TrainERGY project

Case Study - Template

Submission Date:	25th Friday 2016
Place:	Sheffield

Sector Analysed:	Cement Production
Product Analysed:	One Sec of Cement

Training for Energy Efficient Operations - TrainERGY

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1 Introduction

The implication of green external operations management in order to reduce electricity and fuel consumption through outsourcing.

2 Overview

2.1 Firm description

As the new leader in the building materials industry, LafargeHolcim has the assets necessary to address the challenges of a new world. With a local presence in 90 countries, the most innovative cement, concrete, and aggregates solutions, we have the most efficient business model and the best performing operating models and teams.

2.2 Product description

The product is 150kg of Cement which is packaged in carton based wrapping and stored in warehouses that applied the optimum humidity conditions.

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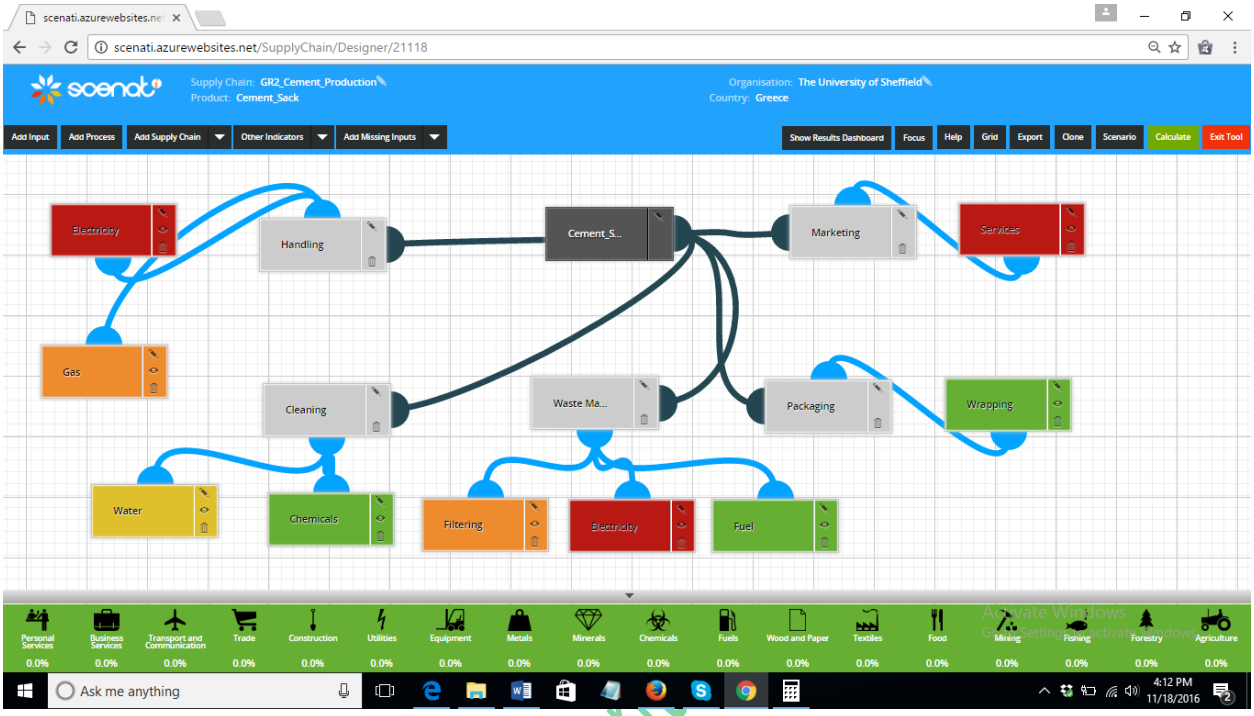
2.3 Supply chain of the product



3 Main Analysis

3.1 Process approach

The main production steps are:

- Cement mineral production via crashing and compression
- Packaging into sacks
- Local warehouse transportation
- Cleaning
- Marketing

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

Overall Process & Measurement Unit	Main processes	Inputs
Product/Process: Cement Production (unit=50 KG of Cement)	Handling Equipment (including crushing and powdering)	• Electricity (620KWH) • Gas (325 KWH)
	Cleaning (curation)	• Water (187 L) • Chemicals (5 L) • Filtering (Electricity – 156 KWH)
	Waste management	• Electricity (340 KWH) • Fuel (1.34 L)
	Packaging	• Paper wrapping (0.276 KG)
	Marketing	• Paper (0.376 KG) • Ink (0.014 KG) • Services (0.10 FTE)

3.2 Scenat analysis

3.2.1 SC Carbon Map

The Supply Chain Environmental Analysis Tool (SCEnAT) was used to model the Cement_Sack 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 Cement_Sack Supply Chain. The total lifecycle carbon emissions was estimated to be 2,515.75 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 Cement_Sack 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,

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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.

The Lifecycle Emissions of the Cement_Sack Supply Chain are presented below in a bar chart. It consists of all direct and indirect inputs into the LCA system, classified into different input categories.

Gas	325.00kWh	$0.12	0.7800	12,675.0000	10.1%
Filtering	156.00kWh	$0.45	1.2300	9,594.0000	7.6%
Water	187.00litre	$0.10	0.6700	6,264.5000	5.0%
Electricity	40.00kWh	$0.67	1.1200	2,240.0000	1.8%
Chemicals	5.00litre	$0.08	0.7800	195.0000	0.2%
Fuel	0.23litre	$0.78	1.4500	16.6750	0.0%
Wrapping	0.28kg	$0.18	0.8900	12.2820	0.0%
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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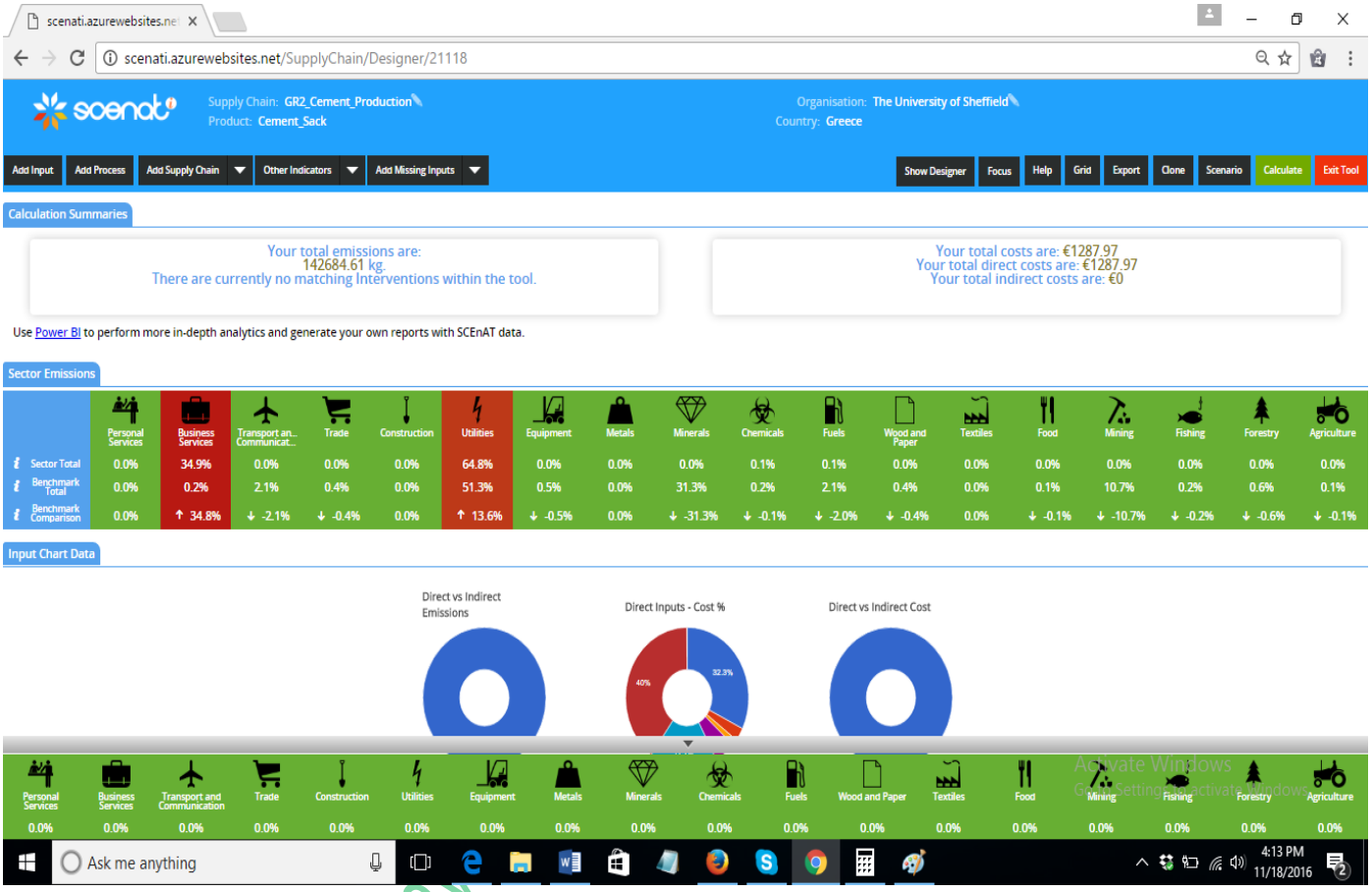
3.3 Results



4 Possible improvements

4.1 Scenario 1

Apply green external operations management for better waste handling. This process, as you explained, for 500 sacks of cement involved:

- New green outsourcing mechanisms
- Increased business cost (operational) by 15%
- Decrease of waste management cost by 55%
- Decreased electricity cost by 15%
- Decreased fuel consumption by 28%

Results:

- Total emissions cut per 500 sacks from 142 to 125

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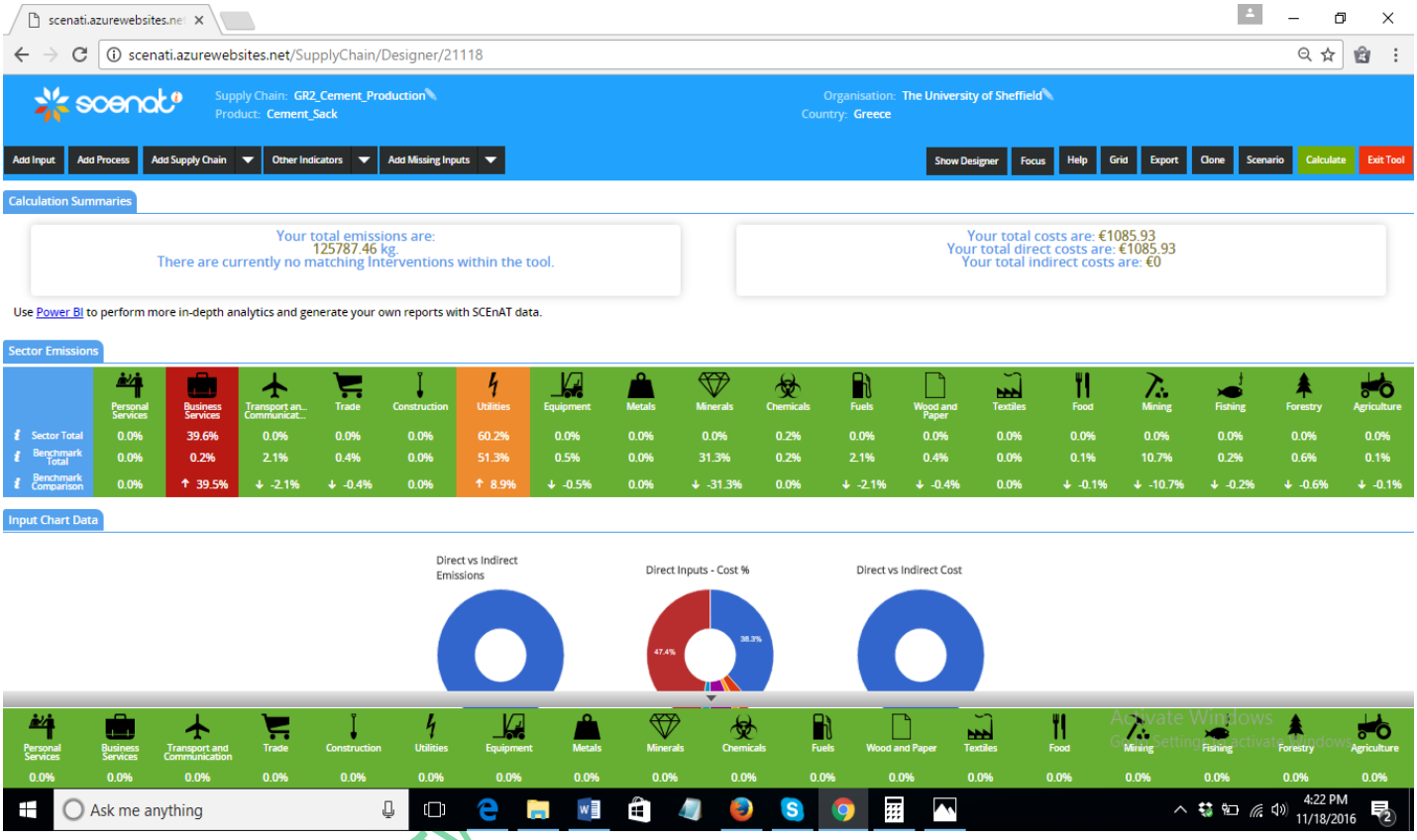
- Total cost cut per unit from: 1287 EUR to 1087 EUR
- Initial estimated investment (operational change + hardware): 7680 EUR. Cost mitigation after 19200 cement sack sales.



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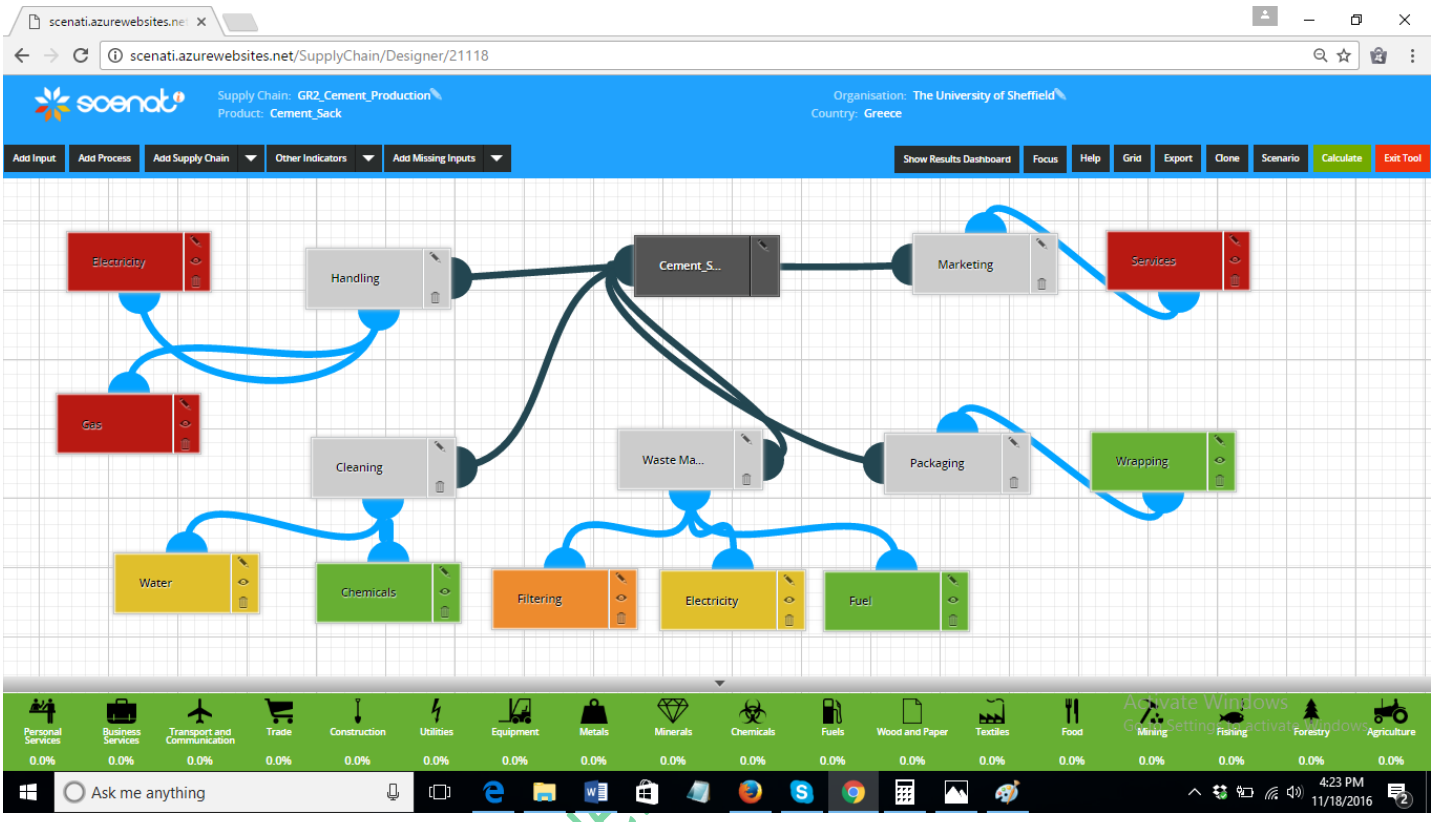

5 Final conclusions

This process shows that if green external operation management is applied, cost and emission could be indeed reduced. However, an initial investment is required to support these processes and this will return the investment in a period of 1 year.

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