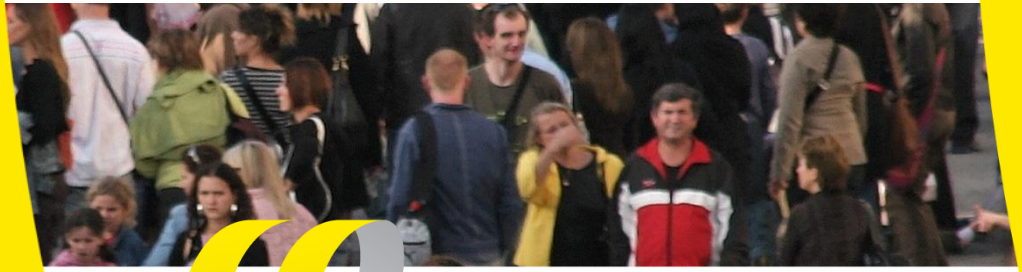
Carbon footprinting of EBRD freight investment projects

The development of a methodology and tool



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Project objective & framework

To develop a methodology and tool for ex-ante GHG emissions inventory of investment projects in the area of the green logistics programme in EBRD non-EU countries in the Mediterranean and Black sea region.

- *Simplified and generally applicable*
- *Limited data and time needs*

- The methodology will:
  - Be targeted at investment projects
  - be based on available operational methodologies (GLEC)
  - Start from existing practice (data availability)
  - contain a relevant default emissions data set
- The tool shall be user friendly and be accompanied with full instruction for application of methodology

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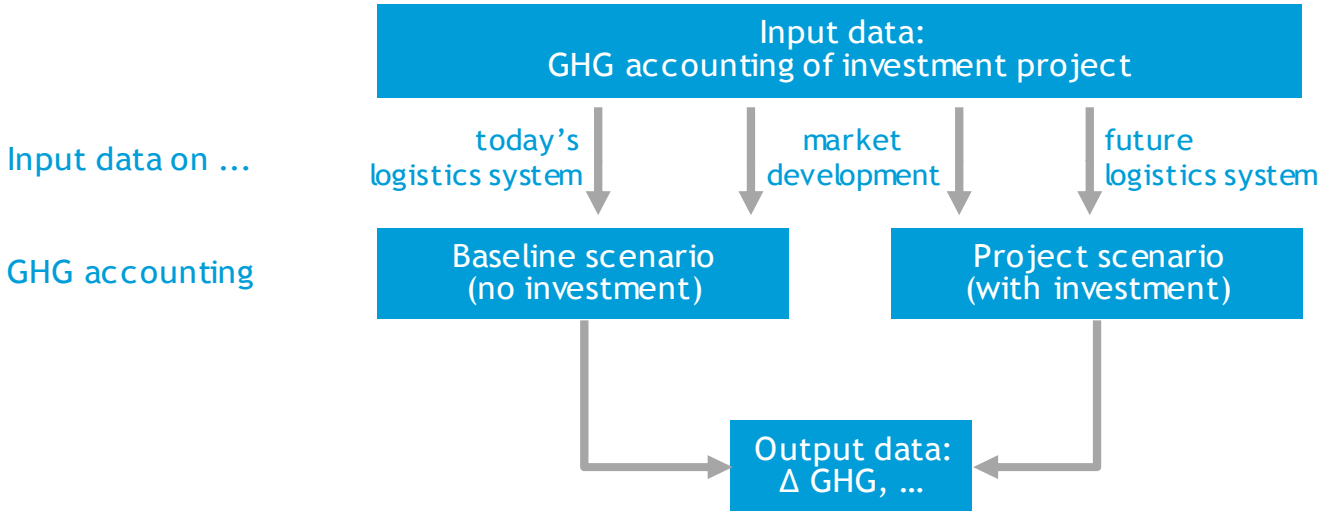
Overall assessment framework

Project objective

Establishing a theoretical framework for investment evaluation, including

- Traffic diversion, traffic inducement, construction impacts
- GHG accounting of scenarios: (1) baseline scenario, (2) project scenario
- Fleet renewal and terminal investments covered (80-90% of projects)



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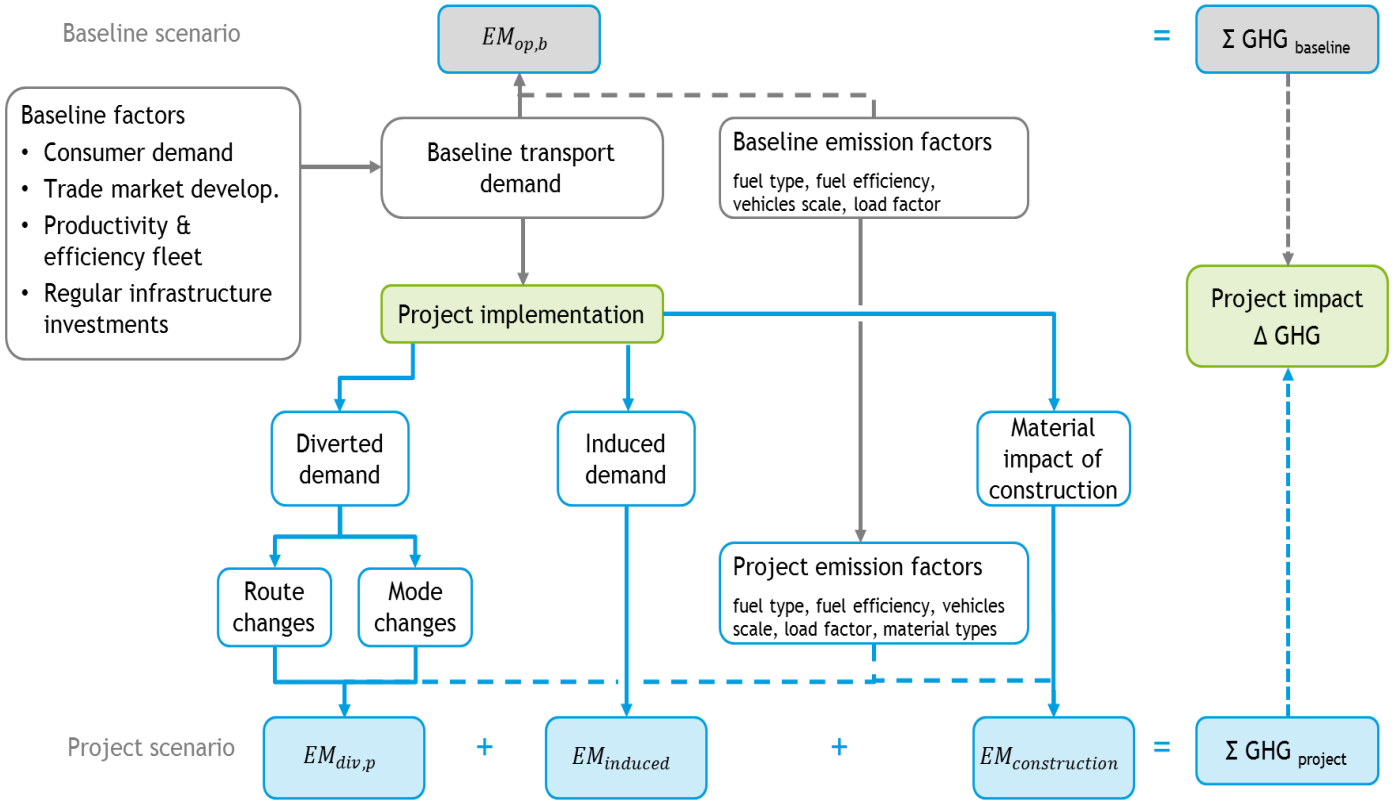
Overall assessment framework



Note:
Construction emissions are only considered in case of infrastructure investment projects.

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Tool methodology

- Baseline:

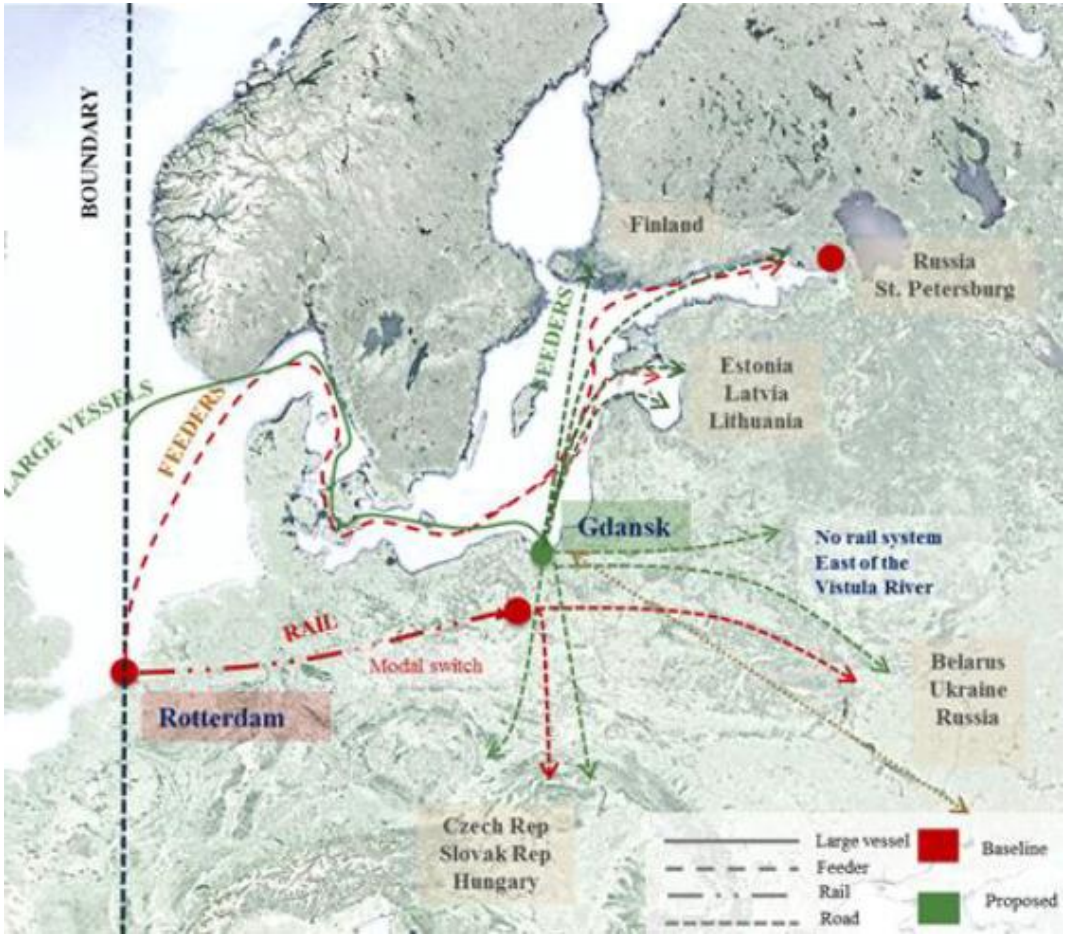
The baseline (or BAU) for the assessment of the net GHG footprint will refer to a projection when the project is not implemented. In most cases, this baseline projection corresponds to a situation without an alternative new project, while trend investments to ensure the integrity of existing infrastructure and cater for demand, if any, will be included (IFI, 2015)

- Project impacts

The main GHG impacts expected from infrastructure investments are:

- GHG effects of traffic diversion + operational changes
- GHG effects of induced traffic
- GHG effects of construction

Example: deep sea container terminal in Poland



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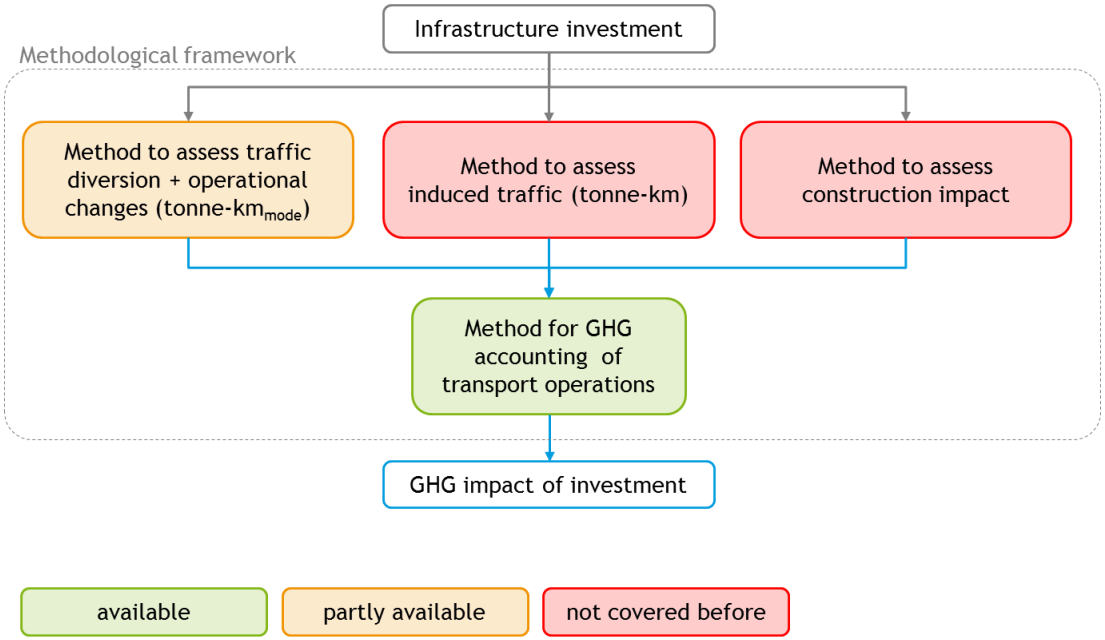
Three sub methodologies



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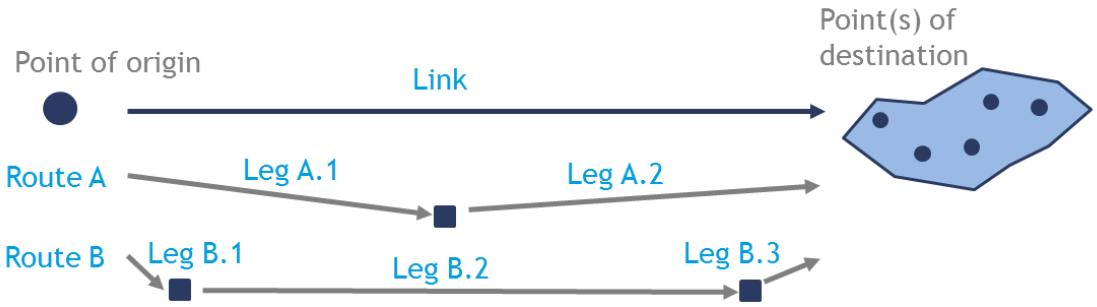
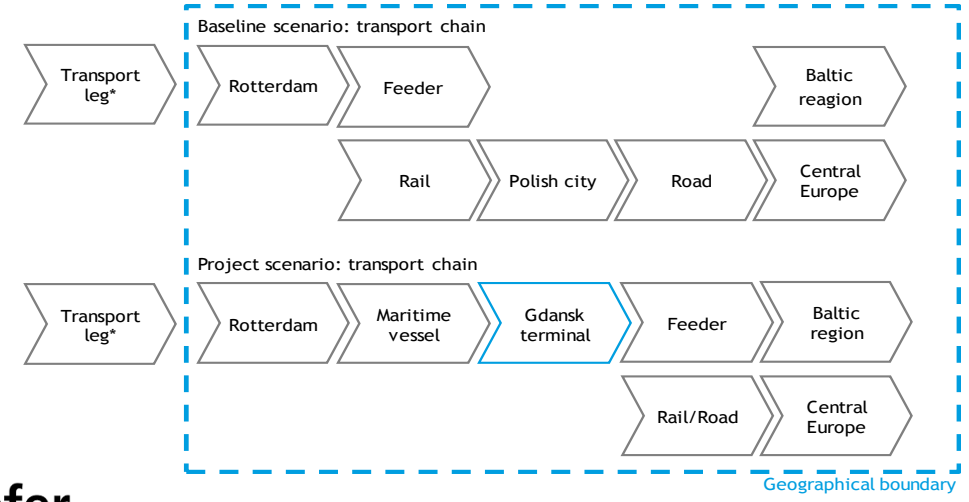
Step 1: Definition of logistics chain

- Definition of geographical boundary (origin – destination)
- Identification of links, routes and legs





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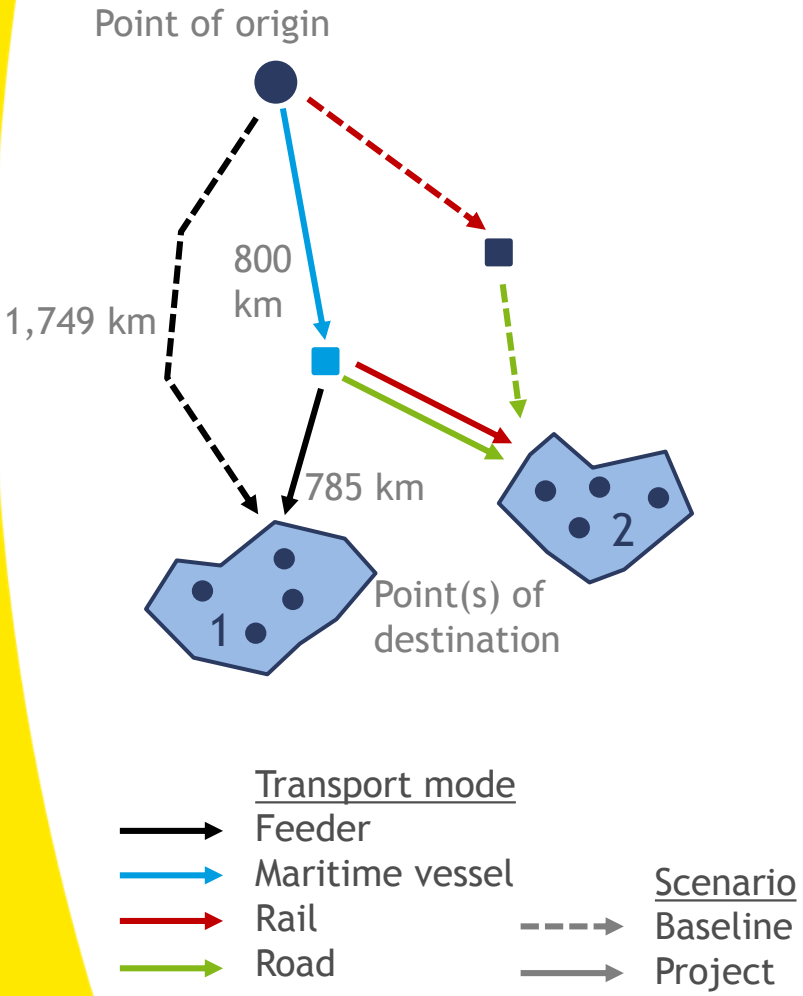
Step 2: Assessment of diverted traffic and operational effects



- Calculation based on links (from point of origin to point of destination) using relevant routes & modes

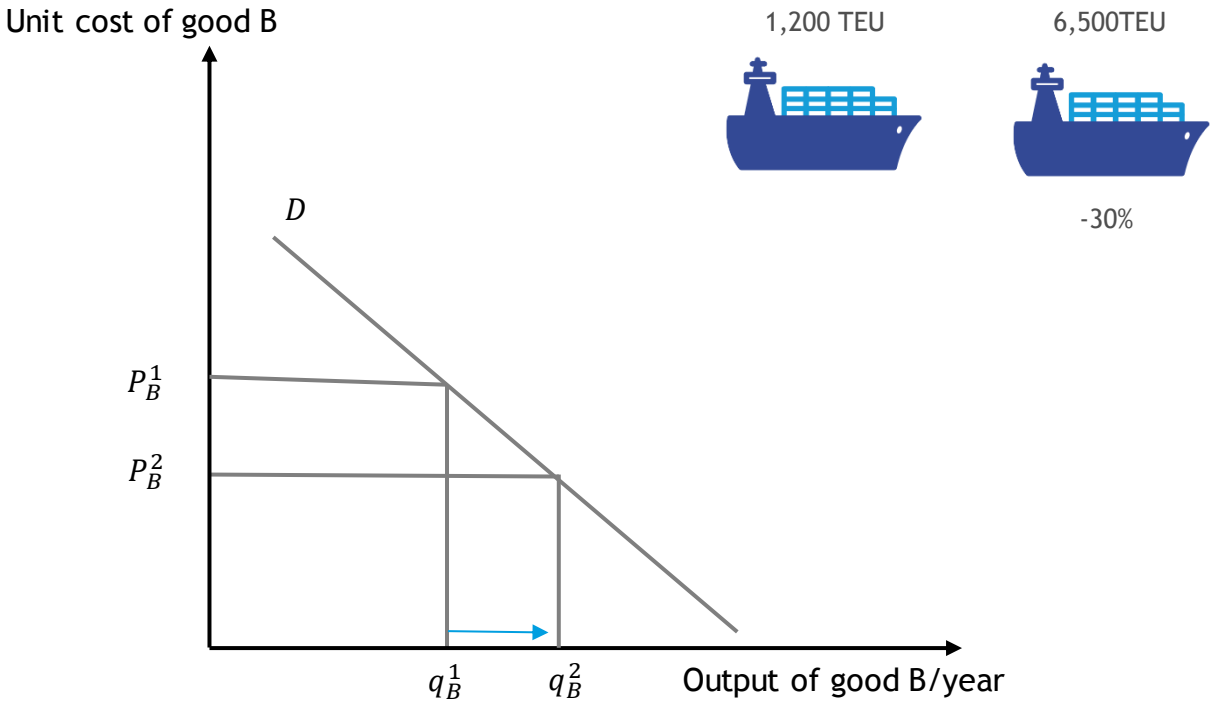
GHG emissions of link =
tonne-km x mode emission factor
+ tonne x transhipment emission factor

Σ for baseline & project scenario

Diverted GHG emissions =
operational project emissions
- operational baseline emissions

Step 3: Traffic inducement (1)

- Traffic inducement results from operational advantages in the project scenario compared to the baseline scenario
- The discussion in Europe about LHV's is an illustrative example



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Step 3: Traffic inducement (2)

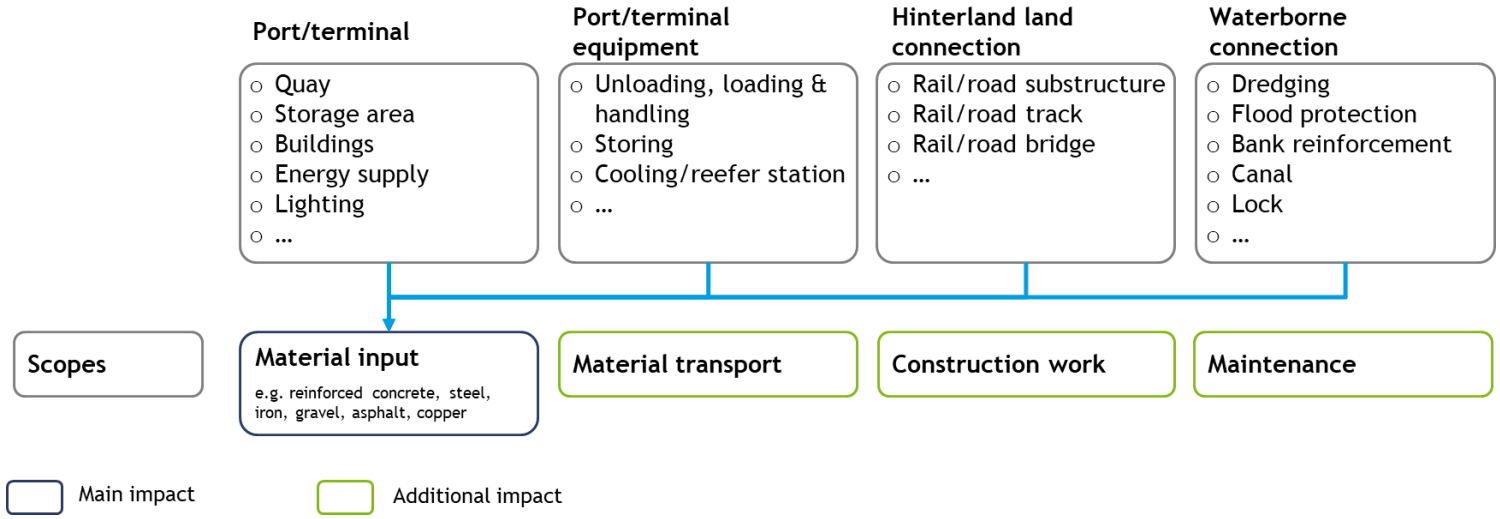
- The typical average transport elasticity for freight transport (excluding shift to other modes) is estimated to be around -0.5 (Beuthe, 2014).
- This implies that a project resulting in a 10% cost decrease will lead to an increase of demand of 5%, applied to volume of the project.

$$CostChange\ (\%) = \frac{Cost_p - Cost_b}{Cost_b} \times 100\%$$

Total GHG emissions of traffic inducement =
Cost change # elasticity * operational emissions in project scenario.

Step 4: Assessment of construction emissions (1)

- Based on material input analysis
- Areas of material use (examples)



Total GHG emissions of infrastructure =
total material input x material emission factor + emissions surcharge for additional impacts

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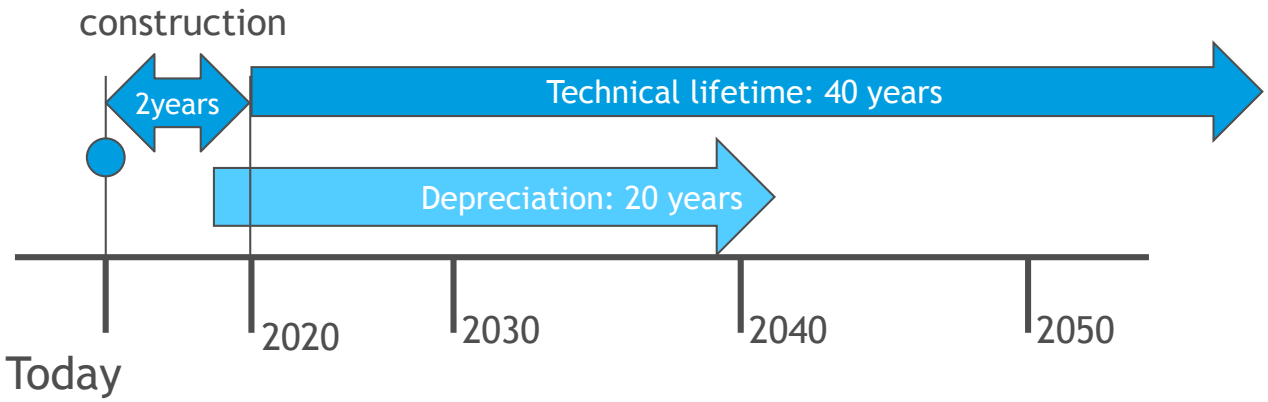
Step 4: Assessment of construction emissions (3)

- Depreciation period of GHG emissions of infrastructure and equipment
  - Technical depreciation period
  - Economic depreciation period
  - Following 1.5°C goal ⇨ “zero” emissions by 2050

long-term horizon

depreciation in 20 years



Step 5 & 6: Total emissions and reporting

Total annual impact of investment project =
diverted emissions + induced emissions + construction emissions

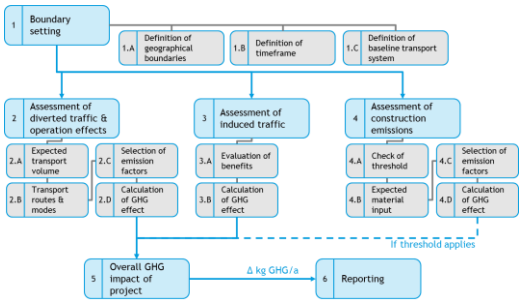
Requirements for the reporting of assessment results

- Ensure that data reported represent a comprehensive inventory of the emissions within the selected project and transport chains
- Clearly list
  - The source of data and emission factors (if other than tool)
  - Assumptions embedded in the analysis or underlying data (e.g. selected routes, legs; applied lifetime)

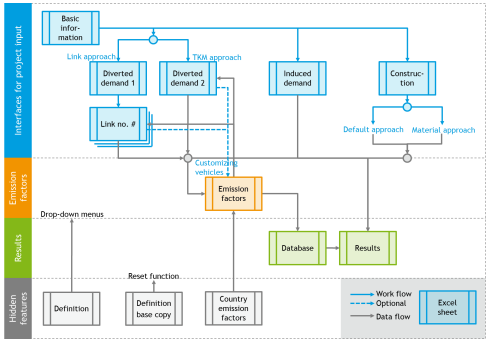
Recommendation to use reporting template.

Structure of the tool

Framework of methodology



Excel tool for GHG assessment



Database

Consumption & emission factors

Manual

- Architecture
- Step-by-step description
- Overarching questions
- Database

Training

16.07.2018 afternoon

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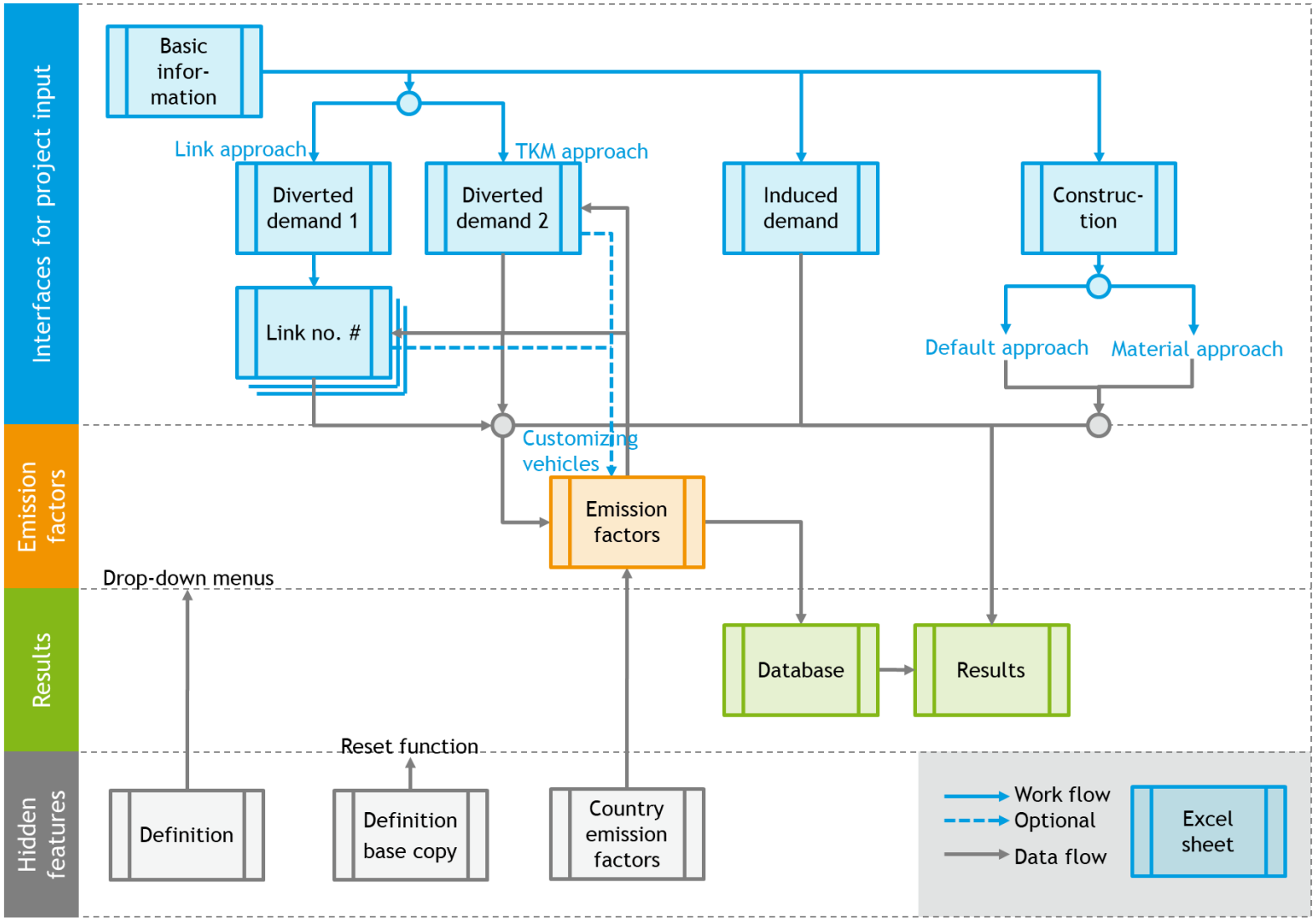
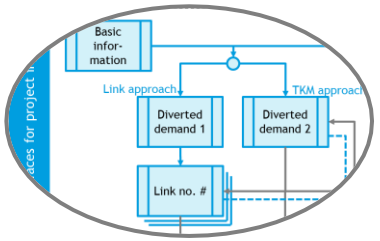
Structure of the tool



Minimum input data for calculation of GHG impact



Basic information

- Base & project year
- Total transport activity in base year [tonnes]
- Expected growth rate of transport [%]

Diverted demand

- Transport activities for both scenarios with info on
  - Cargo type
  - Vehicle type
  - Distance / tkm

Two options

Diverted demand

1 Link approach

- Yearly transport activity per link
- Specification of links with leg info

- Knowledge of the routes & underlying legs is available
- Possibility to model cost changes on link level

2 Tkm approach

- Specification on the level of transport activity per vehicle type

- Information on route level is not available
- Model of investment projects on fleet renewal

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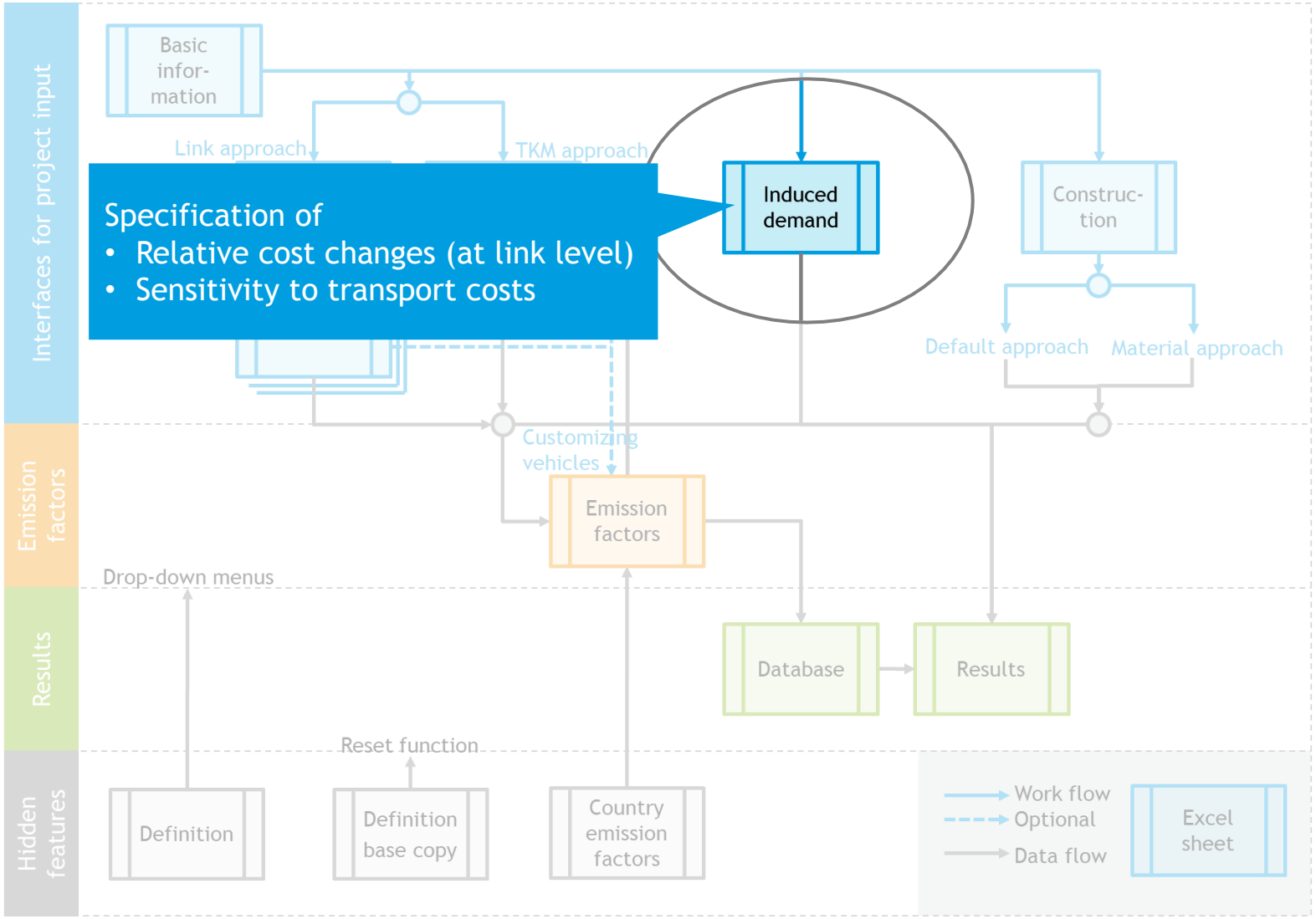
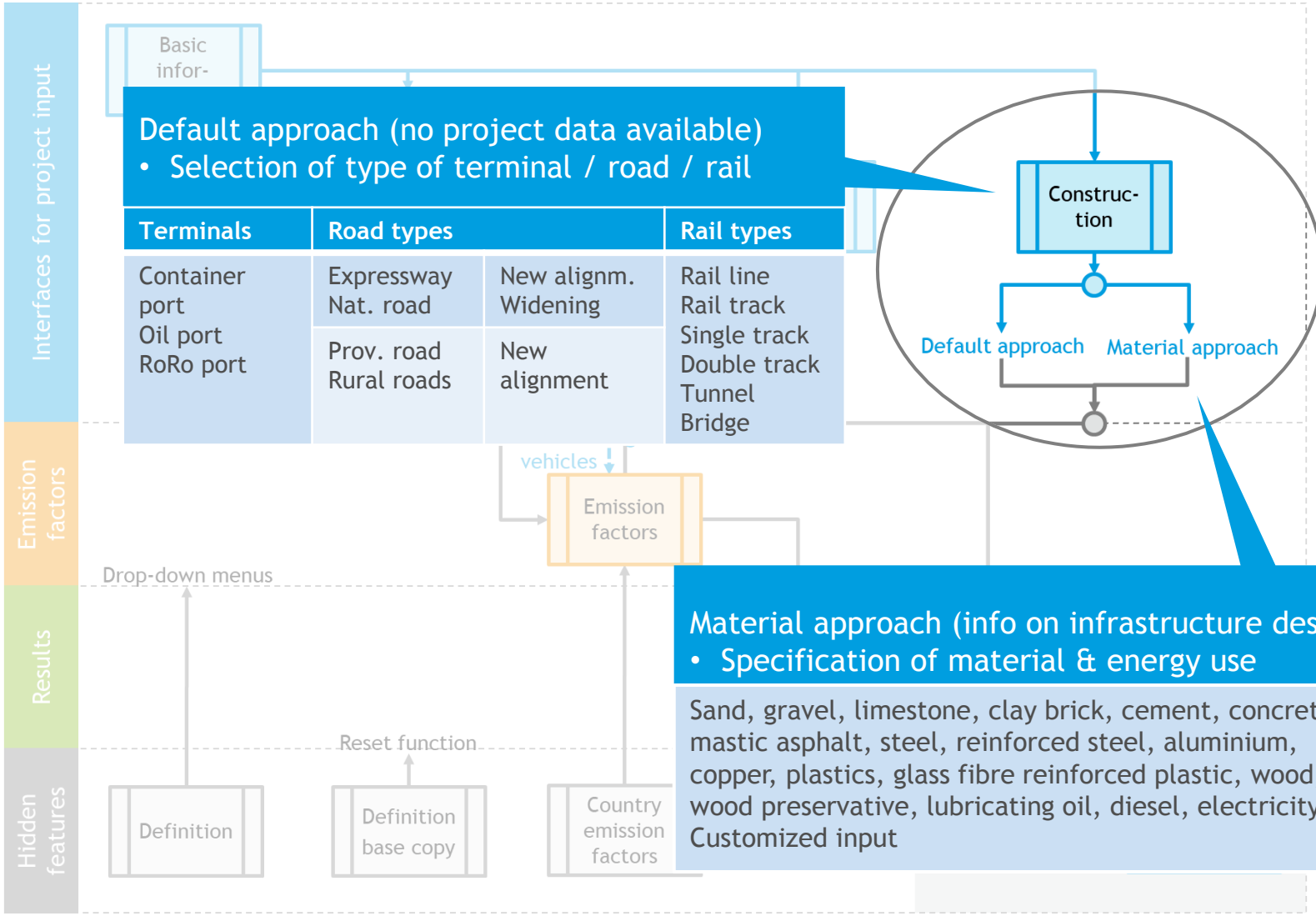
Additional data input for induced demand



Additional data input for construction



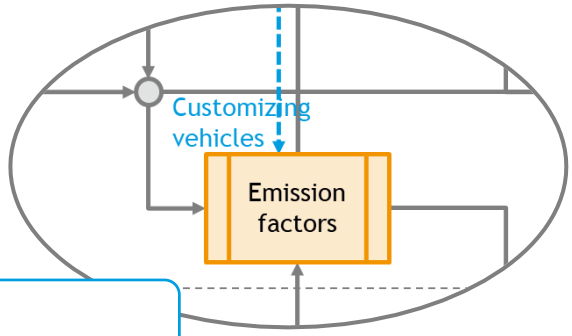
Default approach (no project data available)
- Selection of type of terminal / road / rail

Terminals	Road types		Rail types
Container port Oil port RoRo port	Expressway Nat. road	New alignm. Widening	Rail line Rail track Single track Double track Tunnel Bridge
	Prov. road Rural roads	New alignment	

Material approach (info on infrastructure design)
- Specification of material & energy use

Sand, gravel, limestone, clay brick, cement, concrete, mastic asphalt, steel, reinforced steel, aluminium, copper, plastics, glass fibre reinforced plastic, wood, wood preservative, lubricating oil, diesel, electricity, …
Customized input

Embedded database with consumption & emission factors



Database

Cargo type	Transport (operational emissions)	Transhipment (operational emissions)	Infrastructure (construction emissions)
Light	Road	C: Water/land	Road
Average	Rail	C: Rail/road	Rail
Heavy	IWW	Oil terminal	Ports
Containerised	Maritime	RoRo terminal	

Mode-specific short list of (vehicle) categories

- Use of international accepted databases/methods for consumption factors of transport
  - i.e. GLEC, HBEFA v3, EcoTransIT, IMO/Stream
- Use of available data (partly updated) on transhipment & infrastructure
  - GLEC, IVL (SE), Roadeo (Worldbank), Ökoinstitut (DE, UIC) & ecoinvent v3.3

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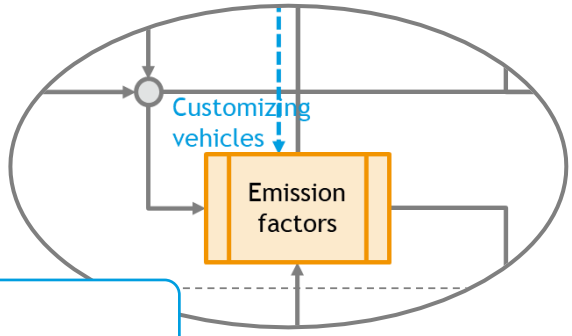
Embedded database with consumption & emission factors



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Heavy	IWW	Oil terminal	Ports
Containerised	Maritime	RoRo terminal	

Mode-specific short list of (vehicle) categories

Relevant databases e.g. HBEFA, EcoTransIT, BLN - Pierre Ooms, IMO/STREAM

- Database provides consumption factors for selected cargo type & e.g. vehicle type [MJ/tkm]
- Tool offers possibility to
  - Customize consumption factors of selected vehicle types (scaling / load / empty trip factors)
  - Define additional vehicle types (e.g. new fuel types (CNG, electric drives))

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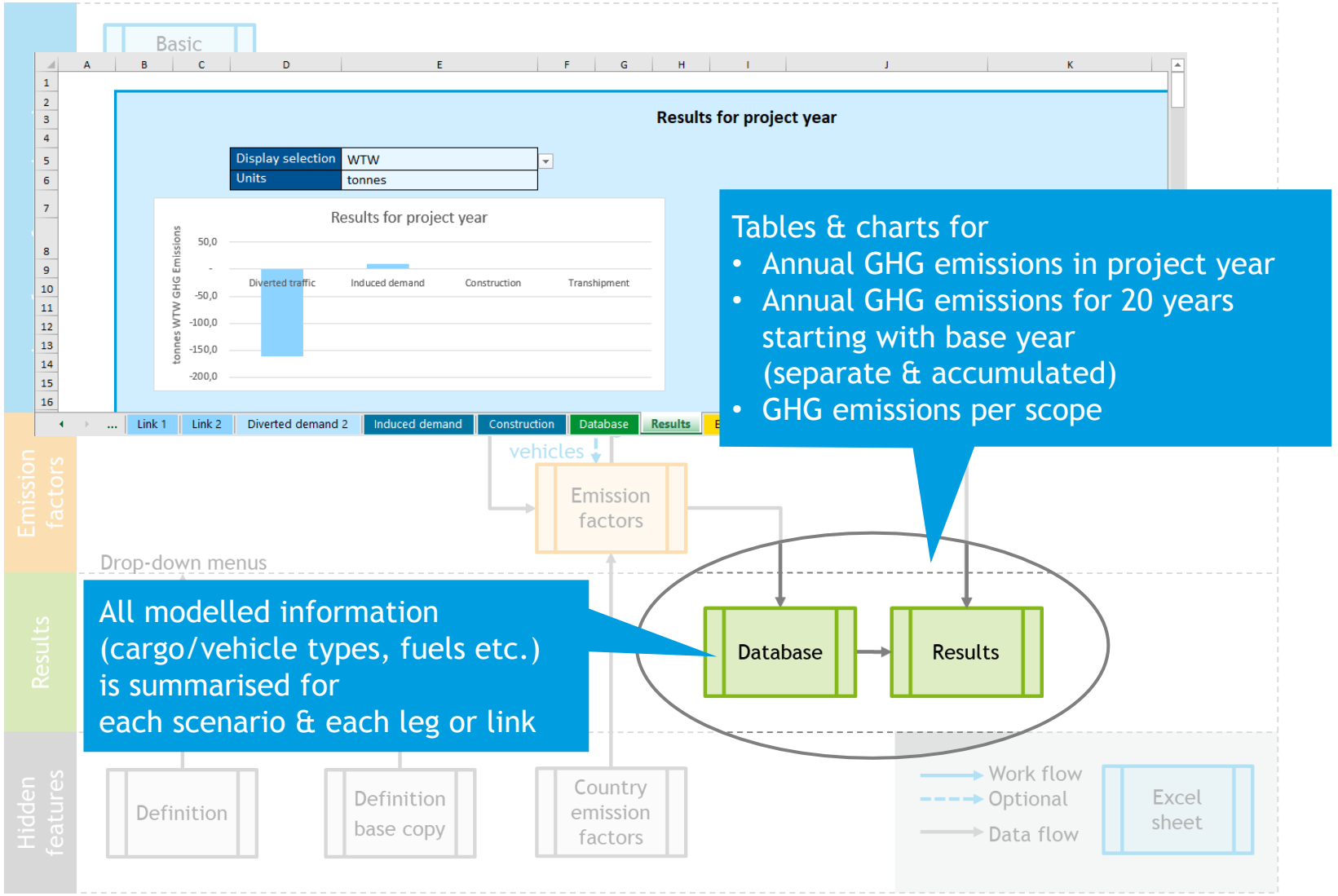
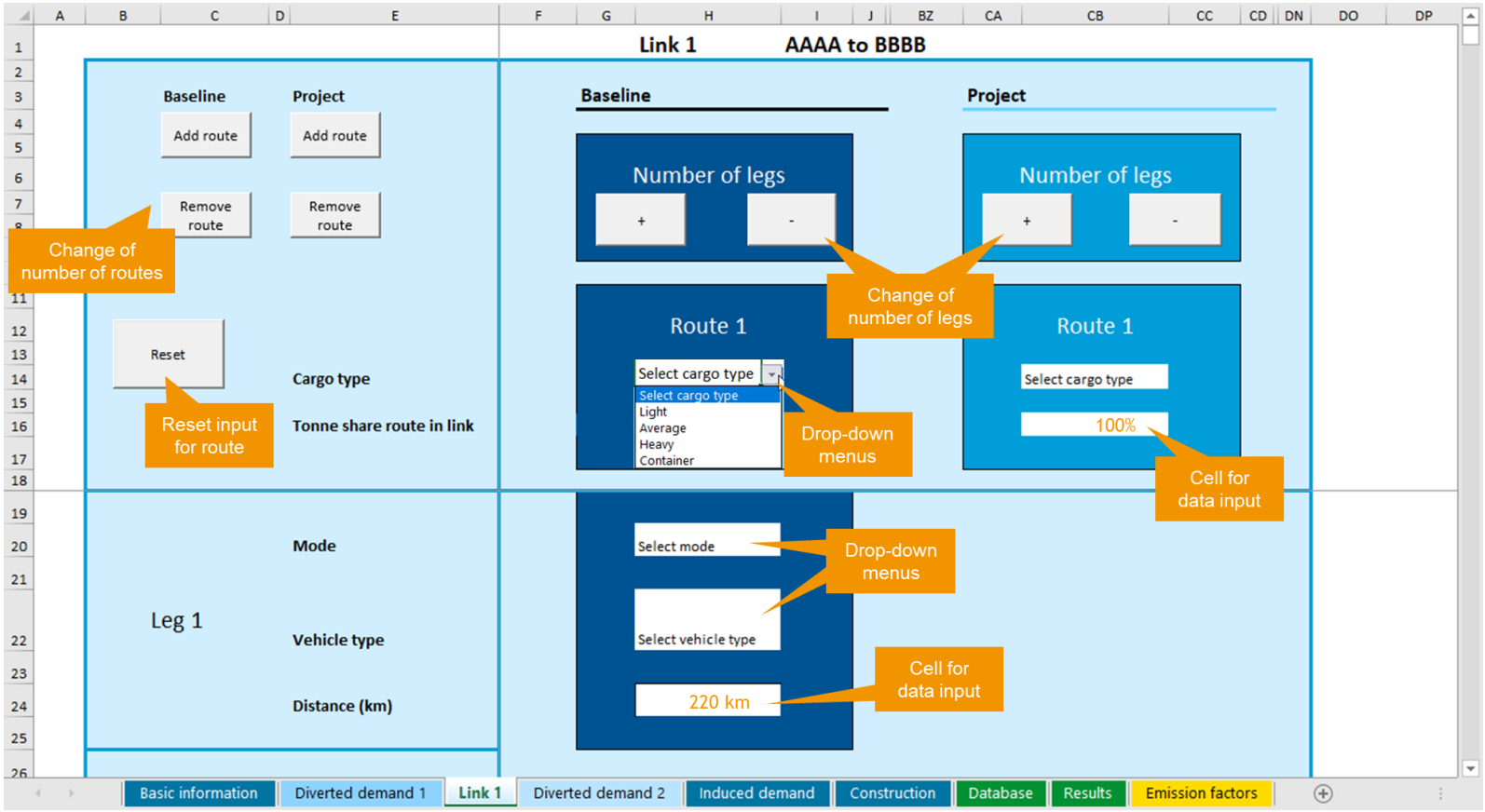
Results of the calculation



Tool provides flexibility

through buttons, drop-down menus & cells for data input



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