MScBA Sustainable SC - Case Study

The « **Taste my Coffee™** » company is based on regional franchising in NA with 37 medium size coffee shops delivering drinking coffee to its clients, who can drink all day from 6,00 am up to 1.00 am take away or served cups at the table with croissants or other small food supplied from externally. The company turnover is 41 Mill USD/year and a net profit BT of 17% of Sales. The average n° of coffee served is 350/day/shop at a price of 3,5 USD/coffee. Above 80% of workers are employed and seasonal peaks are covered by temporary personnel who serve clients.

The company has reached a positive reputation thanks to its flavoured coffee, fair price and the overall ambiance easy going and friendly in the shops.

The management of the chain, who have invested almost 12 years ago in properties and equipment, has started to become more sensitive to the sustainability impact as an overall combination of both increasing regulations on the emissions control and realizing that efficiency translates in lower emissions and reduced costs. Last but not least, they want to properly and fairly communicate the sustainability effort into a positive marketing message thus branding the company.

Starbucks and the major coffee shops chains have set a new frontier to the perception of sustainable coffee and "Taste my Coffee™" company wants to pursue the trend defined by the larger global corporations to demonstrate they are on top of the evolution in the business and in the sustainability area.

Taking the opportunity to become more sustainable, they want also to rethink their value proposition and market positioning with the goal to grow while becoming more green.

In order to take action, the company assigns a team composed by: a) experts of coffee R&D hired externally with a consulting contract, b) technical people who know quite well the specs of the machines, c) a few engineers and a number of procurement experts, who manage purchasing contract and indirect spending. Marketing and Sales are part of the team and they are ready to discuss commercial solutions as soon as environmental data are available.

	Marketing & Sales	Current Recycling Research	Future Recycling Research	LCA Analysis
Man Hours	40 hours	60 hours	60 hours	320 hours
Labor Costs (hrs*$40/hour)	$1600	$2400	$2400	$12800

They have allocated resources and decided to make a thorough investigation to identify possible improvement solutions in terms of emissions reduction and verify if these solutions could bring to economic advantages as well as better social impact. The team decides to adopt the LCA methodology following the 4 steps:

1.Goals and Scope ("gate to gate" at initial stage) definition

2. Inventory analysis

3. Impact Assessment (available)

4. Interpretation and conclusions/Next steps

They postpone the opportunity to collaborate with suppliers at a second stage through associations and with other coffee sellers, in order to discuss green procurement principles and achieve a better economy of scale and also contractual power.

In the first approach to the problem they identify as scope the "gate to gate" boundaries, which will bring them to map the coffee preparation process, easily identified as the coffee preparation to the clients using the single cup coffee machines. The team has collected some data necessary to calculate the energy and material balance for an average business day, in which they produce and serve 350 coffees/shop.

As a team you are asked to perform the following steps in line with the LCA methodology:

- Fill the data taken from the job done by the technical staff (Coffee Machine Data spreadsheet) into the process flow document (EMPTY spreadsheet), resulting in mass and energy balance.
- Such data will be summarized in the process flow available in xls (FILLED spreadsheet). Graphics with results are available in the xls workbook (GHG, Power, Water, etc)
- Consider the outcomes of the LCIA (Life Cycle Impact Assessment) already available in figures in the xls workbook, which provide information on the effects of coffee preparation onto health and environment for qualitative considerations only.
- Once you figure out the final picture, you will prepare a short Interpretation summary of your study with some conclusions
- Define Goals (business and/or Sustainability goals) and Scope (Gate to Gate). You can elaborate a mini business plan in which you will evaluate some possible investments on renewable energy sources and to improve the current processes efficiency. Social aspects can be discussed where relevant as coffee raw material coming from fair trade plantations, etc. Also you might think on ways to communicate the improved sustainability to improve the Brand awareness (and revenues).
- Summarize all aspects in a short presentation of 15-20' of a few slides, which you will be delivering to the extended class group. Please put the ppt on USB key to download on the pc.

Here following a few information which may help in focusing on plans. Feel free to collect more data on coffee business/other on the web to address your plans

Coffeehouse chains revenues in USA (Mill USD)

Starbucks	21 095
Costa Coffee	1 809
McCafe	1 462
Doutor Coffee Shop	718
Coffee Bean & Tea Leaf	520
Caffè Nero	442
Tully's	440
Ediya Espresso	361
Caribou Coffee	311
Gloria Jean's Coffees	303

"Taste my Coffee™": 41 Mill USD

Revenue in million U.S. dollars
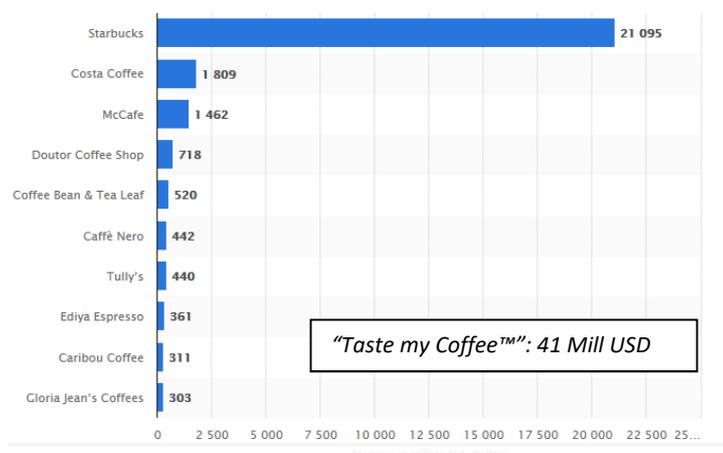
Leading vendors of single cup coffee in USA (2017 sales figures)

Sales in million U.S. dollars

Vendor	Sales
Keurig Green Mountain	1 157.9
Private label	656.5
Starbucks Coffee Co.	612
Kraft Heinz Co.	419.7
The Folger Coffee Co.	307
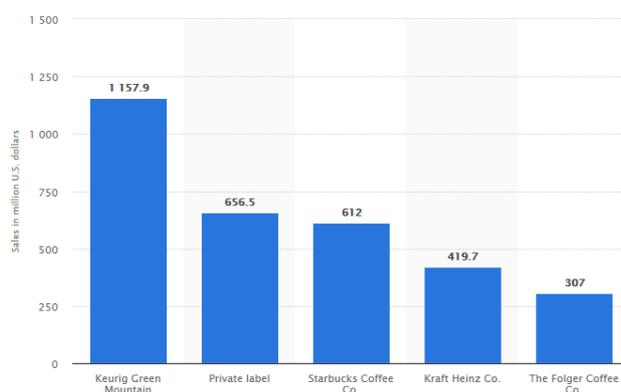
Small scale PV (Photo Voltaic) cost data (adapted from the UK Government – Dept. of Energy & Industrial Strategy). Only for reference.

Year	Month	0-4kW					4-10kW				
						£ per kW installed					£ per kW installed
		Number of installations	Median	Mean	Lower CI	Upper CI	Number of installations	Median	Mean	Lower CI	Upper CI
2017	April	1,186	1,669	1,864	1,817	1,910	110	1,283	1,368	1,280	1,456
	May	1,898	1,794	1,920	1,885	1,954	149	1,364	1,495	1,425	1,564
	June	1,745	1,698	1,824	1,788	1,860	207	1,425	1,531	1,462	1,601
	July	1,491	1,636	1,768	1,732	1,805	168	1,415	1,534	1,448	1,621
	August	1,918	1,660	1,821	1,786	1,856	173	1,372	1,500	1,427	1,573
	September	1,975	1,733	1,878	1,845	1,911	210	1,370	1,482	1,412	1,552
	October	1,635	1,659	1,815	1,778	1,851	176	1,407	1,519	1,437	1,601
	November	2,006	1,720	1,812	1,780	1,843	178	1,428	1,513	1,434	1,591
	December	1,390	1,733	1,829	1,792	1,866	162	1,439	1,521	1,444	1,598
2018	January	1,378	1,685	1,811	1,772	1,849	129	1,365	1,522	1,425	1,619
	February	1,293	1,714	1,854	1,817	1,891	129	1,419	1,583	1,476	1,689
	March	1,793	1,714	1,885	1,848	1,922	194	1,431	1,546	1,471	1,621
Total 2017/18		19,708	1,701	1,840	1,830	1,850	1,985	1,393	1,509	1,486	1,533

Estimated CO_2 equivalent emissions range for a car running 100 km

Fuel	CO2 emissions kg
Diesel	22-33
Gas	23-34
Petrol	20-30
Biogas	16-26

Specifications, LCI and LCIA

N° coffee / Day/shop: **350** (1 coffee about 100 cl)

COFFEE MACHINE data

Power Consumption / day		6.0	kWh
		21.6	MJ
Power consumtion / coffee		0.017	kWh
		0.062	MJ

Power to heat additional milk (65°C)	t = 65°C	0.5	kWh
(15 cl/coffee)		2.0	MJ

Water IN (200 cl / coffee)	t = 15°C	70	liters
Water OUT	t = 80°C	35	liters
Water discharged energy		-9.5	MJ

GHG Indirect Emissions (Scope 2) - coffee	16.0	kg CO2 eq.
GHG Indirect Emissions (Scope 2) - milk	1,2	" "

Energy 21.6 MJ 2.0 MJ	Water IN 70 lt (15°C)
coffee machine	← Milk
Emission 16 kg CO2 1.2 kg CO2	Water OUT 35 lt (80°C) 9,5 MJ
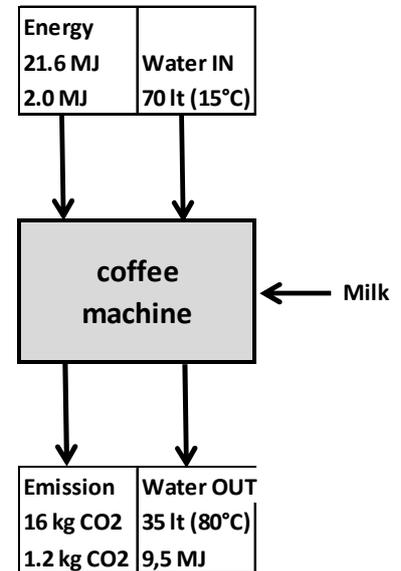
1 MJ = 0.27 kWh
1 kWh = 3.6 MJ
1 cal = 4.186 J
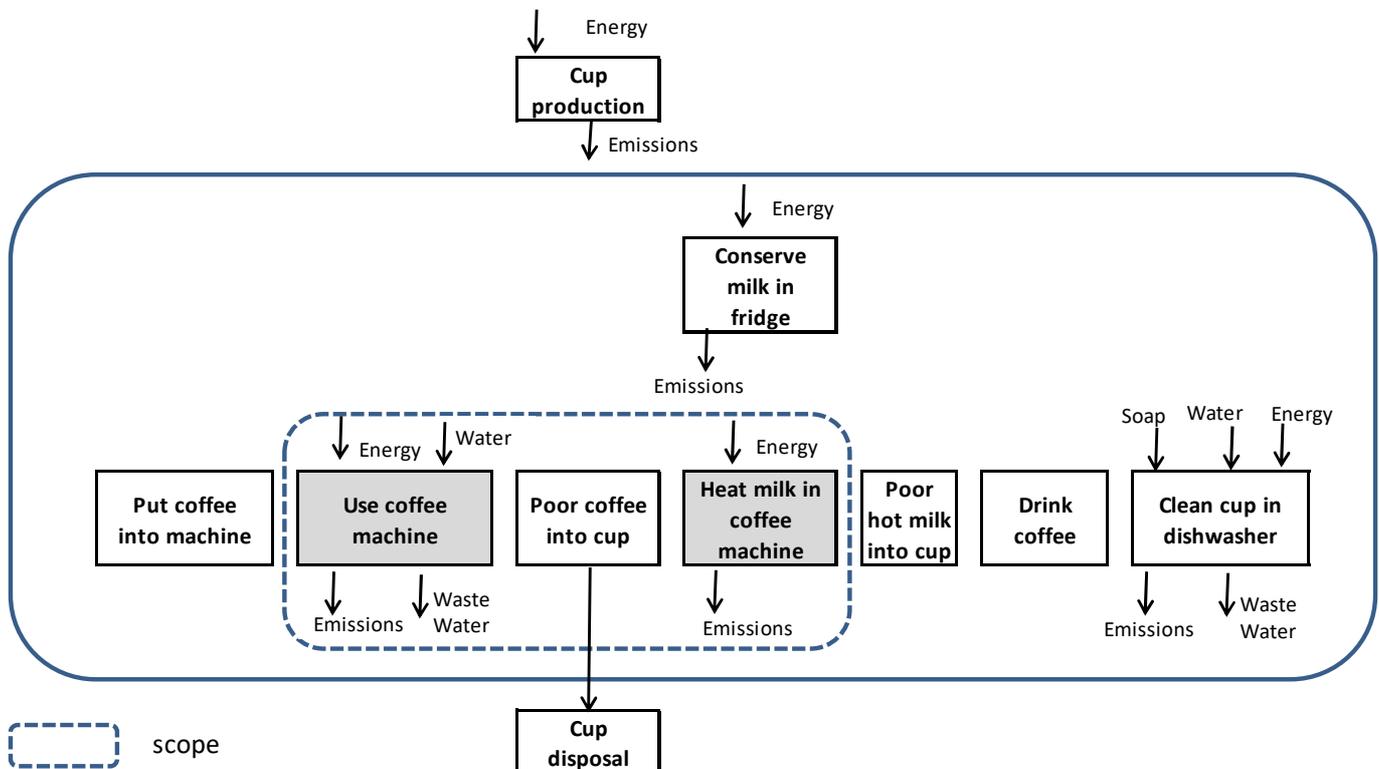
LCIA - Life Cycle Impact Assessment
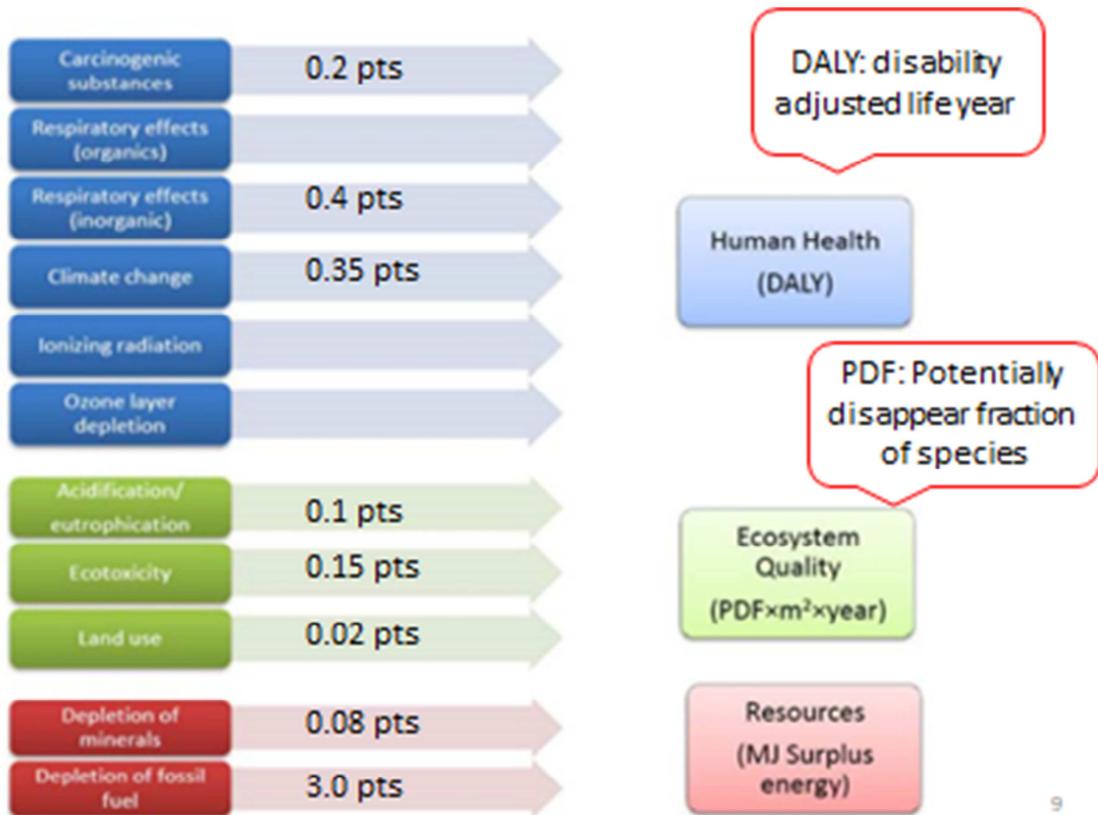
Carcinogenic substances	0.2 pts
Respiratory effects (organics)	
Respiratory effects (inorganic)	0.4 pts
Climate change	0.35 pts
Ionizing radiation	
Ozone layer depletion	

DALY: disability adjusted life year

Human Health (DALY)

Acidification/ eutrophication	0.1 pts
Ecotoxicity	0.15 pts
Land use	0.02 pts

PDF: Potentially disappear fraction of species

Ecosystem Quality (PDF×m²×year)

Depletion of minerals	0.08 pts
Depletion of fossil fuel	3.0 pts

Resources (MJ Surplus energy)

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In the NA region 63% of electricity generation is from fossil fuels (coal, natural gas, petroleum, and other gases). About 20% from nuclear energy, and about 17% was from renewable energy sources.