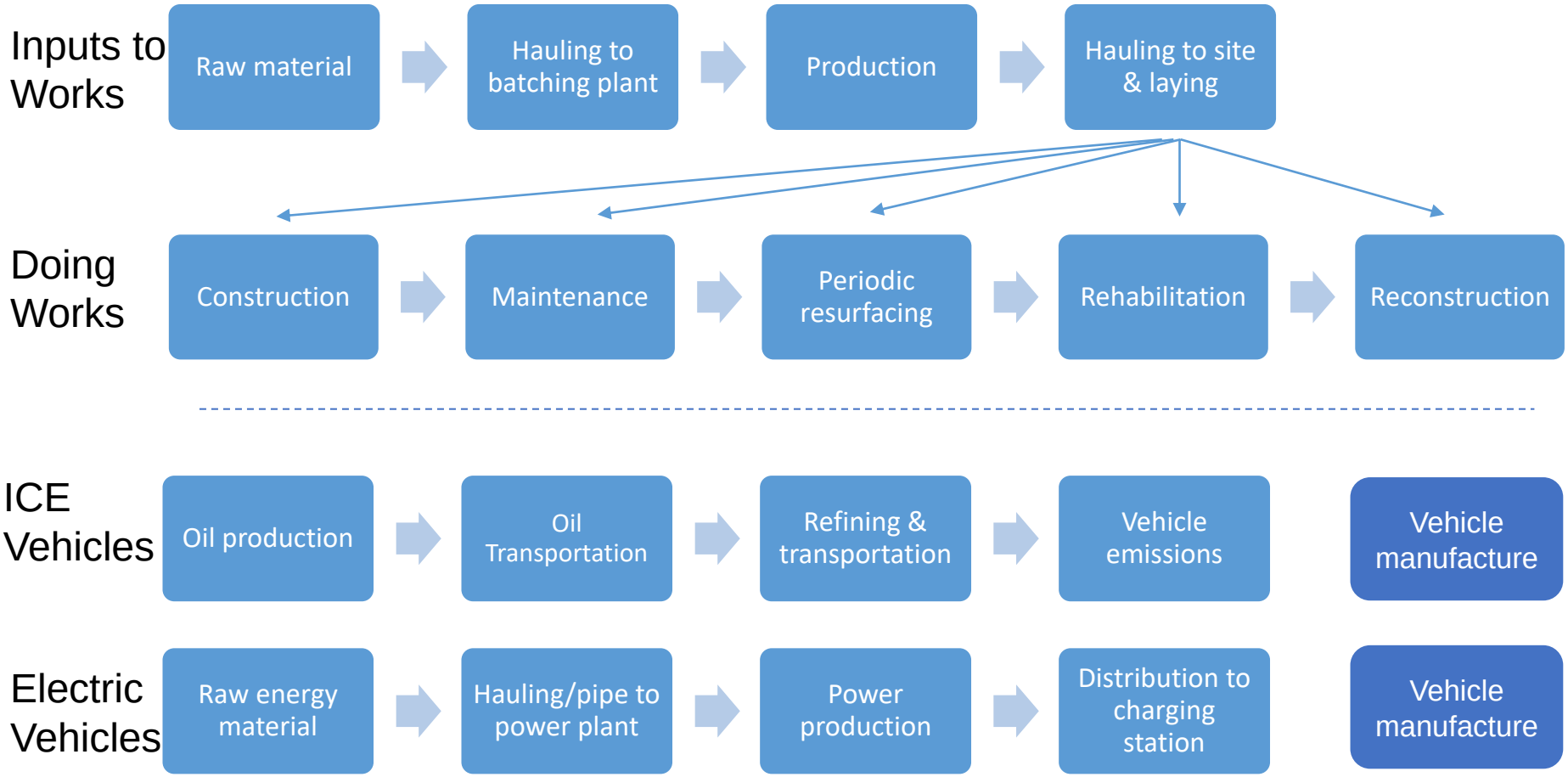
Scope of GHG Modelling



The Conceptual Framework



Many Components



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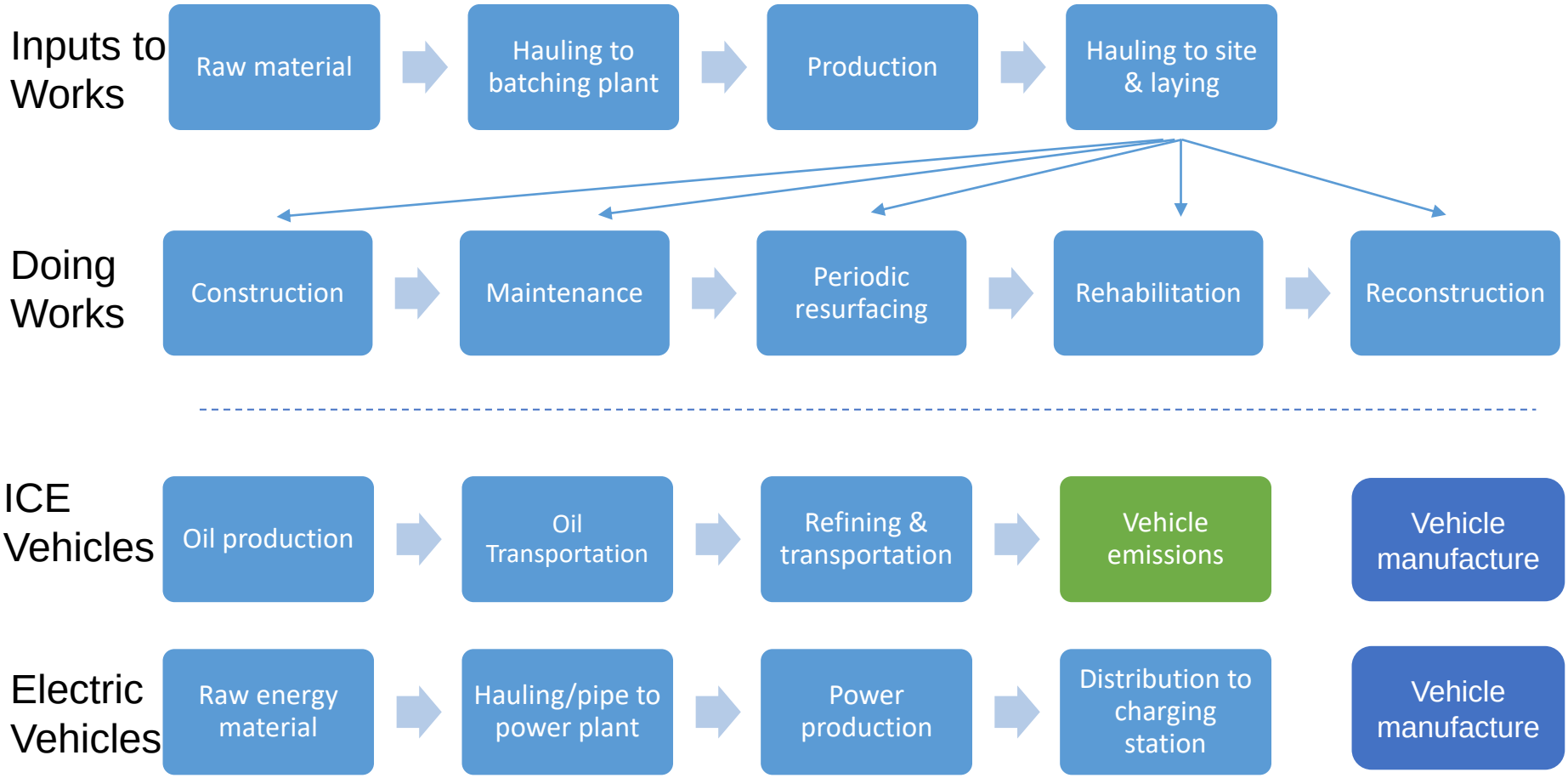


ADB Toolkit

- Excel based toolkit that links to HDM-4
- Makes the analysis simple and efficient

- Enables comparison of different investment scenarios at project, program or strategy level.

- Traffic based emissions, comprising:
  - Tailpipe emissions for ICE vehicles, including upstream well-to-tank emissions n the production
  - Emissions from the generation of power for EVs
  - Emissions associated with the manufacturing of vehicles.

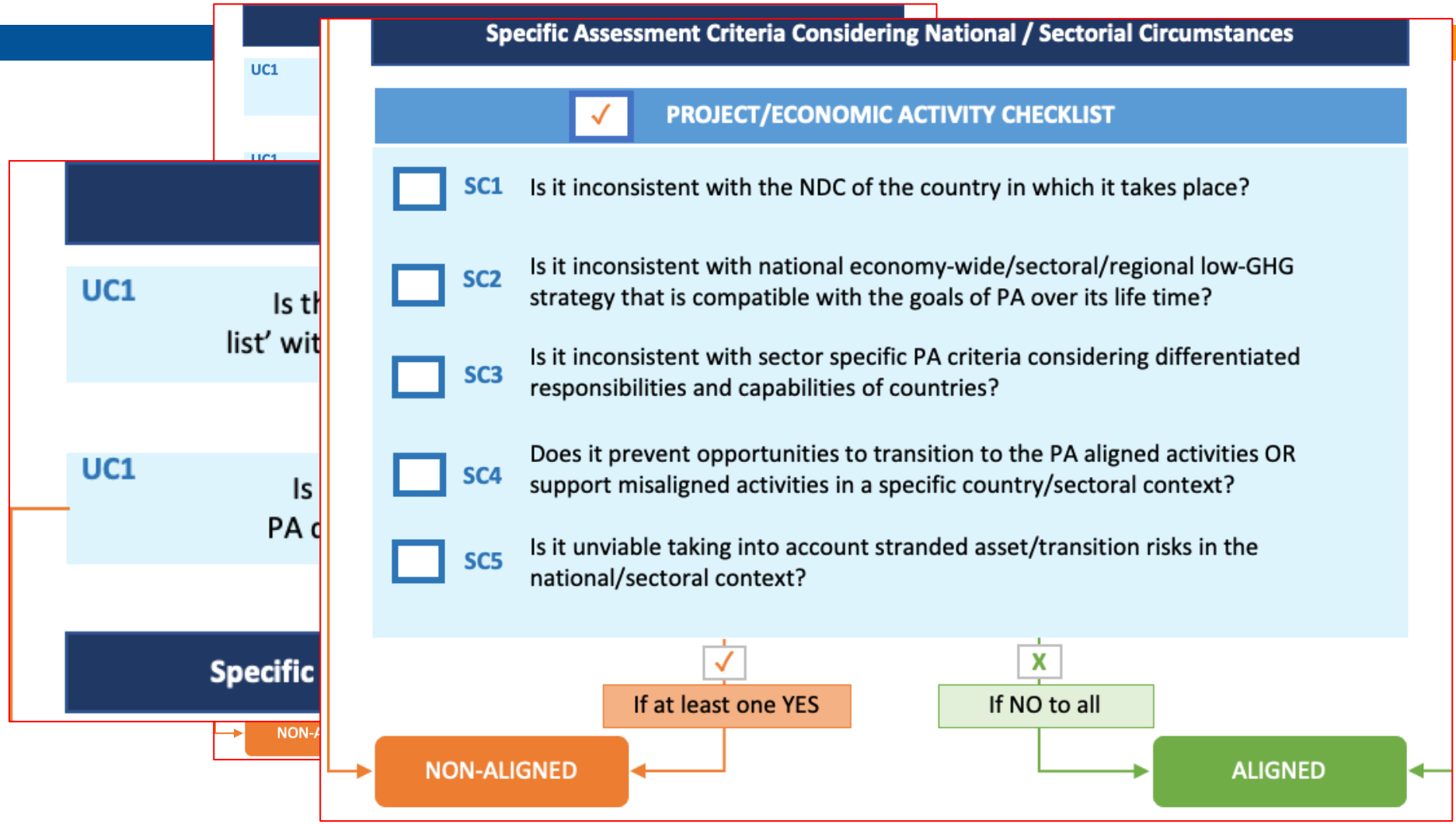
- Road based emissions, comprising:
  - Emissions from maintenance, renewal and rehabilitation works
  - Emissions associated with specified capital improvement works

GHG Policies

MDB Approach – Paris Alignment

Align funding with the Paris Agreement

- Some projects are universally aligned
  - Eg Maintenance and renewal of existing transport infrastructure
- Some projects are universally misaligned
  - Eg Building a coal power station
- Rest go through a screening process
  - If any misalignment, they don't get funding.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UC1
Is th
list' wit
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Is
PA c
Specific
NON-A
Specific Assessment Criteria Considering National / Sectorial Circumstances
PROJECT/ECONOMIC ACTIVITY CHECKLIST
SC1
Is it inconsistent with the NDC of the country in which it takes place?
SC2
Is it inconsistent with national economy-wide/sectoral/regional low-GHG strategy that is compatible with the goals of PA over its life time?
SC3
Is it inconsistent with sector specific PA criteria considering differentiated responsibilities and capabilities of countries?
SC4
Does it prevent opportunities to transition to the PA aligned activities OR support misaligned activities in a specific country/sectoral context?
SC5
Is it unviable taking into account stranded asset/transition risks in the national/sectoral context?
If at least one YES
If NO to all
NON-ALIGNED
ALIGNED

GHG Based Policies

Policy	Impact	Potential Usage
Maintain roads in a good to fair state of repair.	Minimizes the quantity of reactive repair works (pothole filling etc), and reduces rolling resistance of vehicles (lowers fuel consumption).	All road networks.
Low carbon road treatments	Reduce the CO_2/unit of physical works undertaken. Includes technologies such as recycling, as well as the incorporation of plastic wastes into AC mix etc.	All road networks (particularly low traffic road networks where works based CO_2 dominates total CO_2)
Optimizing work zones – duration and timing of closures	Minimize traffic congestion impacts, including through the use of lane rental schemes or similar	Higher trafficked roads

GHG Based Policies

Policy	Impact	Potential Usage
Manage vehicle speeds to minimize speed change cycles (traffic signals, congestion impacts etc.) and to avoid excessively high average speeds.	Speed changes result in additional fuel consumed in comparison to steady speed travel. High speeds result in disproportionately higher fuel consumption as a result of aerodynamic drag.	All road networks
Encourage transition to Public Transport	Reduction in private vehicles, but increase in bus vehicles. Also potential increase in congestion for private vehicles if bus stops are not well designed. If bus lanes are provided, then these have additional CO_2 associated with their construction and maintenance.	Where demand on a route is high.

GHG Based Policies

Policy	Impact	Potential Usage
Encourage transition to LZEVs – through a combination of subsidies, improved charging infrastructure, priority lanes or similar.	Eliminate tail pipe emissions, and replace with power generation emissions. However as EVs have significantly higher manufacturing CO_2 levels that ICEs, the benefit requires a relatively high vehicle usage to generate meaningful benefits.	Where power generation is 'cleaner' than equivalent ICE running, and vehicle usage enables for a reduction in life-cycle CO_2 emissions to occur.
Increased vehicle emissions standards (i.e. requirement for low emission vehicles)	Eliminate the most polluting vehicles from the network, and replace with more efficient vehicles	All road networks

GHG Based Policies

Policy	Impact	Potential Usage
Build bypasses around heavily congested areas, or add additional lanes on congested routes.	Reduces GHG per vehicle, but has additional GHG for the construction and maintenance of the road.	Highly congested areas where diversion to low emission transport solutions is not practical.
Improve border crossing logistics	Minimize time vehicles spend in queues to complete immigration/quarantine etc.	All locations where excessive queuing exists.

Questions

- Do you undertake GHG modelling of projects?
- How are you tracking towards your NDC target?
- What initiatives have you put in place?

Questions

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