TrainERGY project

Case Study - Template

Submission Date:	17-05-17
Place:	Naples, Italy

Sector Analysed:	Metal production
Product Analysed:	**Warehouse forklift operations**

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1 Introduction

This report describes the analysis of a forklift movement process for a metal producer company. The chosen company is a well-established Greek firm called Alumil. The forklift movement process was analyzed through the tool SCEnAT, which aims to calculate the emission of the product's process in order to make some recommendation concerning the CO2 emissions, the water consumption, cartoons waste, etc. In that manner, this report proposes a scenario to the forklift movement process, which is using lean process in order to re-design the product in order to be more sustainable.

2 Overview

2.1 Firm description

Alumil S.A. is the largest privately-owned aluminium extrusion group in South-East Europe, in terms of **production, distribution network and range of aluminium profile systems**. It is among the top suppliers of branded aluminium systems for architectural use in Europe.

With 30 years of experience, Alumil is one of the most advanced companies globally in the **design and production** of aluminium extrusion products with **state – of – the art production lines** in all its factories.

Alumil produces aluminium systems which are designed and developed in the Group's Research & Development Department and then tested and certified by internationally accredited certification institutes and laboratories, such as Ift **Rosenheim** (Germany), **A.A.M.A** (USA), **Instituto Jordano** (Italy), **EKANAL** (Greece), etc.

2.2 Product description

The product is a forklift that is used by Alumil in its warehouse for operation purposes. It is an industrial truck that is used to lift objects (i.e boxes) for short distances. Forklift is core to an organization because it enables moving products from trucks to the warehouse (and vice versa) in a more efficient and faster way.

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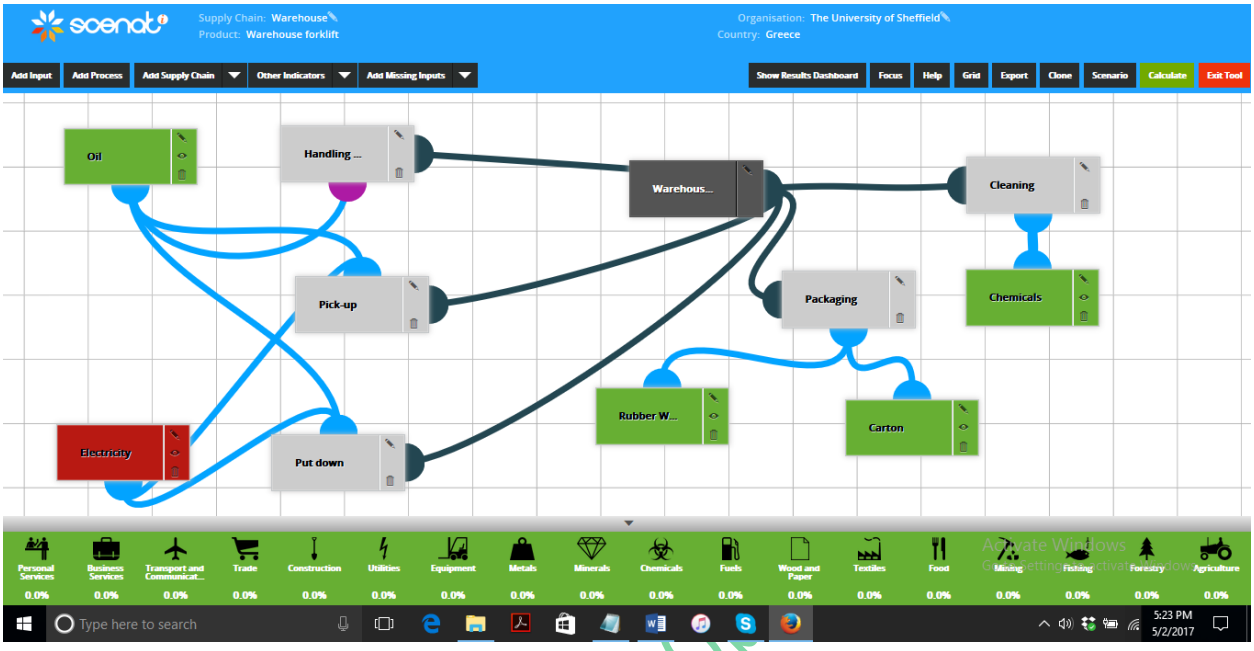
2.3 Supply chain of the product



3 Main Analysis

3.1 Process approach

- Handling Equipment
- Pick-up
- Put down
- Packaging
- Cleaning

3.1.1 Resources and materials, energy usage, package, water, waste, transport

Overall Process & Measurement Unit	Main processes	Inputs
	Handling Equipment	• Oil (0.05 L) • Electricity (11.2KWH)

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Product/Process: Warehouse forklift operations (unit=1 KG or moved product)	Pick-up	• Electricity (12.6KWH) • Oil (0.089 L)
	Put down	• Electricity (4.2KWH) • Oil (0.062 L)
	Packaging	• Rubber wrapping (0.125KG) • Paper cartons (0.05 KG)
	Cleaning	• Chemicals (0.120 L)

3.2 SCEnAT analysis

3.2.1 SC Carbon Map

The Supply Chain Environmental Analysis Tool (SCEnAT) was used to model the **Warehouse forklift Supply Chain** of **The University of Sheffield** in order to evaluate the total lifecycle carbon emissions, identify carbon-hotspots and suggest possible low carbon intervention measures to address the hot-spots. The results of lifecycle assessment (LCA) undertaken using the Hybrid LCA methodology are based on the environmental impacts due to global warming potential of the **Warehouse orklift Supply Chain**. The total lifecycle carbon emissions was estimated to be **25.09 kg CO2-eq/kg**. This can further be divided into two main categories: process LCA impacts and indirect impacts. The process LCA impacts contributed **100.00 %** of the total lifecycle impacts of the Warehouse forklift Supply Chain. Indirect impacts associated with the supply chain were estimated to be **0.00 %**. These indirect impacts arise from emissions associated with indirect inputs from the industries aggregated across 18 sectors namely: Agriculture,
Forestry, Mining, Food, Textiles, Wood & Paper, Fuels, Chemicals, Minerals, Metals, Equipment, Utilities, Construction, Trade, Transport & Communication, Business services, Personal Services. The use of the robust Hybrid LCA ensures that the those inputs that might otherwise be missed in the process LCA system, such as such as construction of commercial buildings (to account for construction of plants and related buildings), service related inputs (such as administration and business related activities), and other special purpose machineries for instance are captured.

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Full Supply Chain Data

Input Name	Amount	Avg. Unit Cost	Emission Intensity	Carbon Emissions	Emission %
Electricity	18.00kWh	$0.87	1.3400	24.1200	96.1%
Carton	0.56kg	$0.10	0.6700	0.3752	1.5%
Rubber Wrapping	2.56kg	$0.45	0.1250	0.3200	1.3%
Chemicals	0.12litre	$0.89	1.7800	0.2136	0.9%
Oil	0.05litre	$0.50	1.2300	0.0615	0.2%
Personal Services (Indirect)	N/A	N/A	N/A	0.0000	0.0%
Business Services (Indirect)	N/A	N/A	N/A	0.0000	0.0%
Transport and Communication (Indirect)	N/A	N/A	N/A	0.0000	0.0%
Trade (Indirect)	N/A	N/A	N/A	0.0000	0.0%
Construction (Indirect)	N/A	N/A	N/A	0.0000	0.0%
Utilities (Indirect)	N/A	N/A	N/A	0.0000	0.0%
Equipment (Indirect)	N/A	N/A	N/A	0.0000	0.0%
Metals (Indirect)	N/A	N/A	N/A	0.0000	0.0%
Minerals (Indirect)	N/A	N/A	N/A	0.0000	0.0%
Chemicals (Indirect)	N/A	N/A	N/A	0.0000	0.0%
Fuels (Indirect)	N/A	N/A	N/A	0.0000	0.0%
Wood and Paper (Indirect)	N/A	N/A	N/A	0.0000	0.0%
Textiles (Indirect)	N/A	N/A	N/A	0.0000	0.0%
Food (Indirect)	N/A	N/A	N/A	0.0000	0.0%
Mining (Indirect)	N/A	N/A	N/A	0.0000	0.0%
Fishing (Indirect)	N/A	N/A	N/A	0.0000	0.0%
Forestry (Indirect)	N/A	N/A	N/A	0.0000	0.0%
Agriculture (Indirect)	N/A	N/A	N/A	0.0000	0.0%
Final Product	N/A	N/A	N/A	0.0000	0.0%

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3.3 Results

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4 Possible improvements

- In order to enable Environmental performance measurement Lean principles have been applied for the re-design of the forklift process;
- This resulted in an energy consumption reduction but in more wrapping –
- The big heavy pallets that were making the forklift consumer more have been broken down into smaller pallets which made the forklift consume less but which also required more packaging and afferent operations – as well as increased forklift movements – though at a more optimized rate)

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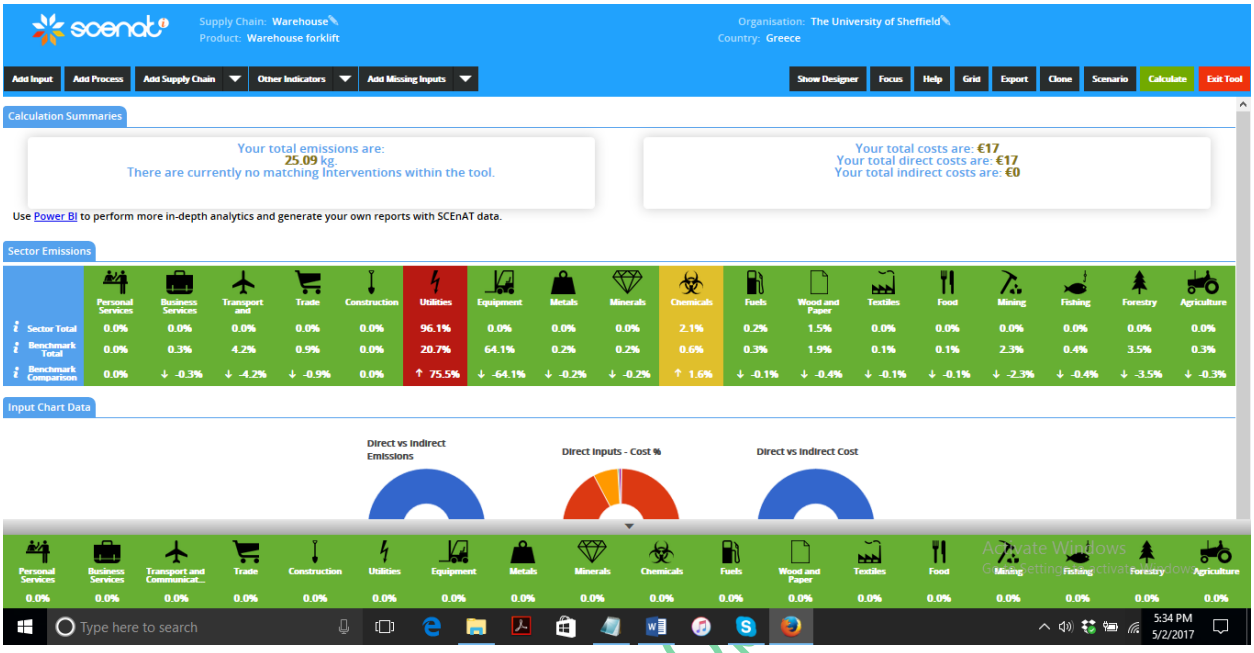
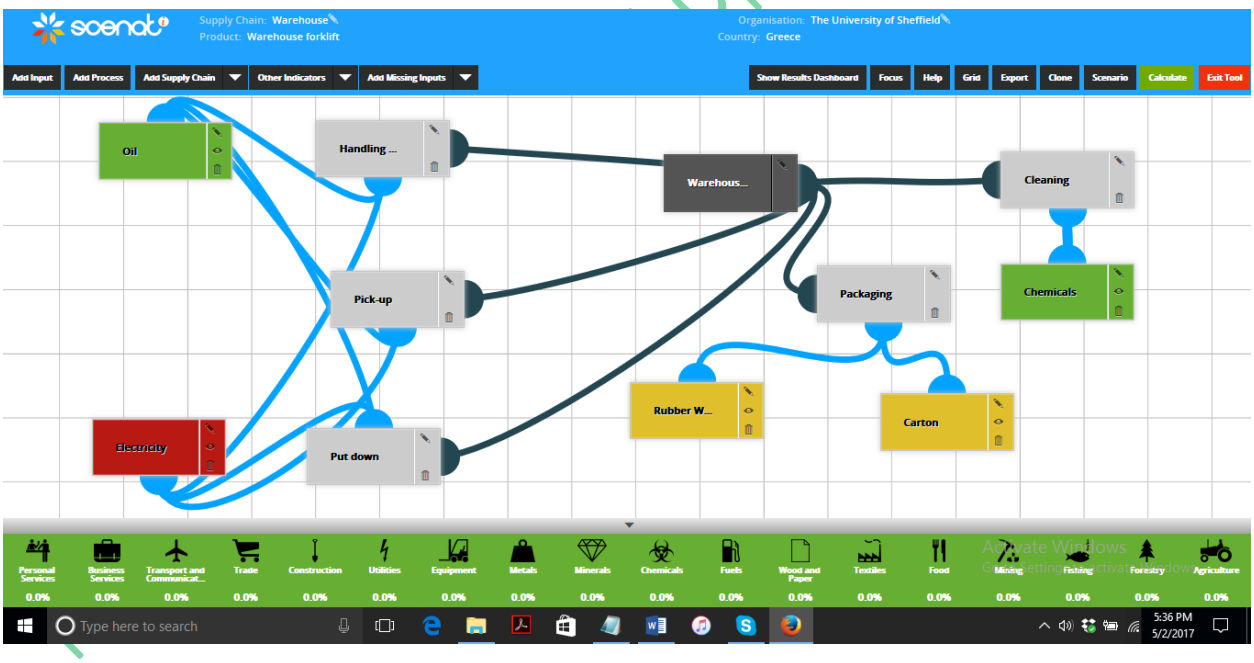
4.1 Scenario 1





- Total emissions cut per unit from **32.59** to **25.09 KgCO2**
- Total cost cut per unit (i.e. movement) from: **21.47 EUR** to **17 EUR**

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5 Final conclusions

This report described the analysis of a forklift movement process for a metal producer company. The results show that "More is less" in this case. By adopting a lean thinking (optimization-wise) and breaking-down large movement units (i.e. palets) into smaller ones that fit the optimum capacity of the forklift, the overall cost and emissions have been lowered. The total emissions cut per unit were from **32.59** to **25.09 KgCO2** and the total cost cut per unit (i.e. movement) from: **21.47 EUR** to **17 EUR.**

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