naked sprout

Carbon footprint of toilet & kitchen rolls (ISO 14067)

Quantitative assessment to support Naked Sprout's marketing claims.

inèdit LC Paper

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Research objectives

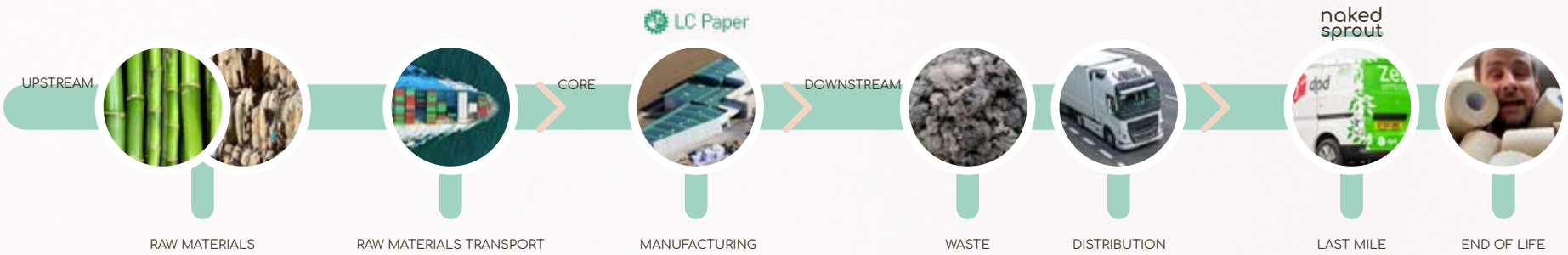
The objective of this study is to develop a Carbon Footprint (ISO 14067) of 3 tissue paper products, to assess the environmental impacts associated with their life cycle.

Through this study, Naked Sprout will obtain quantitative environmental information associated with all stages of the life cycle of tissue paper products. This information will be relevant when it comes to identifying sources of impact, ordering priorities, making decisions focused on minimizing environmental impacts, implementing ecodesign strategies, and communicating product environmental information to consumers.

Specific objectives:

- Analyse and evaluate the environmental impact of three tissue paper products:
  - Box of 24 rolls of FSC® bamboo toilet paper
  - Box of 24 rolls of FSC® recycled toilet paper
  - Box of 6 FSC® bamboo kitchen paper rolls
- Identify critical aspects in the product life cycle to be able to make decisions in the future.

Methodology



The methodology applied has been the Product Carbon Footprint (ISO 14067). This method allows for the quantitative assessment of the greenhouse gas (GHG) emissions of products, processes and services from a life cycle perspective in an objective, quantitative and transparent manner. The applied methodology includes all life cycle stages. That is, all the stages from the extraction of raw materials to the door of Naked Sprout's customers and their disposal after the usage of the product, as described in the ISO 14067 standard guidelines. The impact evaluation method used has been the GWP100 IPCC 2021, and the databases have been: Ecoinvent v3.8, OCCC 2022, and DEFRA 2022.

Product	The analysed products are: Box of 24 rolls of bamboo toilet paper; Box of 24 rolls of recycled toilet paper; and Box of 6 bamboo kitchen paper rolls.
Functional unit	1 box of product as described above.
Scope of study and system boundaries	Cradle-to-grave

Inventory analysis

System scope and hypotheses

LCA stage	Scope	Source	Hypotheses
	The system includes: Paper pulp, REACH certified converting chemicals, cardboard core, wastewater treatment plant additives, biomass, cardboard box and packaging film.	Data provided by LCPaper. Emission factors from Ecoinvent 3.8.	The ecoinvent emission factor for unbleached softwood pulp has been modified to incorporate bamboo. The emission factor of the recycled paper pulp has been considered 0 because the sorting is done in LCPaper and its impact is negligible. No deinking process involved. The biomass emission factor is equivalent to the chipping of forest biomass.
	The system includes: Transport of raw materials and biomass from nearby forests.	Data provided by LCPaper. Calculation of distances using Google Maps. Emission factors from Ecoinvent 3.8.	The distance considered for transport of recycled paper has been 135 km (Average distances between LCPaper and the main paper producers).
	The system includes: offsite renewable electricity, self- produced photovoltaic electricity, water.	Data provided by LCPaper. Renewable electricity mix OCCC 2022. Emission factors from Ecoinvent 3.8.	The emission factor of the self-produced electricity has been considered 0, because the manufacture of photovoltaic panels have not been included. The Product Category Rule (PCR) of tissue paper indicates that "The construction and maintenance of factory buildings and infrastructure" do not have to be included.

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Inventory analysis

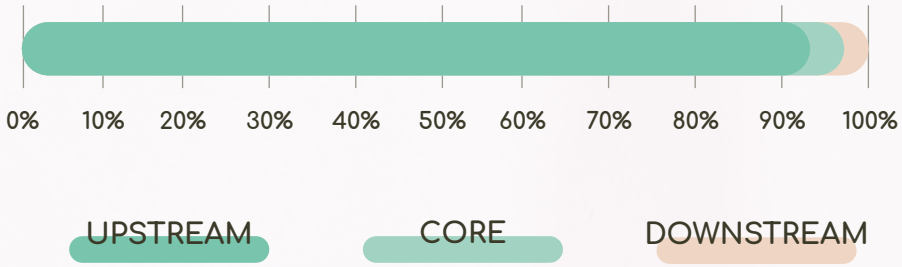
System scope and hypotheses

LCA stage	Scope	Source	Hypotheses
	The system includes: waste produced in the manufacturing process and its transport.	Data provided by LC Paper. Calculation of waste transport distances using Google Maps. Emission factors from OCCC 2022.	
	The system includes: Transport of the final product from LC Paper to Naked Sprout's customers.	Data provided by LC Paper, DPD and Naked Sprout. Calculation of distances using Google Maps. Emission factors from DEFRA 2022.	DEFRA's emission factor has been modified to reflect that the product has a low density.
	Product usage and disposal, including packaging elements.		Toilet paper is not susceptible to recycling. Packaging is recycled as post-consumer cardboard.

Results - Bamboo

Carbon footprint of 24 toilet rolls box

GWP100 (kgCO2eq/24 toilet roll box)		
Raw materials	1.38	73%
Transport raw materials	0.41	22%
Manufacturing	0.07	4%
Waste	0.04	2%
*Distribution	0.00*	*0%
TOTAL	1.90	100%



*Our transport provider (DPD) makes a carbon offset. Actual emissions are 0.56kgCO2eq.

Product weight
3.4kg

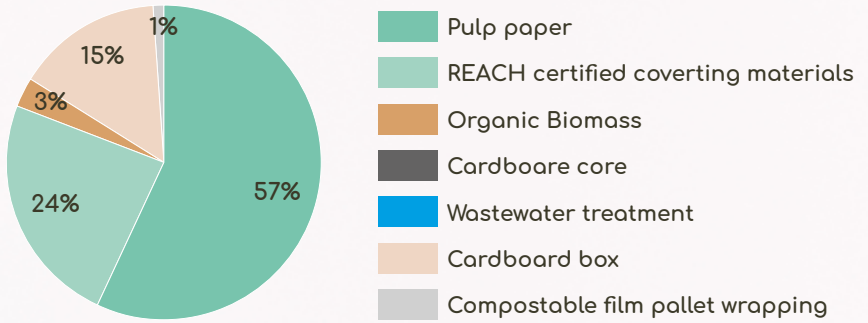
Packaging weight
0.3kg

Total weight
3.7kg

Results - Bamboo

Upstream results: This LCA category includes the Raw Materials stage and the Raw Materials Transport stage.

Kg CO2eq	Raw materials	Transport raw materials	Upstream
Pulp paper	0.6075	0.406.	1,0140
REACH certified converting materials	0.4363	0.0025	0.4388
Cardboard core	0.0024	0.0003	0.0027
Wastewater treatment	0.0486	0.0007	0.0493
Organic biomass	0.0005	0.0021	0.0021
Cardboard box	0.2706	0.0013	0.2719
Compostable film for pallet wrapping	0.0146	0.0010	0.0155
TOTAL	1.38	0.41	1.79



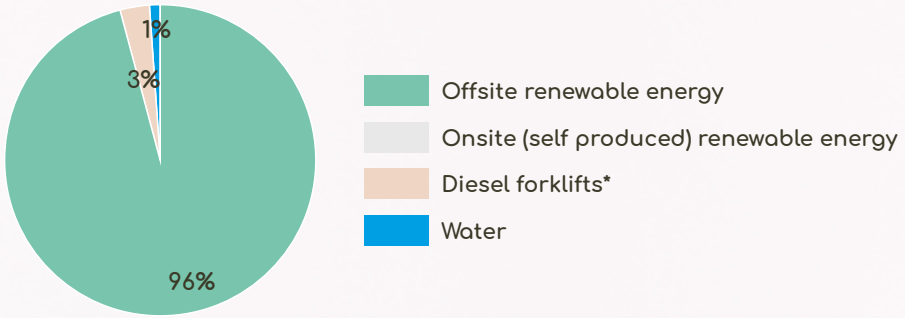
The impact associated with the Upstream category is mainly due to the production and transportation to LCPaper of the following raw materials:

Paper pulp production and transportation (57%).
Production of chemical additives and their transport (24%).
Production and transport of packaging (cardboard box 15% + film 1%).

Results - Bamboo

Core results: This LCA category includes only the Manufacturing stage.

Kg CO2eq	Manufact.	Core
Offsite renewable energy	0.069	1.0140
Onsite (self-produced) renewable energy	0	0
Diesel forklifts*	0.0019	0.0019
Water	0.0008	0.0008
TOTAL GENERAL	0.07	0.07



*67% of forklifts are electrified; however, handling of parent reels of +3 tons cannot be electrified with today's weight lifting technology.

The impact associated with the Core category is mainly due to the energy inputs.

96% of the impact in the Core category is associated with the renewable imported electricity from the power grid due to distribution emissions.

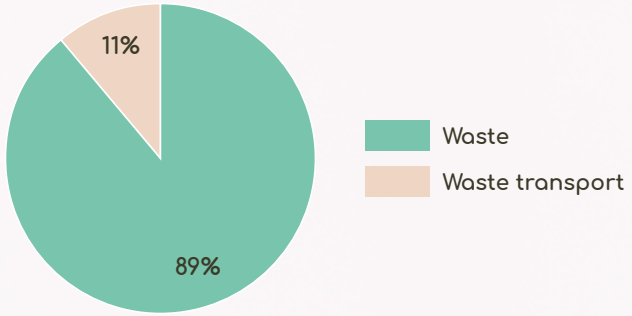
The self-produced electricity has no impact since distribution is local.

There is no impact associated with the stationary combustions because the fuel is biomass

Results - Bamboo

Downstream Results: This LCA category includes the Waste Treatment stage and the Distribution.

Kg CO2eq	Manufact.	Distrib.	Downstream
Waste	0.0325		0.0325
Waste transport	0.0039		0.0039
Distribution		0.00*	0.00
TOTAL GENERAL	0.04	0.00	0.04



*The transport provider makes a carbon offset. Actual carbon emissions are 0.21 kg CO2 eq.

The impact associated with the Downstream category is mainly due to the waste generated in LCPaper.

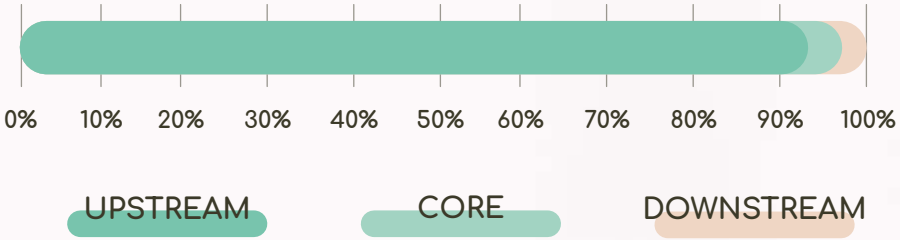
89% of the impact is due to the treatment of the waste generated in LCPaper.

11% of the impact is from waste transport.

Results - Recycled

Carbon footprint of 24 toilet rolls box under alternative estimation criteria

GWP100 (kgCO2eq/24 toilet roll box)		
*Raw materials	1.19	58%
Transport raw materials	0.75	37%
Manufacturing	0.07	3%
Waste	0.04	2%
**Distribution	0.00**	0%
TOTAL	2.05	100%



*Under this alternative estimation criteria, it is considered that recycled raw material originates inrecycling containers spread throughout the country. Collection takes place to each container and afterwards the material is filtered and classified, which creates additional emissions related to the processing of such raw material.

**The transport provider makes a carbon offset. Actual carbon emissions are 0.56kg CO2 eq

Product weight
3.4kg

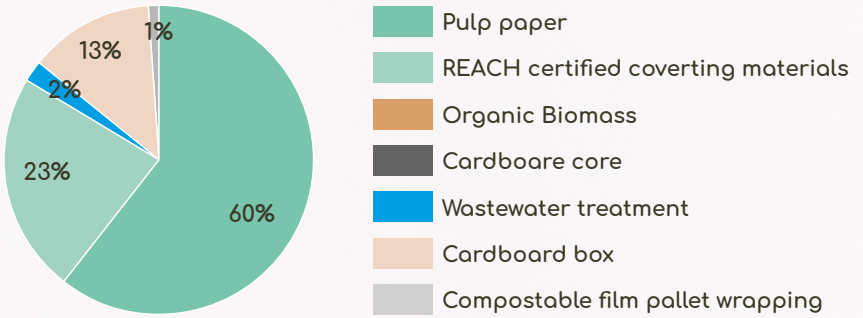
Packaging weight
0.3kg

Total weight
3.7kg

Results - Recycled

Upstream results: This LCA category includes the Raw Materials stage and the Raw Materials Transport stage.

Kg CO2eq	Raw materials	Transport raw materials	Upstream
Pulp paper	0.4100	0.7430	1.1530
REACH certified converting materials	0.4363	0.0025	0.4388
Cardboard core	0.0024	0.0003	0.0027
Wastewater treatment	0.0486	0.0007	0.0493
Organic biomass	0.0005	0.0021	0.0027
Cardboard box	0.2706	0.0013	0.2719
Compostable film for pallet wrapping	0.0146	0.0010	0.0155
TOTAL	1.18	0.75	1.94

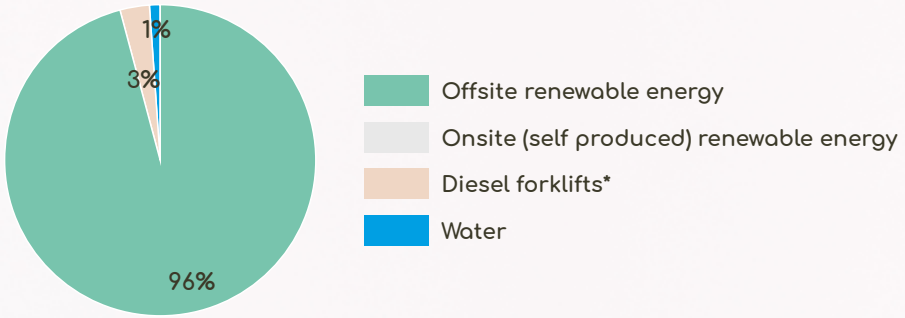


Under this alternative methodology in which we consider the source of recycled pulp as primary residue generation locations (containers), the impact associated with the Upstream category is mainly due to the transportation to the recycling facilities of the recycled pulp. The remaining elements do not differ from other calculation approaches where different sources of recycled pulp are considered

Results - Recycled

Core results: This LCA category includes only the Manufacturing stage.

Kg CO2eq	Manufact.	Core
Offsite renewable energy	0.0693	0.0693
Onsite (self-produced) renewable energy	0	0
Diesel forklifts*	0.0019	0.0019
Water	0.0008	0.0008
TOTAL GENERAL	0.07	0.07



*67% of forklifts are electrified; however, handling of parent reels of +3 tons cannot be electrified with today's weight lifting technology.

The impact associated with the Core category is mainly due to the energy inputs.

96% of the impact in the Core category is associated with the renewable imported electricity from the power grid due to distribution emissions.

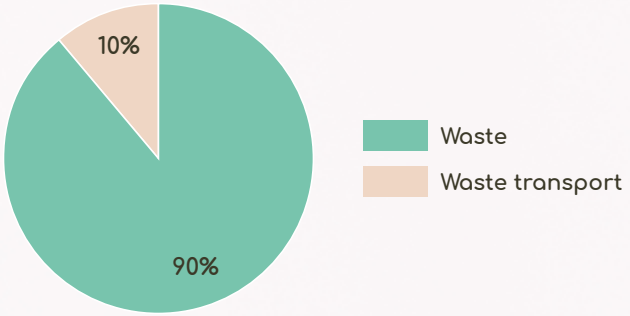
The self-produced electricity has no impact since distribution is local.

There is no impact associated with the stationary combustions because the fuel is biomass

Results - Recycled

Downstream Results: This LCA category includes the Waste Treatment stage and the Distribution.

Kg CO2eq	Manufact.	Distrib.	Downstream
Waste	0.0368		0.0368
Waste transport	0.0041		0.0041
Distribution		0.00*	0.00
TOTAL GENERAL	0.04	0.00	0.04



*The transport provider makes a carbon offset. Actual carbon emissions are 0.21 kg CO2 eq.

The impact associated with the Downstream category is mainly due to the waste generated in LCPaper.

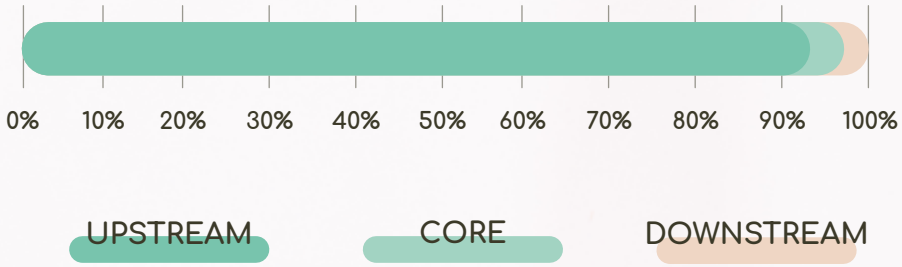
89% of the impact is due to the treatment of the waste generated in LCPaper.

11% of the impact is from waste transport.

Results - Bamboo

Carbon footprint of 24 kitchen roll box

GWP100 (kgCO2eq/6 toilet roll box)		
Raw materials	061	75%
Transport raw materials	0.16	20%
Manufacturing	0.03	3%
Waste	0.01	2%
*Distribution	0.00*	0%
TOTAL	**0.81**	**100%**



*Our transport provider (DPD) makes a carbon offset. Actual emissions are 0.56kgCO2eq.

Product weight
1.3kg

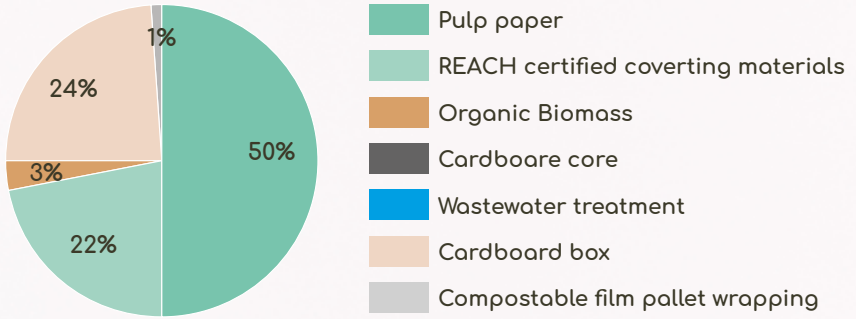
Packaging weight
0.2kg

Total weight
1.5kg

Results - Bamboo

Upstream results: This LCA category includes the Raw Materials stage and the Raw Materials Transport stage.

Kg CO2eq	Raw materials	Transport raw materials	Upstream
Pulp paper	0.2323	0.1554	0.3877
REACH certified converting materials	0.1668	0.0010	0.1678
Cardboard core	0.0009	0.0001	0.0010
Wastewater treatment	0.0186	0.0003	0.0188
Organic biomass	0.1835	0.0009	0.1843
Cardboard box	0.0099	0.0007	0.0106
Compostable film for pallet wrapping	0.0002	0.0008	0.0010
TOTAL	0.61	0.16	0.77



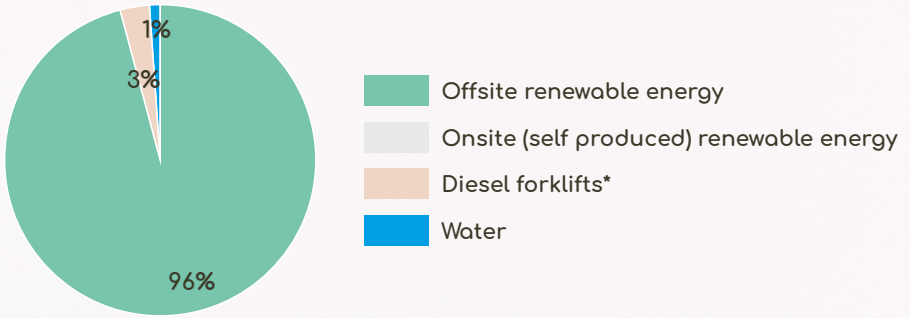
The impact associated with the Upstream category is mainly due to the production and transportation to LCPaper of the following raw materials:

Paper pulp production and transportation (50%).
Production of chemical additives and their transport (22%).
Production and transport of packaging (cardboard box 24% + film 1%).

Results - Bamboo

Core results: This LCA category includes only the Manufacturing stage.

Kg CO2eq	Manufact.	Core
Offsite renewable energy	0.0265	0.0265
Onsite (self-produced) renewable energy	0	0
Diesel forklifts*	0.0007	0.0007
Water	0.0003	0.0003
TOTAL GENERAL	0.03	0.03



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The impact associated with the Core category is mainly due to the energy inputs.

96% of the impact in the Core category is associated with the renewable imported electricity from the power grid due to distribution emissions.

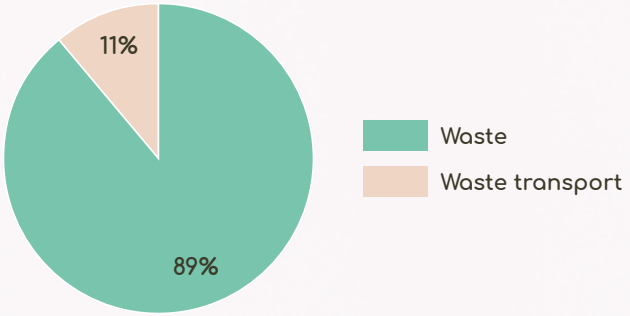
The self-produced electricity has no impact since distribution is local.

There is no impact associated with the stationary combustions because the fuel is biomass

Results - Bamboo

Downstream Results: This LCA category includes the Waste Treatment stage and the Distribution.

Kg CO2eq	Manufact.	Distrib.	Downstream
Waste	0.0124		0.0124
Waste transport	0.0015		0.0015
Distribution		0.00*	0,00
TOTAL GENERAL	0.01	0.00	0.01



*The transport provider makes a carbon offset. Actual carbon emissions are 0.21 kg CO2 eq.

The impact associated with the Downstream category is mainly due to the waste generated in LCPaper.

89% of the impact is due to the treatment of the waste generated in LCPaper.

11% of the impact is from waste transport.

Results per KG of product

Results Carbon Footprint (kg CO2 eq) of 1kg of product:

	Raw materials	Transport raw materials	Manufact.	Waste	Distribution	TOTAL
1 kg FSC® bamboo toilet paper	0.41	0.12	0.02	0.01	0.00*	**0.56**
1 kg FSC® recycled toilet paper	0.34	0.22	0.01	0.01	0.00*	**0.58**
1 kg FSC® bamboo kitchen paper	0.47	0.12	0.02	0.01	0.00*	**0.62**

*actual emissions are 0.16 kg CO2 eq, but the transport provider makes a carbon offset

Conclusions

The Carbon Footprint study concludes that:

In respect to the product of 24 rolls of bamboo toilet paper, the impact is mainly concentrated in the acquisition of paper pulp and chemical additives during the Raw Materials stage (56%). The environmental impacts associated with the distribution of the product from LCPaper to Naked Sprout in the Distribution stage (23%) are also notable.

With reference to the product of 24 rolls of recycled toilet paper, the impact is mainly concentrated in the acquisition of chemical additives during the Raw Materials stage (50%). The environmental impacts associated with the distribution of the product from LCPaper to Naked Sprout in the Distribution stage (36%) are also notable.

Regarding the product of 6 rolls of bamboo kitchen paper the impact is mainly concentrated in the acquisition of paper pulp and chemical additives during the Raw Materials stage. The environmental impacts associated with the distribution of the product from LC Paper to Naked Sprout in the Distribution stage are not relevant due to the offset process performed by the logistics supplier to which the distribution is outsourced.

All products achieve a much better environmental performance than average tissue products. This is due to the use of unbleached raw materials and, especially, to a production system with renewable electricity and biomass.

The products made from recycled paper pulp has a better environmental performance than virgin bamboo product.

Limitations and improvement opportunities

Paper pulp has a very high impact, however, the emission factors considered are not from primary data, they are from secondary data from reference databases (Ecoinvent 3.8). Getting primary data is an opportunity for improvement to have a more accurate calculation.

The product of 6 rolls of bamboo kitchen paper has less impact (in absolute values) than the product of 24 rolls of bamboo toilet paper. This is because the 6 rolls of kitchen paper product weigh less than the 24 rolls of toilet paper. However, in relative values, kitchen paper has more impact. Since for a kilogram of kitchen paper more kilograms of packaging are needed compared to toilet paper. An opportunity for improvement would be to implement packaging ecodesign initiatives.

Finally, distribution has a significant impact. Even if the logistics provider makes an offset, these emissions could be reduced by looking for alternative means of transport.

naked sprout

SO GREEN, IT'S BROWN™

Carbon footprint of toilet & kitchen rolls (ISO 14067)

Quantitative assessment to support Naked Sprout's marketing claims.

Company number: 12861535 | VAT number: 357165385 | FSC license code: FSC C007915