



### **Science Arts & Métiers (SAM)**

is an open access repository that collects the work of Arts et Métiers ParisTech researchers and makes it freely available over the web where possible.

This is an author-deposited version published in: <https://sam.ensam.eu>  
Handle ID: <http://hdl.handle.net/10985/14097>

#### **To cite this version :**

Fernanda Belezario SILVA, Olga Satomi YOSHIDA, Rachel HORTA ARDUIN, Carolina Almeida SOUZA, Claudia Echevenga TEIXEIRA - Uncertainty sources in the life cycle assessment of construction products in Brazil - 2017

Any correspondence concerning this service should be sent to the repository  
Administrator : [archiveouverte@ensam.eu](mailto:archiveouverte@ensam.eu)



# Uncertainty sources in the life cycle assessment of construction products in Brazil

MSc. Fernanda Belizario Silva\*, PhD. Olga Satomi Yoshida\*, MSc. Rachel Horta Arduin\*\*, MSc. Caroline Almeida Souza\*, Elisabeth Donega Diestelkamp\*, PhD Cláudia Echevengúá Teixeira\*, PhD. Luciana Alves de Oliveira\*

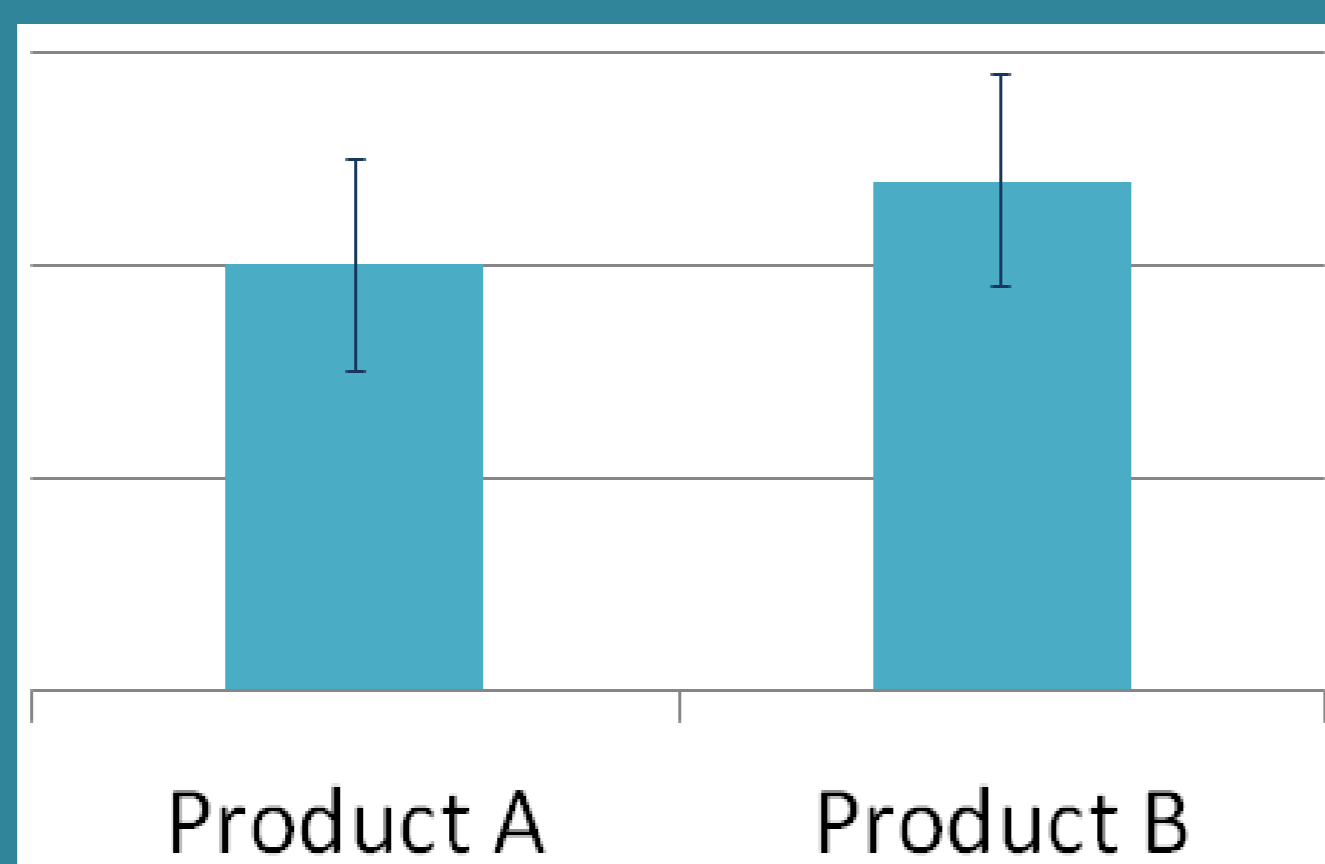
\* Institute for Technological Research. São Paulo, SP, Brazil.

\*\* Arts et Métiers ParisTech, I2M, UMR 5295, F-33400 Talence, France

[fbsilva@ipt.br]

## Context and Goal

- Uncertainty estimation is important in LCA, especially when comparing product alternatives



- Question : what is the main source of uncertainty in LCA : the process itself or upstream and downstream processes?

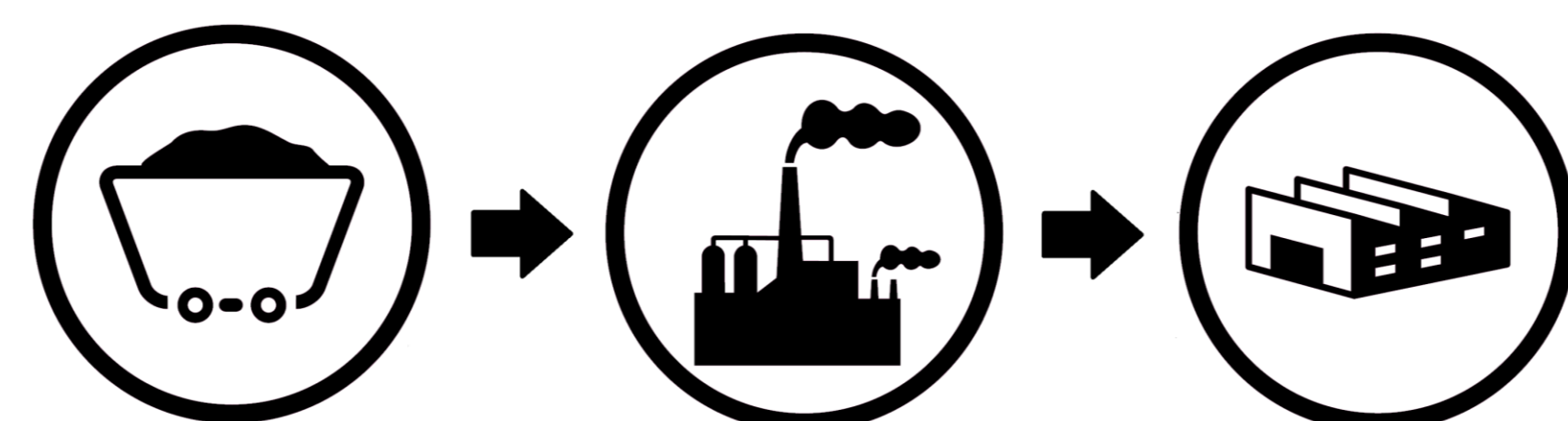
- Analysis of 09 construction products in Brazil

## Methods

- LCI : product manufacturing - primary data collection (factory / literature) | upstream and downstream - Ecoinvent 3.2 global datasets
- Data quality assessment : Pedigree matrix universe: 01 factory (EPD)
- LCIA : IPCC 2013 - 100 years' timeframe
- GWP coefficient of variation : Monte Carlo sampling with 10.000 interactions

- CV distribution between itself and upstream / downstream processes : ANOVA

## Construction products



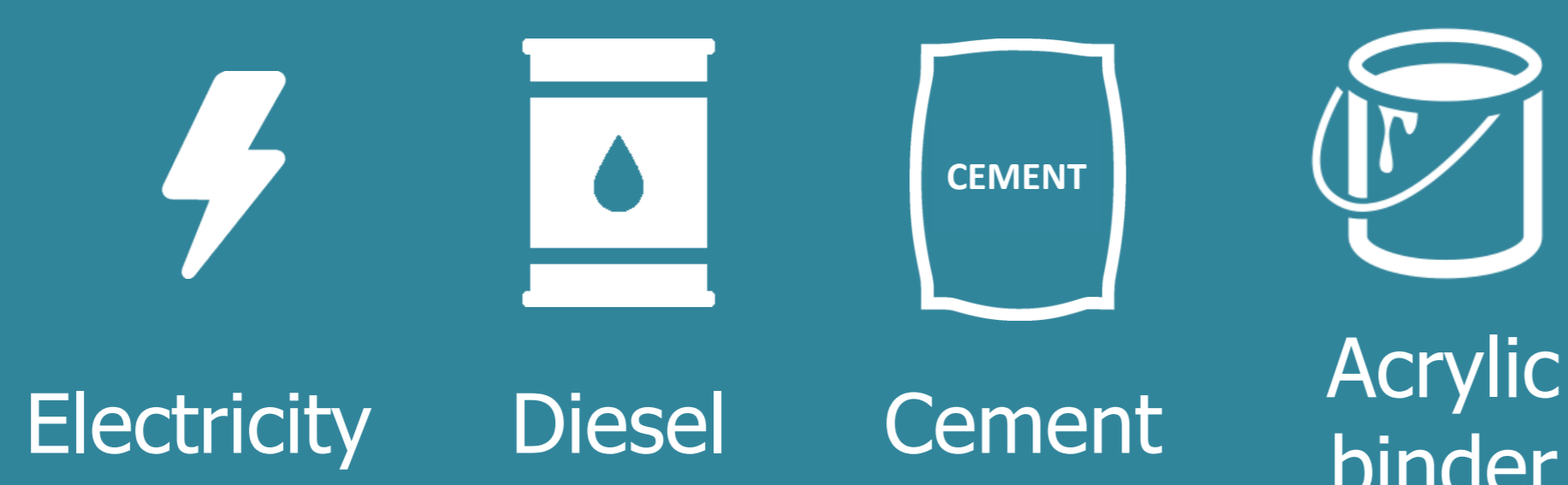
Materials extraction → Materials manufacturing → Product manufacturing

## cradle-to-gate

## Results

CV of GWP (%)	Upstream or downstream (%)	Process itself (%)	
10.4	<b>78</b>	22	Clay block
21.1	<b>95</b>	5	Sand
15.1	<b>65</b>	35	Gravel
13.0	<b>82</b>	18	Concrete block
21.8	<b>97</b>	3	Concrete
18.2	<b>78</b>	22	Mortar
9.5	<b>60</b>	40	Acrylic painting
18.3	13	<b>87</b>	Sawnwood (native)
16.5	23	<b>77</b>	Sawnwood (planted)

Main contributors to uncertainty



## Conclusions

- CV values for GWP indicator range from 9,5% to 21,1% - importance of considering uncertainty in LCA studies

- Upstream processes are a major uncertainty source in LCA of construction products
- Improving data quality of construction products requires better data for upstream processes: importance of a national database to increase LCA reliability
- Main upstream contributors: can help to define priorities for data collection