Valuation of Sustainability Impacts for the Eden Holland project

The Team

Case Team RSM

Jenthe Braspenning
MSc. Finance & Investments

Victor Jünger
MSc. Finance & Investments

Marc Oerlemans
MSc. Finance & Investments

Rokas Šukevičius
MSc. Finance & Investments

Jingwen Zhao
MSc. Finance & Investments

Eden Holland

Reinier de Adelhart Toorop
Impact Institute

Anne Mesguich
Impact Institute

Robert Bark
Eden Holland

Hesse McKechnie
Eden Holland

Case Supervisor

Prof. Dirk Schoenmaker
RSM – Erasmus University

Contents

Executive overview

Workflow	Identifying impacts	Sources & Assumptions	Impact calculations	IP&L statements
	Finding and selecting the most material and feasible impacts	Detecting relevant assumptions from reliable sources	Calculating the impact of expected behavioural changes by incorporating the assumptions	Aggregating all impact calculations into one figure to estimate the IP&L of Eden Holland

Project focus areas	
Meat consumption reduction	Meat production uses a lot of natural resources and even small changes in people's dietary habits can aggregate into a huge positive effect
Air travel reduction	Air travel causes significant CO2 emissions (avg. ~500 kg CO2 per flight per person). Smarter/more sustainable travel options can have an astonishing impact.
Reduced use of fast fashion	Even buying just 2 pieces of clothing less per year can have an incredible impact. The visitors must start understanding that having the latest collection things is an absolute luxury that is not good for the environment and change accordingly.
Reduction of energy and water use / greener alternatives	People need energy in their daily lives, but some use of it is just lavish. Switching these lavish habits and being smart about natural resource use can have a tremendous positive impact.
Other less material impacts	Improved water quality, marine life conservation, increased recyclability of products, social inclusion are all areas that Eden Holland will raise awareness about, although these impacts are hard to quantify. We believe these impacts will also add up, but, for now, we keep the smaller impacts out of consideration in our IP&L calculations so that we can present just the lower end of the range, although with more confidence and certainty.

Identified impacts

Impact	Behavioural changes / description	Materiality	Feasibility	Strategic focus
Reduced use of fast fashion	• Increase the useful life-cycle of consumable products • Changing for more durable products			
Reduction meat consumption	• Increase awareness about the devastating impacts of meat consumption on climate and the living conditions of breeding animals			
Reduction of the travelling frequency	• Reducing the frequency of travelling by being aware of the effect tourism has on the environment and local communities			
Reduction energy consumption	• Switching to eco-electricity and using electronic cars • Conserve energy and water by for example using cold cycle in the washing machine etc.			
Increase of water quality	• Educate people about improved water quality by reducing improper dispose of toxic waste such as batteries and cleaning products			
Conservation of marine life	• Reduce overfishing and plastic waste to secure the stability of the marine eco-system			
Increase recyclability of products	• Increase awareness regarding the importance of waste separation which helps to make materials recyclable			
Social Inclusion – Promotion of solidarity with the community	• Increased engagement with other people while doing hobbies or volunteering			

High Impact

○	◔	◑	◕	●
Unclear	Estimation difficult	Subjective assumptions needed	Objective assumptions needed	Clear

1. Materiality: Does the impact contribute significantly enough to the total impact to be worth calculating

2. Feasibility: Is it possible to calculate the impacts to a reasonable degree of accuracy given constraints?

3. Strategic focus: Does the investor have a specific strategic focus and/or alignment with fund objectives related to this impact

Overall assumptions

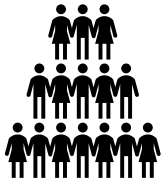
General Assumptions:

- A visitor who visits the park is an average Dutch citizen
- All visitors are able to make behavioral changes after visiting the park

Phase 1:

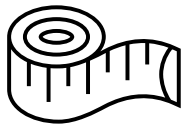
50,000 visitors

Phase 2:

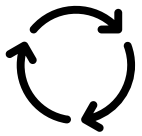


400,000 visitors

Upper and lower case differentiation points:



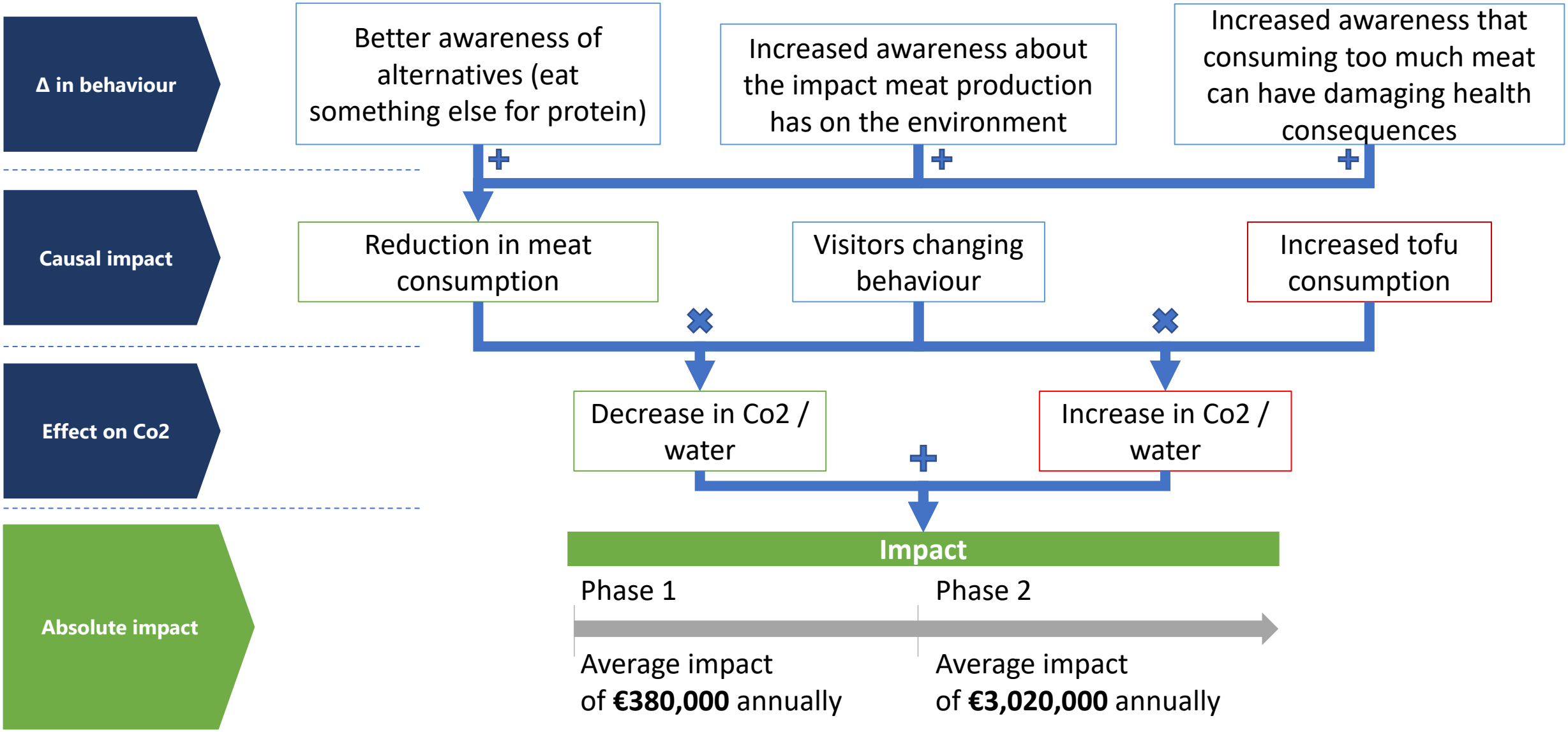
Size of contribution



Conversion rate of visitors

Meat Consumption

Impact meat consumption



Impact valuation meat consumption

PHASE 1

Upper range	CO2	Water
Reduction in kg of meat per year	300,000	300,000
Saved emission per year in mln. kg or l	2.2	2,283
Costs emission per year in NL in mln €	0.35	0.22
Total impact in mln. €	€ 0.57	

Lower range	CO2	Water
Reduction in kg of meat per year	100,000	100,000
Saved emissions per year in mln. kg or l	0.71	760.7
Costs emission per year in NL in mln €	0.12	0.07
Total impact in mln. €	€ 0.19	

Average impact in mln. € **€ 0.38**

PHASE 2

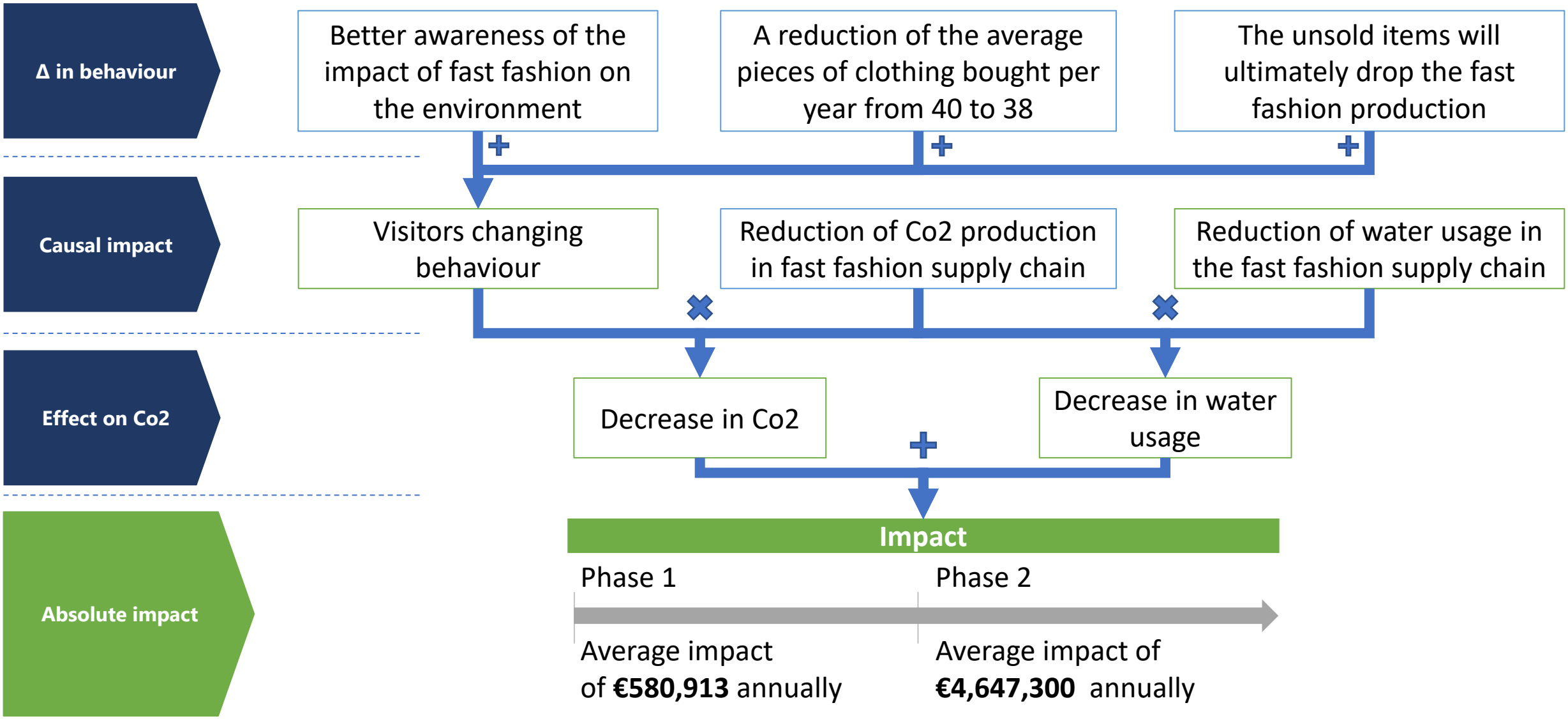
Upper range	CO2	Water
Reduction in kg of meat per year	2,400,000	2,400,000
Saved emissions per year in mln kg. or l	18.26	18,256
Costs emission per year in NL in mln €	2.76	1.77
Total impact in mln €	€ 4.53	

Lower range	CO2	Water
Reduction in kg of meat per year	800,000	800,000
Saved emissions per year in mln. kg or l	6.09	6,085
Costs emission per year in NL in mln €	0.92	0.59
Total impact in mln €	€ 1.51	

Average impact in mln. € **€ 3.02**

Fast Fashion

Impact fast fashion



Impact valuation fast fashion

PHASE 1

Upper range	CO2	Water
Reduction number of clothes per year	150,000	150,000
Saved emission per year in mln. kg or l	0.59	562.5
Costs emission per year in NL in mln €	0.08	0.79
Total impact in mln. €	€ 0.87	

Lower range	CO2	Water
Reduction number of clothes per year	50,000	50,000
Saved emissions per year in mln. kg or l	0.20	187.5
Costs emission per year in NL in mln €	0.03	0.26
Total impact in mln. €	€ 0.29	

Average impact in mln. € € 0.58

PHASE 2

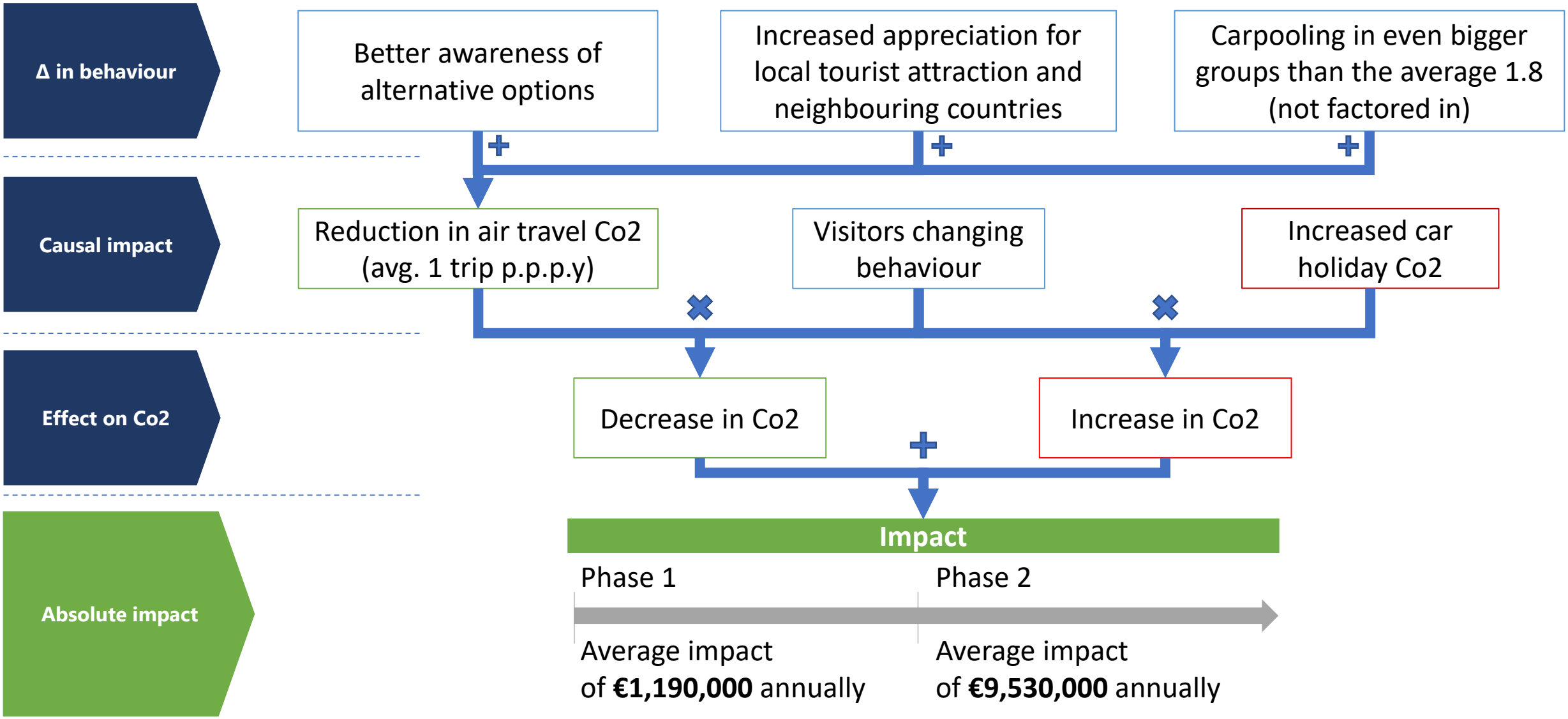
Upper range	CO2	Water
Reduction number of clothes per year	1,200,000	1,200,000
Saved emissions per year in mln kg. or l	4.73	4,500
Costs emission per year in NL in mln €	0.67	6.3
Total impact in mln €	€ 6.97	

Lower range	CO2	Water
Reduction number of clothes per year	400,000	400,000
Saved emissions per year in mln. kg or l	1.58	1,500
Costs emission per year in NL in mln €	0.22	2.1
Total impact in mln €	€ 2.32	

Average impact in mln. € € 4.65

Air Travel

Impact air travel



Impact valuation air travel

PHASE 1

Upper range	CO2
Reduction number of flights per year	25,000
Saved emission per year in mln. kg	11.71
Value emission per year in NL in mln. €	1.59
Total impact in mln. €	€ 1,59

Lower range	CO2
Reduction number of flights per year	12,500
Saved emission per year in mln. kg	5.99
Value emission per year in NL in mln. €	0.79
Total impact in mln. €	€ 0,79

Average impact in mln. € € 1.19

PHASE 2

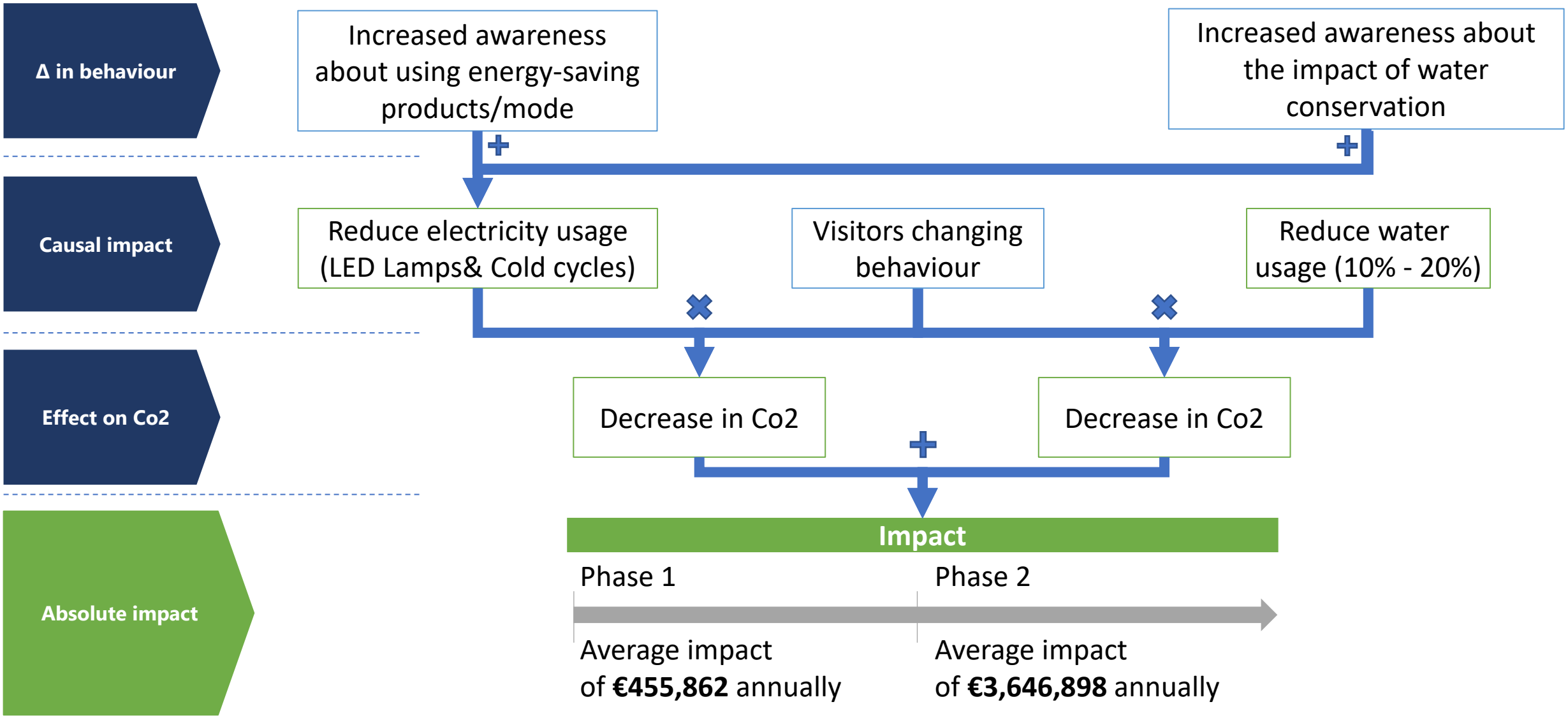
Upper range	CO2
Reduction number of flights per year	200,000
Saved emission per year in mln. kg	90.64
Value emission per year in NL in mln. €	12.7
Total impact in mln. €	€ 12,7

Lower range	CO2
Reduction number of flights per year	100,000
Saved emission per year in mln. kg	47.92
Value emission per year in NL in mln €	6.35
Total impact in mln. €	€ 6,35

Average impact in mln. € € 9.53

Energy Saving

Impact energy saving



Impact in numbers: Energy-saving products/mode

PHASE 1

Upper range	CO2	Lower range	CO2
Reduction kWh in mln.	3.58	Reduction kWh in mln.	1.79
Saved emission per year in mln. kg	1.64	Saved emission per year in mln. kg	0.87
Value emission per year in NL in mln. €	0.25	Value emission per year in NL in mln. €	0.12
Total impact in mln. €	€ 0.25	Total	€ 0.12

Average impact in mln. € € 0.18

PHASE 2

Upper range	CO2	Lower range	CO2
Reduction kWh in mln.	28.61	Reduction kWh in mln.	14.31
Saved emission per year in mln. kg	13.89	Saved emission per year in mln. kg	6.95
Value emission per year in NL in mln. €	1.97	Value emission per year in NL in mln. €	0.99
Total impact in mln. €	€ 1.97	Total impact in mln. €	€ 0.99

Average impact in mln. € € 1.48

Impact valuation energy saving (water conservation)

PHASE 1

Upper range	Water
Reduction (m3)/person	8.6
Environmental euros per year per person	7.22
Amount of people impacted	50.000
Environmental Impact in mln. €	**€ 0.36**

Lower range	Water
Reduction (m3)/person	4.3
Environmental euros per year per person	3.61
Amount of people impacted	50.000
Environmental Impact in mln. €	**€ 0.18**

Average impact in mln € **€ 0.27**

PHASE 2

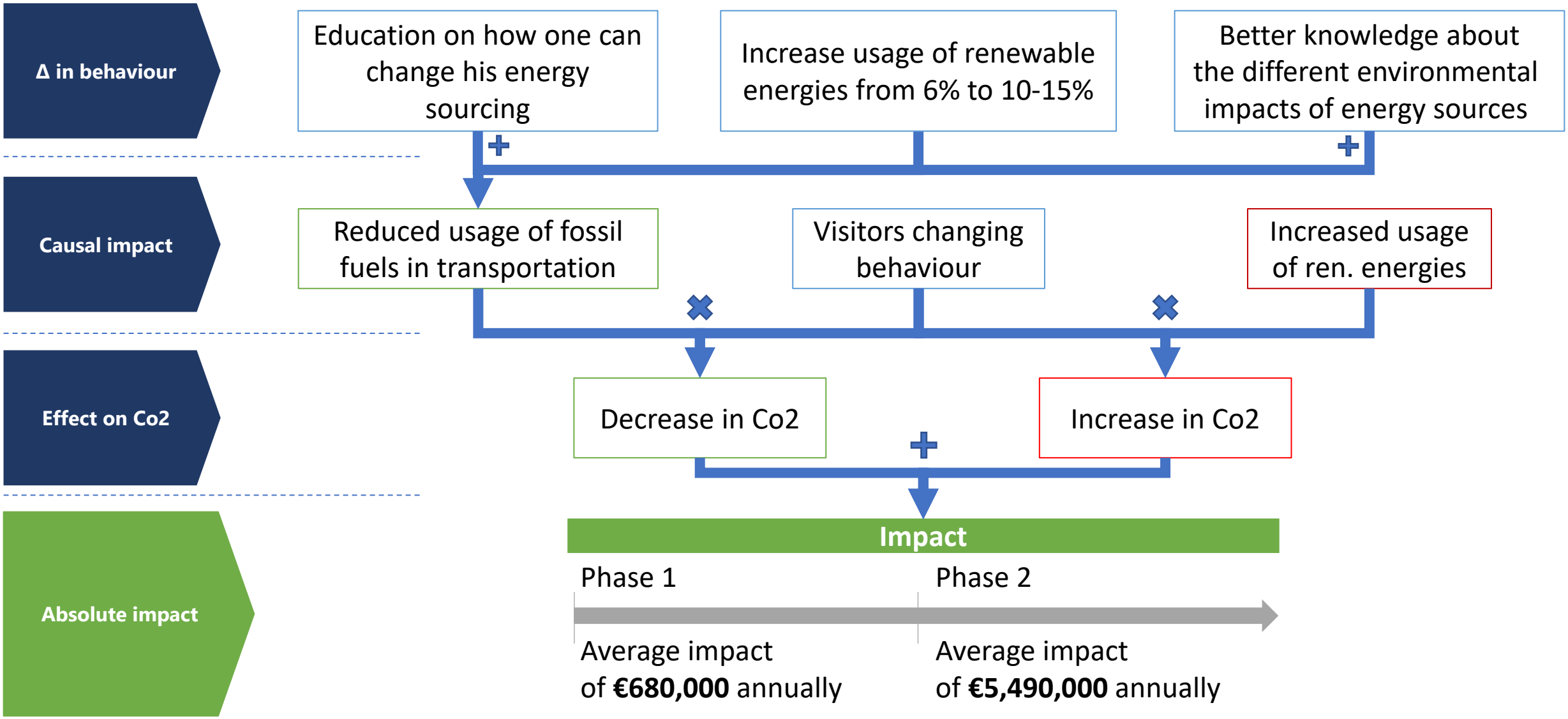
Upper range	Water
Reduction (m3)/person	8.6
Environmental euros per year per person	7.22
Amount of people impacted	400.000
Environmental Impact in mln. €	€ 2.89

Lower range	Water
Reduction (m3)/person	4.3
Environmental euros per year per person	3.61
Amount of people impacted	400.000
Environmental Impact in mln. €	€ 1.44

Average impact in mln. € **€ 2.17**

Energy Sourcing

Impact energy sourcing



Impact valuation energy sourcing (household)

PHASE 1

Upper range	CO2
% Renewable energies	10%
Saved emission per year in mln. kg	6.88
Value emission per year in NL in mln. €	€ 0.96
Total impact in mln. €	€ 0.96

Lower range	CO2
% Renewable energies	7%
Saved emission per year in mln. kg	1.86
Value emission per year in NL in mln. €	€ 0.26
Total impact in mln. €	€ 0.26

Average impact in mln. € € 0.61

PHASE 2

Upper range	CO2
% Renewable energies	10%
Saved emission per year in mln. kg	55.01
Value emission per year in NL in mln. €	€ 7.70
Total impact in mln. €	€ 7.70

Lower range	CO2
% Renewable energies	7%
Saved emission per year in mln. kg	14.86
Value emission per year in NL in mln. €	€ 2.08
Total impact in mln. €	€ 2.08

Average impact in mln. € € 4.89

Impact valuation energy sourcing (electric car)

PHASE 1

Upper range	CO2
% New electric cars	0.5%
Saved emission per year in mln. kg	0.89
Value emission per year in NL in mln. €	€ 0.125
Total impact in mln. €	€ 0.13

Lower range	CO2
% New electric cars	0.1%
Saved emission per year in mln. kg	0.18
Value emission per year in NL in mln. €	€ 0.03
Total impact in mln. €	€ 0.03

Average impact in mln. € € 0.08

PHASE 2

Upper range	CO2
% New electric cars	0.5%
Saved emission per year in mln. kg	7.2
Value emission per year in NL in mln. €	€ 1.00
Total impact in mln. €	€ 1.00

Lower range	CO2
% New electric cars	0.1%
Saved emission per year in mln. kg	1.43
Value emission per year in NL in mln. €	€ 0.2
Total impact in mln. €	€ 0.2

Average impact in mln. € € 0.6

Impact big five

Impact	Phase 1	Phase 2
Reduced use of fast fashion	€ 0.29m -€ 0.87m	€ 2.32m - € 6.97m
Reduction meat consumption	€ 0.19m - € 0.57m	€ 1.51m - €4.53m
Reduction of the travelling frequency	€ 0.79m - € 1.59m	€ 6.35m - € 12.7m
Reduction of the use of energy resources	€ 0.30m - € 0.61m	€ 2.43m - € 4.85m
Using more sustainable energy resources	€ 0.29m - € 1.09m	€ 2.1m - € 8.8m
Total	€ 1.86m - € 4.73m	€ 14,71m - € 37.85m
	Phase 1	Phase 2

Integrated Profit & Loss Phase 1

Financial	(in € x 1000)
Payments from clients	430
Payments to suppliers	(143.25)
Employee salaris (and related taxes)	(205.05)
Interest payments	
Income tax paid	
Net profit/loss	*81.7*
Cost of capital	
Manufactured	
Visitors value of products and services	
Value of goods delivered by supplier	
Intellectual	
Development of immaterial assets & technology	
Human	
Creation of human capital	
Well-being effects of employment	
Workplace health & safety incidents	
Opportunity costs of labour	
Social	
Child labour (in the value chain)	
Forced labour (in the value chain)	
Underpayment (in the value chain)	
Natural	
Use of scarce materials	
Water pollution	
Fossil fuel depletion	
Contribution to climate change	
Land use and transformation	
Air pollution	
Reduction of travelling frequency	1,190
Reduction meat consumption	380
Reduction of fast fashion consumption	580.91
Reduction of the use of electricity, gas, water etc.	455.86
Shift to more sustainable sources of energy	680
Integrated profit & loss	**3,368.47**

Initial investment Phase 1	€ 1.74M

- Based on the expected amount of **50,000 visitors** annually, the Eden Holland exhibition in the Nemo Science Museum will generate a **net profit** of **€ 81,700**
- After the **inclusion** of the **annual environmental benefits**, the Eden Holland exhibition in the Nemo Science Museum will generate a **net profit** of **€ 3.37M** annually
- This implies that in **one year**, the integrated profit will **exceed** the initial investment required

In the current calculation, no environmental costs are included. To get a complete overview of the integrated net profit and loss, additional estimations and assumption are needed

Integrated Profit & Loss Phase 2

Financial	(in € x 1000)
Payments from clients	7,600
Payments to suppliers	(4,300)
Employee salaris (and related taxes)	(1,700)
Interest payments	
Income tax paid	
Net profit/loss	*1,600*
Cost of capital	
Manufactured	
Visitors value of products and services	
Value of goods delivered by supplier	
Intellectual	
Development of immaterial assets & technology	
Human	
Creation of human capital	
Well-being effects of employment	
Workplace health & safety incidents	
Opportunity costs of labour	
Social	
Child labour (in the value chain)	
Forced labour (in the value chain)	
Underpayment (in the value chain)	
Natural	
Use of scarce materials	
Water pollution	
Fossil fuel depletion	
Contribution to climate change	
Land use and transformation	
Air pollution	
Reduction of travelling frequency	9,530
Reduction meat consumption	3,020
Reduction of fast fashion consumption	4,647
Reduction of the use of electricity, gas, water etc.	3,646
Shift to more sustainable sources of energy	5,490
Integrated profit & loss	**27,93**

Initial investment Phase 2	€ 35M

- Based on the expected amount of **400,000 visitors** annually, the Eden Holland Centre will generate a **net profit** of **€ 1,600,000**
- After the **inclusion** of the **annual environmental benefits**, the Eden Holland Centre will generate a **net profit** of **€ 27.93M** annually
- This implies that in **two years**, the integrated profit will **exceed** the initial investment required

In the current calculation, no environmental costs are included. To get a complete overview of the integrated net profit and loss, additional estimations and assumption are needed

Appendix

Sources

Information type	Sources	Link	Impact area
Behavioural changes	Fast Fashion Onderzoek Rijksoverheid	https://www.rijksoverheid.nl/documenten/rapporten/2020/04/14/onderzoek-fast-fashion	**Fast Fashion**
	Greenhouse Gas Emissions Generated by Tofu Production: A Case Study	https://www.tandfonline.com/doi/abs/10.1080/19320248.2017.1315323	**Meat Consumption**
	Kenmerken sociaal-recreatieve mobiliteit	http://web.minienm.nl/socrecrmob/2_1.html#:~:text=Gemiddeld%20over%20alle%20vrijetijdsritten%20komt,kilometer%20uit%20op%201%2C82.&text=De%20gemiddelde%20afstand%20van%20sociaal,niet%20verder%20dan%2010%20kilometer	**Air Travel**
	Low-carbon lifestyle	https://www.undp.org/content/dam/india/docs/low_carbon_lifestyles.pdf	**Energy Saving**
	How to save time and energy around your home while spending less on your water bill?	https://learn.eartheasy.com/guides/45-ways-to-conserve-water-in-the-home-and-yard/	**Energy Saving**
	Energy report – Transition to Renewable Energies	https://www.government.nl/binaries/government/documents/reports/2016/01/01/energy-report-transition-to-sustainable-energy/Energy+Report+Transition+to+sustainable+energy.pdf	**Energy Sourcing**

Sources

Information type	Sources	Link
Assumptions & Numbers applied in our calculations	Bevolkingsteller	https://www.cbs.nl/nl-nl/visualisaties/bevolkingsteller
	Zakelijke kosten drinkwater	https://www.waternet.nl/zakelijk/drinkwater-voor-bedrijven/kosten-met-watermeter/
	Water price in the Netherlands	https://www.statista.com/statistics/597953/drinking-water-price-in-the-netherlands-by-company/
	De Vliegende Hollander	https://www.kimnet.nl/publicaties/rapporten/2018/03/22/de-vliegende-hollander
	Marginal abatement costs (A meta-analysis)	https://www.sciencedirect.com/science/article/abs/pii/S0301421508007295
	Technology-specific Cost and Performance Parameters	https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_annex-iii.pdf#page=7
	Trends in the Netherlands	https://longreads.cbs.nl/trends18-eng/economy/figures/energy/
	Reduce jet demand as climate awareness grows	https://www.cnbc.com/2019/09/30/boeing-and-airbus-to-see-reduced-plane-demand-as-climate-awareness-grows.html
	Analysis of emission: global commercial aviation	https://www.researchgate.net/figure/Flight-length-and-duration-for-short-haul-and-long-haul-flights_tbl7_267927654
	Water footprint of crop and animal products	https://waterfootprint.org/en/water-footprint/product-water-footprint/water-footprint-crop-and-animal-products/
	CO2-emissie per voertuigkilometer van nieuwe personenauto's	https://www.clo.nl/indicatoren/nl0134-koolstofdioxide-emissie-per-voertuigkilometer-voor-nieuwe-personenautos
	Average household size in the Netherlands	https://www.statista.com/statistics/521777/netherlands-average-household-size-by-number-of-residents/#:~:text=The%20statistic%20displays%20the%20average,1950%20to%202.15%20in%202019.

Meat consumptions

Assumptions

chicken came in at 4,325l/kg, pork at 5,988l/kg, sheep/goat meat at 8,763l/kg, and beef at a stupendous 15,415l/kg		an influential study 2010				
Water cost						https://www.statista.com/statist
assume - industrial use is half as expensive, so 0.7 euros/10	0,84					https://www.waternet.nl/zakelij
142 euros/1000kg co2	0,142					https://www.sciencedirect.com/
	water footprint l/kg	**kg of Co2/kg**	**calories per kg**	**weight**		**Sources**
chicken	4.325	5,0	2.870	0,29		https://waterfootprint.org/en/w
pork	5.988	6,4	2.170	0,48		
sheep/goat	8.763	17,4	2.820	0,02		
beef	15.415	13,0	1.913	0,22		
weighted avg/kg	7.607	7,6	2.327	1		(FAO)
Tofu	2.520	0,98	940	1		https://www.tandfonline.com/d
Tofu multiplier			2,48			
Actual needed as substitute	6.237	2,43				

Calculation

	Phase 1		Phase 2	
Upper Range	**Water**	**Co2**	**Water**	**Co2**
costs/kg	1,15	0,74	1,15	0,74
average meat consumption year 80 kg/person	80	80	80	80
reduction	0,075	0,075	0,075	0,075
environmental euros per year per person	6,90	4,41	6,90	4,41
amount of people impacted on a typical year	50.000	50.000	400.000	4.000.000
environmental impact in euros	345.092	220.650	2.760.736	17.651.969
environmental impact in million euros	€ 0,35	€ 0,22	€ 2,76	€ 17,65

Lower Range	**Water**	**Co2**	**Water**	**Co2**
costs/kg	1,15	0,74	1,15	0,74
average meat consumption year 80 kg/person	80	80	80	80
reduction	0,025	0,025	0,025	0,025
environmental euros per year per person	2,30	1,47	2,30	1,47
amount of people impacted on a typical year	50.000	50.000	400.000	4.000.000
environmental impact in euros	115.031	73.550	920.245	5.883.990
environmental impact in million euros	€ 0,12	€ 0,07	€ 0,92	€ 5,88

	kilos reduced		**water saved**	
reduction kg upper	300.000	37.500	410.823.760	51.352.970
reduction kg lower	100.000	12.500	136.941.253	17.117.657

Fast Fashion

Assumptions

The number of clothes sold is approximately similar to the number of clothes disposed		Onderzoek Fast Fashion Rijksoverheid
Plastic consumption is not included in the analysis		
Inputs		
Population NL	17400000	https://www.cbs.nl/nl-nl/visualisaties/bevolkingsteller
Pieces of clothing both per year per person	40	Onderzoek Fast Fashion Rijksoverheid
CO2 footprint kg textile (polyester, cotton etc.)	10,5	Onderzoek Fast Fashion Rijksoverheid
Weight per clothing (average in KG)	0,375	Onderzoek Fast Fashion Rijksoverheid
Water footprint kg clothing	10000	Onderzoek Fast Fashion Rijksoverheid
Price per liter water in euros	0,0014	
Price per kg co2 in euros	0,142	Van Kuik et al. 2009
Reduction lower range	1	Own assumptions
Reduction upper range	3	Own assumptions
Number of people visiting the park (phase 1)	50000	Eden Project
Number of people visiting the park (phase 2)	400000	Eden Project

Calculation

	Phase 1		Phase 2	
Upper range	CO2	Water	CO2	Water
Reduction number of clothes both annually per year	150000	150000	1200000	1200000
Emission per year in NL	590625	562500000	4725000	4500000000
Costs emission per year in NL	€ 83.869	€ 787.500	€ 670.950	€ 6.300.000
Total	€ 871.369		€ 6.970.950	
Lower range	CO2	Water	CO2	Water
Reduction number of clothes both annually per year	50000	50000	400000	400000
Emission per year in NL	196875	187500000	1575000	1500000000
Costs emission per year in NL	€ 27.956	€ 262.500	€ 223.650	€ 2.100.000
Total	€ 290.456		€ 2.323.650	
	Average impact	€ 580.913	Average impact	€ 4.647.300

Air travel

Assumptions

	kg of Co2/km	Avg. distance	weight	Source	Assumptions
Short distance	0,115	1240	43%	https://www.kimnet	Ryanair average distance per f
Long distance	0,101	7419	57%	https://www.resear	8% of the population make up l
Weighted avg. kg of co2 per flight per person	489,96		100%	http://web.minienm.nl/socrecrmob/2_1.html#:~:text	
reduction amount of flights		25,0%	people trave	https://www.cnbc.com/2019/09/30/boeing-and-ai	
Kost of kg of Co2			0,142	142 euros/1000kg co2	
substitute car trip emissions per person for a typica	0,062		1240,0	https://www.clo.nl/indicatoren/nl0134-koolstofdiox	
Kg CO2 per substituting car trip	77,2				

Calculations

Upper Range	Phase 1	Phase 2
CO2 cost/kg	0,142	0,142
Average km per flight per person	489,96	489,96
Avg. Flights per person	2,60	2,60
reduction amount of flights	0,50	0,50
impact in euros per person per year	34,79	34,79
amount of people impacted on a typical year	50000	400000
environmental impact in euros	1.739.352	13.914.813
environmental impact in million euros	1,74	13,91
Car compensation		
Trips substituted	0,50	0,50
Emissions caused	38,57777778	38,57777778
Cost per person	5,48	5,48
People impacted	50000	400000
Substitution costs	152.167,90	1.217.343,21
People per car	1,80	1,80
Net impact in million euros	**1,587184**	**12,697470**
saved Co2	11.713.153	90.636.086
Lower range		
CO2 cost/kg	0,142	0,142
Average km per flight per person	489,96	489,96
Avg. Flights per person	2,60	2,60
reduction amount of flights	0,25	0,25
impact in euros per person per year	17,39	17,39
amount of people impacted on a typical year	50000	400000
environmental impact in euros	869.676	6.957.407
environmental impact in million euros	0,870	6,95741
Car compensation		
Trips substituted	0,25	0,25
People per car		
Emissions caused	19,28888889	19,28888889
Cost per person	2,74	2,74
People impacted	50000	400000
Substitution costs	76.083,95	608.672
People per car	1,80	1,80
Net impact in million euros	**0,79**	**6,35**
saved Co2	5.990.526,96	47.924.215,67

Energy saving

Assumptions

Use LED Lamp while studying	(LED lamps are more energy-saving)					
		Wattage	Use Hours (Daily Averag	Annual Consumption (kV	Emission Factc	Annual CO2 Emmision	Sources
	Room Lighting	60	2	43,8	0,4855	21,26	https://ww
	LED Lamps	6	2	4,38	0,4855	2,13	
	Savings			**39,42**		**19,14**	Emission fa
	Average people per household	2,15					https://www.
Use Cold cycle in the washing machine		Electricity (kWI	Cycles (Weekly Average	Annual Consumption (kV	Emission Factc	Annual CO2 Emmision	
	Wash Temperature 60°C	1,4	2	145,6	0,4855	70,69	
	Wash Temperature 30°C	0,3	2	31,2	0,4855	15,15	
	Savings			**114,4**		**55,54**	

Calculations

Led lights

Upper Range	Phase 1	Phase 2
costs/kg	0,142	0,142
reduction	19,14	19,14
environmental euros per year per person	2,72	2,72
amount of people impacted on a typical year	23256	186047
environmental impact in euros	63201,26	505610,0874
environmental impact in million euros	€ 0,063	€ 0,506

Lower Range		
costs/unit	0,142	0,142
reduction	19,14	19,14
environmental euros per year per person	2,72	2,72
amount of people impacted on a typical year	11628	93023
environmental impact in euros	31600,63	252805,0437
environmental impact in million euros	€ 0,032	€ 0,253

Cycles

Upper Range	Phase 1	Phase 2
costs/kg	0,142	0,142
reduction	55,54	55,54
environmental euros per year per person	7,89	7,89
amount of people impacted on a typical year	23256	186047
environmental impact in euros	183415,13	1467321,005
environmental impact in million euros	€ 0,183	€ 1,467

Lower Range		
costs/unit	0,142	0,142
reduction	114,40	114,40
environmental euros per year per person	16,24	16,24
amount of people impacted on a typical year	11628	93023
environmental impact in euros	188893,02	1511144,19
environmental impact in million euros	€ 0,189	€ 1,511

Energy sourcing

Assumptions

Energy usage at home	Total p.p. Net	Percentage	kgCo2 per kw/h	Co2 per Dutch Person
Natural Gas	19,58	71,81%	0,49	2642,349699
Coal	0,42	1,57%	0,82	96,67691678
Electricity	4,81	18,01%	0,4855	656,6171681
Renewable Energy	1,58	5,90%	0,04	17,7223492
Heat	0,72	2,70%	0,37	75,0196053
Total	27,11	100%		
Electricity sources				
Natural Gas	73%			
Coal	15%			
Ren. Energy	12%			

Electric Car		Sources
Average Distance p.p.p.y.	13.000km	https://longreads.
Average g(Co2)/km	350	https://longreads.
Average kg/Co2 p.Y.	4550	https://www.ipce
		"Energy Report -
		https://www.gov
Average g(Co2)/km E.C.	75	https://www.era.
Average kg/Co2 p.Y.	975	https://www.ce.n
		https://www.wor
Saving p. Y.	3575	https://www.cbs.

Calculations

Energy Source Household		
Upper Range	Phase 1	Phase 2
Co2 cost/kg	0,14 €	0,14 €
Average kgCo2 per Person	3.488,4	3.488,4
Change to Rew. Energy	10%	10%
New Average kgC02 per Person	3.351	3.351
impact in euros per person per year	19,3	19,3
amount of people impacted on a typical year	50.000	400.000
environmental impact in euros	962.702 €	7.701.613 €
environmental impact in million euros	**0,96 €**	**7,70 €**
Lower Range		
Co2 cost/kg	0,14 €	0,14 €
Average kgCo2 per Person	3.488,4	3.488,4
Change to Rew. Energy	7%	7%
New Average kgC02 per Person	3.451,22	3.451,22
impact in euros per person per year	5,2	5,2
amount of people impacted on a typical year	50.000	400.000
environmental impact in euros	260.000 €	2.080.000 €
environmental impact in million euros	**0,26 €**	**2,08 €**
Electric Car		
Upper Range	Phase 1	Phase 2
Co2 cost/kg	0,14 €	0,14 €
Average kgCo2 per Person	4.550,0	4.550,0
Change to Electric Car	0,5%	0,5%
New Average kgC02 per Person	975	975
impact in euros per person per year	2,5	2,5
amount of people impacted on a typical year	50.000	400.000
environmental impact in euros	125.125 €	1.000.000 €
environmental impact in million euros	**0,13 €**	**1,00 €**
Lower Range		
Co2 cost/kg	0,14 €	0,14 €
Average kgCo2 per Person	4.550,0	4.550,0
Change to Electric Car	0,1%	0,1%
New Average kgC02 per Person	975	975
impact in euros per person per year	0,5	0,5
amount of people impacted on a typical year	50.000	400.000
environmental impact in euros	25.025 €	200.000 €
environmental impact in million euros	**0,03 €**	**0,20 €**