Intermodal Terminal Eco-Efficiency Calculator (ITEC)

Introduction

Intermodal terminals and providers of intermodal services are challenged by the increasing cost of energy and the need to contribute to sustainable, efficient transport chains. Terminals are depending on their layout, technologies and processes agreed upon with transport operators, which in total make the efficiency of the terminal.

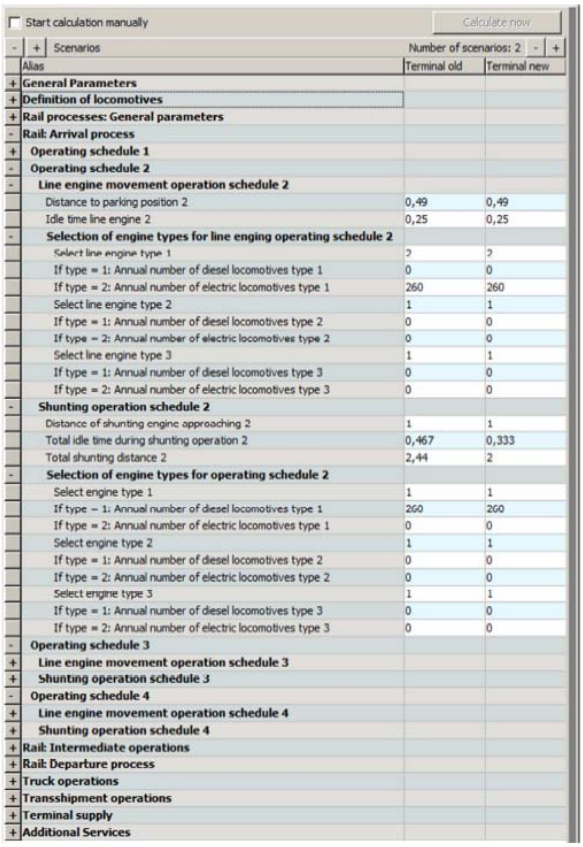
Functionality

The Intermodal Terminal Eco-Efficiency Calculator (ITEC) is a tool developed to the maturity of a prototype which:

- calculates the energy use and greenhouse gas (GHG) performance of intermodal terminals including all relevant operations;
- identifies the terminal's "hot spots", i.e. the main energy consumers and processes;
- points out the impact of "greening measures" already implemented and anticipates effects of planned measures.

Benefits for the terminals

- ITEC can be used ad hoc (no data interfaces needed, no requirements concerning dedicated IT terminal systems or data exchange formats);
- Very detailed capturing of all energy relevant processes possible (800 ITEC parameters might be modified on demand) (see figure 1)
- In case of missing terminal specific parameters, experience figures and model calculations are available
  - Missing terminal specific data does not prevent ITEC applicability;
  - Quick, rough estimation with experience figures possible;



Start calculation manually — Calculate now

Scenarios — Number of scenarios: 2

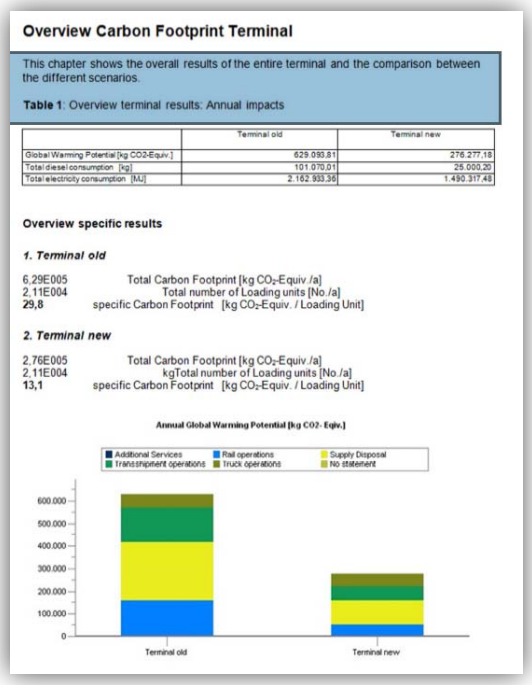
Alias	Terminal old	Terminal new
General Parameters		
Definition of locomotives		
Rail processes: General parameters		
Rail: Arrival process		
Operating schedule 1		
Operating schedule 2		
Line engine movement operation schedule 2		
Distance to parking position 2	0,49	0,49
Idle time line engine 2	0,25	0,25
Selection of engine types for line enging operating schedule 2		
Select line engine type 1	2	2
If type = 1: Annual number of diesel locomotives type 1	0	0
If type = 2: Annual number of electric locomotives type 1	260	260
Select line engine type 2	1	1
If type = 1: Annual number of diesel locomotives type 2	0	0
If type = 2: Annual number of electric locomotives type 2	0	0
Select line engine type 3	1	1
If type = 1: Annual number of diesel locomotives type 3	0	0
If type = 2: Annual number of electric locomotives type 3	0	0
Shunting operation schedule 2		
Distance of shunting engine approaching 2	1	1
Total idle time during shunting operation 2	0,467	0,333
Total shunting distance 2	2,44	2
Selection of engine types for operating schedule 2		
Select engine type 1	1	1
If type = 1: Annual number of diesel locomotives type 1	260	260
If type = 2: Annual number of electric locomotives type 1	0	0
Select engine type 2	1	1
If type = 1: Annual number of diesel locomotives type 2	0	0
If type = 2: Annual number of electric locomotives type 2	0	0
Select engine type 3	1	1
If type = 1: Annual number of diesel locomotives type 3	0	0
If type = 2: Annual number of electric locomotives type 3	0	0
Operating schedule 3		
Line engine movement operation schedule 3		
Shunting operation schedule 3		
Operating schedule 4		
Line engine movement operation schedule 4		
Shunting operation schedule 4		
Rail: Intermediate operations		
Rail: Departure process		
Truck operations		
Transshipment operations		
Terminal supply		
Additional Services		

Figure 1 - ITEC Interface (parameters)

- Single "greening" measures can be implemented (e.g. replacement of transhipment facilities, modified rail/road infrastructure, new road check-in or wagon repair procedure);

- Not only total carbon footprint/"greening" effect, but detailed results:
  - Identification of "hot spots" (e.g. by processes or mode);
  - Explanation of different specific energy consumptions of terminals;
  - Evaluation of greening impact of (single) measures or measure bundles;

Figure 2 - ITEC Results



Overview Carbon Footprint Terminal

This chapter shows the overall results of the entire terminal and the comparison between the different scenarios.

Table 1: Overview terminal results: Annual impacts

	Terminal old	Terminal new
Global Warming Potential [kg CO2-Equiv.]	629.093,81	276.277,18
Total diesel consumption [kg]	101.070,01	25.000,20
Total electricity consumption [MJ]	2.162.933,36	1.490.317,48

Overview specific results

1. Terminal old

6,29E005 Total Carbon Footprint [kg CO_2-Equiv./a]
2,11E004 Total number of Loading units [No./a]
29,8 specific Carbon Footprint [kg CO_2-Equiv. / Loading Unit]

2. Terminal new

2,76E005 Total Carbon Footprint [kg CO_2-Equiv./a]
2,11E004 kgTotal number of Loading units [No./a]
13,1 specific Carbon Footprint [kg CO_2-Equiv. / Loading Unit]

Annual Global Warming Potential [kg CO2- Equiv.]

- Use of proven GaBi software in line with standards and respective methodical basics
  - 1st priority: use of exact, measured data,
  - next priority: use of average data or analogy methods

- Result documentation (Word/PDF) automatically generated;

- Visualisation of parameter modifications (scenarios) on the spot;
- Consideration of (country/terminal) specific energy mix;

- Desktop and web application available;

- Standardised template for data gathering (energy consumers and their specific consumption);

- Operational procedures can be clarified with terminal operator via video/telephone conference, using standardised check-list (ca. 2 h);

Benefits for the other actors

- Functional terminal approach closes the knowledge gap to line oriented CO2 calculators (e.g. EcoTransIt) and standards (e.g. CEN 16258);

- Enhanced knowledge of the CO2-footprint of intermodal terminals to improve the transport chain calculation;

- Reduction potential for rail and road operations within intermodal terminals.

Demonstrators

The following demonstration partners and use cases, all operational intermodal terminals of different size and type, are examined in the course of the EcoHubs project:

1. Interporto Bologna (IBI)
2. Stockholm Arsta (Jernhusen)
3. Ljubljana Moste (Adriakombi)
4. Antwerp Zomerweg (IFB)
5. Antwerp Combinant
6. Neuss Trimodal.