



Environmental impacts of urban transportation alternatives in Brazil: A LCA to promote conscious consumption in urban mobility

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akatu20 years
For a conscious consumption

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CONTEXT



AKATU INSTITUTE

Created in 2001, Akatu is a non-profit NGO that works to **mobilize the population towards sustainability practices through conscious consumption**

Conscious consumption is consumption with better impacts

to consume better | to consume differently | to avoid excess and waste

tupi (indigenous) language

a

+

katu

akatu

seed | world

good | better

good seed | better world
good individual | better collective

OBJECTIVE



MOTIVATION

- *Create awareness about the environmental performance of current urban transport alternatives in large Brazilian cities*



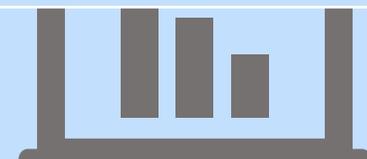
INTENDED APPLICATION

- *To Inform citizens about the environmental impacts associated with each alternative regarding urban mobility*



TARGET AUDIENCE

- *General society, especially the inhabitants of large cities in Brazil that use the different transport modes currently available*



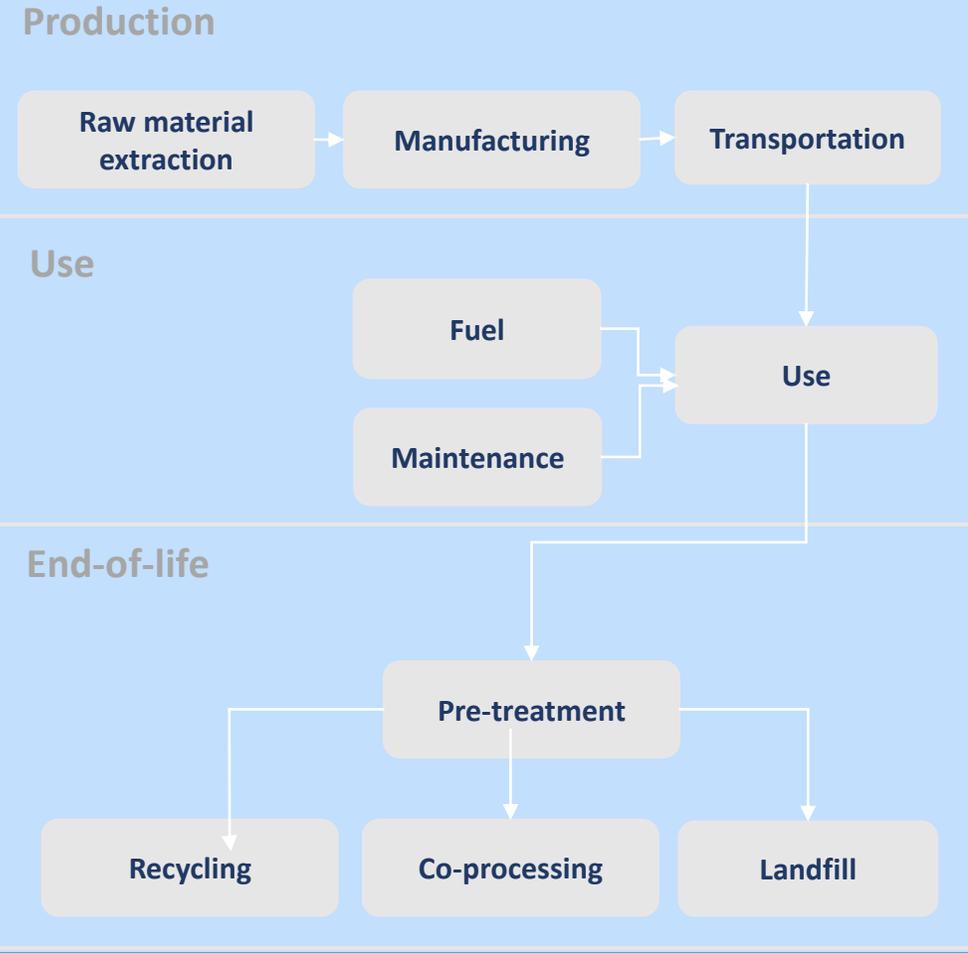
USE IN COMPARATIVE STATEMENTS

- *No, the environmental profiles of each alternative will be presented separately*

SCOPE

Function	To transport one person in the urban area of a large Brazilian city
Alternatives	Bicycle, motorized scooters, motorcycle, car, bus and metro
functional unit*	1 pkm

	Individual Bicycle	Shared Bicycle	Individual scooter	Shared scooter	motorcycle	Individual car	car Compart.	Bus	Metro
Type of fuel	NA	NA	Electric	Electric	C. Gasoline	C. Gasoline	C. Gasoline ¹	Diesel	Electric
Lifespan (km)	50.000	45.000	16.000	7.000	180.000	360.000	360.000	800.000	5.100.000
n° passengers	1	1	1	1	1	1 (20% CM)	2 (40% CM)	36 (50% CM)	890 (50% CM)



BASF methodology (BASF Corporation, 2015) validated by the NSF in 2016, as a Flex Life Cycle Assessment (ACV Flex) in which 11 impact categories were evaluated: BASF Eco-Efficiency Analysis (AEE10) + Particulate Material - Respiratory Inorganics, due to potential relevance

- Not considered:**
- Transport of raw materials;
 - Road infrastructure, rails and stations;
 - Corrective maintenance or repairs for defects, technical failures or accidents
 - individual safety equipment
 - Transport at the end-of-life stage

RESULTS

Bicycle 		Mot. scooter 		motorcycle 	car 		bus 	metro 
1 person	1 person	1 person	1 person	1 person	1 person	2 person	Occupation 20% / 50% / 100%	Occupation 20% / 50% / 100%
 No use of fuels		 Use of electricity						 Use of electricity
 Production of metal components (Steel and Aluminum)  Depletion of metals and fossil resources		 Lithium battery production Metal depletion and eutrophication of rivers		 fuel consumption Particulate matter and climate change	 fuel consumption Particulate matter and climate change	 fuel consumption Particulate matter and climate change	 High demand of electricity Acid rain and depletion of fossil resources	
 Use as much as possible & recycle it at the end of lifespan (ind) Use responsibly (shared)		Take care of the battery and correct destination (ind). Use responsibly (shared)		Prioritize renewable fuels (e.g. Ethanol) reduces at least 20%	Prioritize renewable fuels and share as much as possible	Use as much as possible (avoid new emissions)	Use as much as possible (avoid new emissions)	

* Potential environmental impact: Impacts/km

Private individual

Private shared

Public collective

CONCLUSIONS

Vehicles with greater impacts on production phase



Importance of useful life

When using the maximum transport potential in km driven, each km driven generates the lowest possible environmental load. If the vehicle is only used at 20% of its capacity in km, each km traveled can be up to 5 times larger associated environmental impact.

Importance of correct disposal at end of life

By ensuring the recycling of materials discarded at the end of life of the bicycle and scooter, it is possible to improve the environmental performance of the life cycle of these alternatives by avoiding extraction of new natural resources

Vehicles with greater impact on use/Operation



Importance of sharing and occupying the public transportation

When sharing a vehicle, the environmental impact is proportionally distributed among the number of passengers, making the environmental load per passenger smaller than the benefit of avoiding the use of other means of transport.

While the use of vehicles individually or above its full capacity, the environmental impacts are attributed in their entirety to a passenger only or fewer people.

Importance of using renewable fuels

When running a car with ethanol produced from sugar cane it is possible to reduce at least 25% of carbon dioxide emissions in the atmosphere, if used as a replacement for gasoline.

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