

# Territorial Metabolism through Life-Cycle of Products

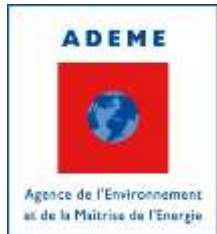
**3 - 6 September 2017**

**By Benoit RIBON** - PhD. in Geography

Laboratoire Image Ville Environnement (LIVE) - UMR 7362 - Université de Strasbourg

With the support of the National Agency for the Environment (ADEME)

Thesis supervisors : Dominique BADARIOTTI (LIVE) & René KAHN (BETA)

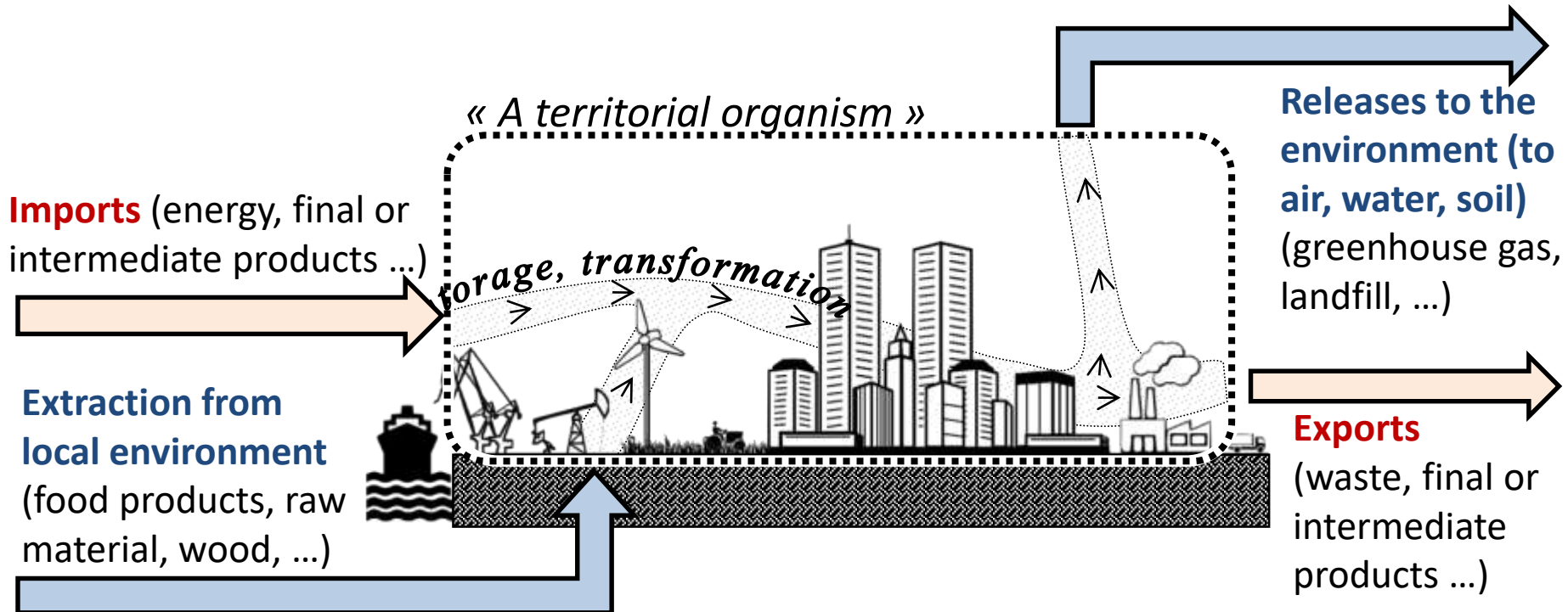


# Summary

- Territorial metabolism : a context
- Study case: the French region of Alsace
- Territorial metabolism through Life-Cycle of Products : concept, method, results
- Discussion & Limits

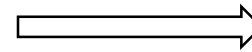
# Territorial Metabolism: a definition

- « Territorial / Urban Metabolism » is a term inspired from biology, and applied to a territory: All of the flows mobilised by the people living on a territory.

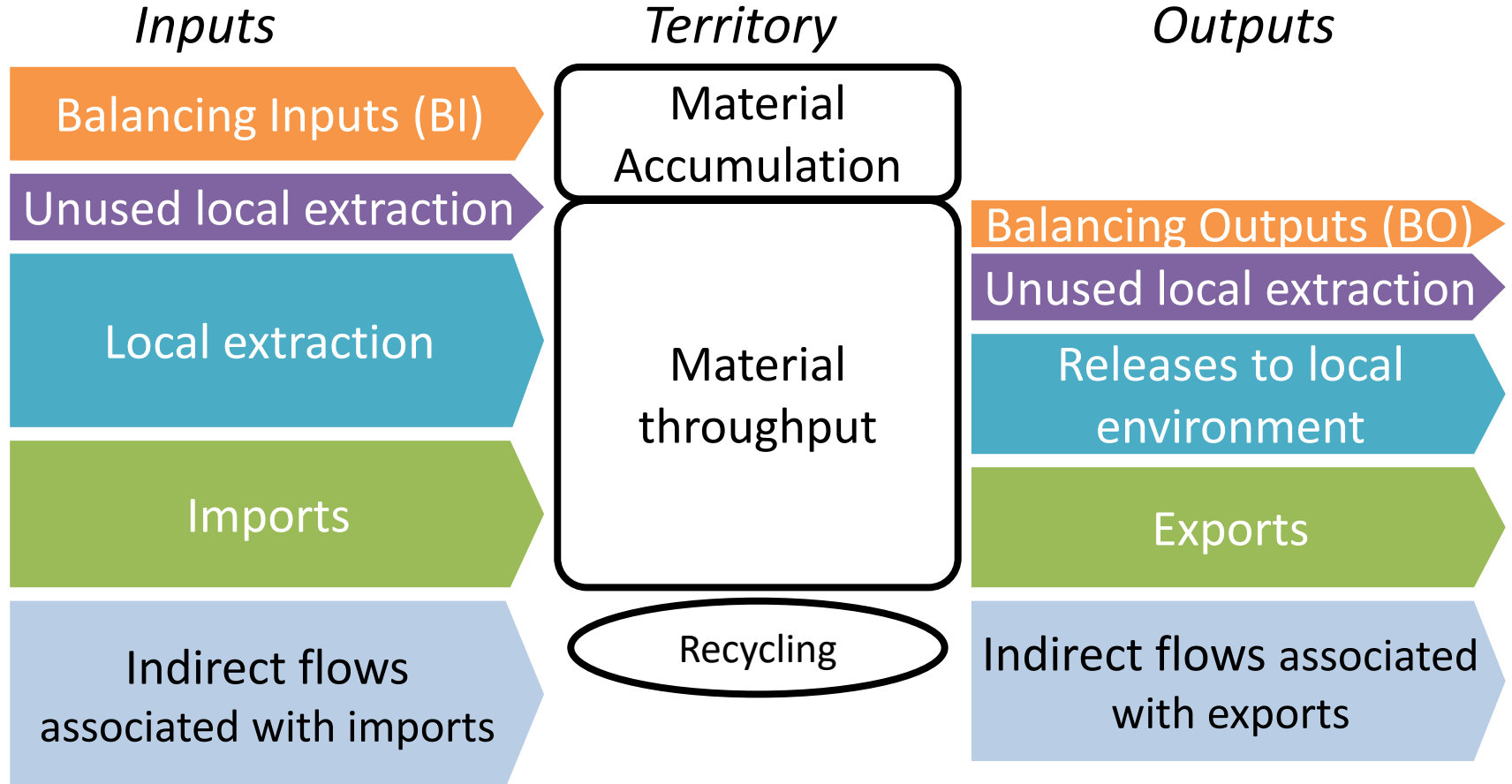


# Territorial Metabolism: an accounting method

- At a national scale : Economy-Wide Material Flow Analysis,  
(Eurostat 2001, 2009, 2013)
- At a regional scale :
  - Academic work:  
*Paris & Île-de-France (Barles, 2007)*
  - Empirical work:  
*Bourgogne (Alterre Bourgogne, 2013)*
  - Institutionalisation:  
*Commissariat Général au  
Développement Durable (2014)*



# Territorial Metabolism: a result template



# Territorial Metabolism : Example of Alsace (Région Alsace & Ademe, 2015) (I)

## ENTRÉES

Addition nette au stock  
13,7Mt 7,3 t/hab

## SORTIES

Balancing inputs

Flux d'équilibrage  
15,5Mt 8,3 t/hab

Unused local extraction



Extraction intérieure inutilisée  
4,3Mt 2,3 t/hab

Local extraction



Extraction intérieure utilisée  
23,5Mt 12,6 t/hab

Imports



Importations\*  
34,7Mt 18,6 t/hab

Indirect flows associated to imports

Flux indirects liés aux importations  
95,8Mt 51,5 t/hab



Recyclage  
2,5Mt  
1.4 t/hab

Flux d'équilibrage  
9Mt 4,9 t/hab

Balancing outputs

Extraction intérieure inutilisée  
4,3Mt 2,3 t/hab

Unused local extraction

Rejets vers la nature  
Air : 12Mt 6,5 t/hab  
Autres : 1,3Mt 0,7 t/hab

Releases to nature

Exportations\*  
37,6Mt 20,2 t/hab

Exports

Flux indirects liés aux exportations  
93,8Mt 50,4 t/hab

Indirect flows associated to exports

\* dont 13,5 et 11,8 millions de tonnes de pétrole et de gaz naturel respectivement importées et exportées via un oléoduc et un gazoduc.

# Territorial Metabolism : Example of Alsace (Région Alsace & Ademe, 2015) (II)

## ENTRÉES

Addition nette au stock  
13,7Mt 7,3 t/hab

## SORTIES

Balancing inputs

Flux d'équilibrage  
15,5Mt 8,3 t/hab

Unused local extraction



Extraction intérieure inutilisée  
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Imports



Importations\*  
34,7Mt 18,6 t/hab

Indirect flows associated to imports

Flux indirects liés aux importations  
95,8Mt 51,5 t/hab

One question remains:

How to open this blackbox ?

Recyclage  
2,5Mt  
1.4 t/hab

Flux d'équilibrage  
9Mt 4,9 t/hab

Balancing outputs



Extraction intérieure inutilisée  
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# Territorial Metabolism through Life-Cycle of Products

- The Life-Cycle Analysis principles are already used to evaluate indirect flows (Goldstein et al. 2013, CGDD 2014)
- They might also help to better describe territorial metabolism  
3 kinds of imported / exported resources:
  - For direct consumption
  - For production of goods
  - For waste management



# An explorative concept

## □ Three life-cycle stage for

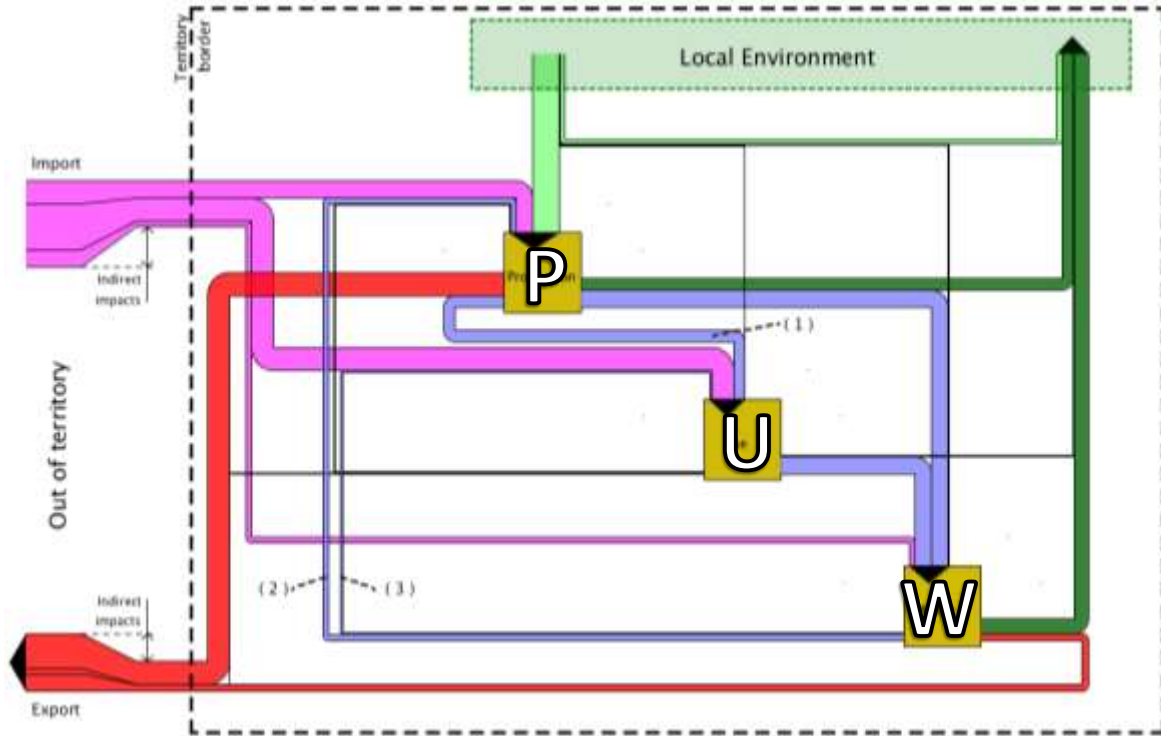
products:

- *Raw & preprocessed (production),*
- *Final product (use),*
- *Waste*

## □ Circular economy

indicators:

- *(1) auto-consumption*
- *(2) recycling*
- *(3) rehabilitation*



# Data processing

## Data sources

### Import/Export : Sitram - Freight Transport

*Ministère de la Transition écologique  
et solidaire*

**Transport Mean** : Truck (2010), River  
(2010), Rail (2005)

**Level** : Department

**Item nomenclature** : NST 2007

### Other data : Metabolism study of Alsace

*Région Alsace et Ademe, 2015*

**Level** : Department

**Item nomenclature** : MFA

## Discrimination

Raw & pre-processed  
(Production stage)

Final product  
(Use stage)

Waste  
(Waste stage)

Gaz Emission  
(From Use stage)

Solid Emission  
(From Waste stage)

Oil & gaz (Pipeline)  
(Out to Out)

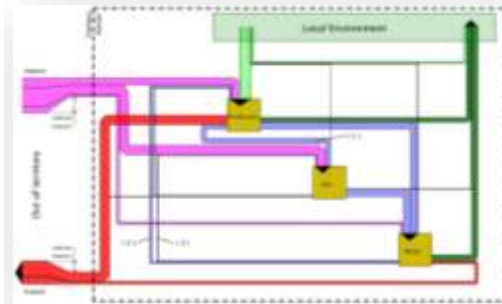
Balancing Input /  
Output (Neglected)

....  
(see additional notes)

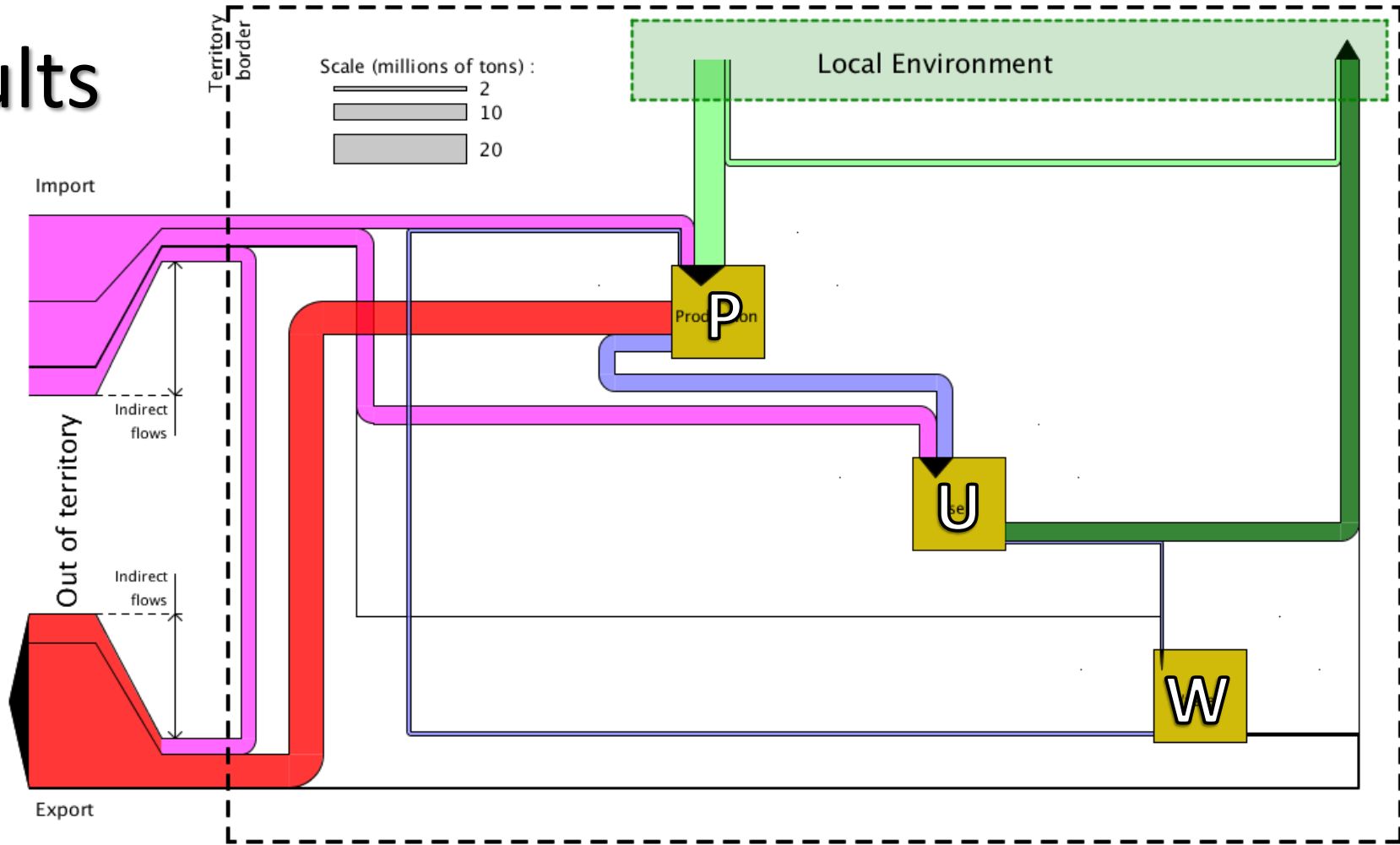
## Results

From To	Loc.Env.	Outside	Prod.	Use	Waste
Loc.Env.	4 290	0	23 450	0	0
Outside	0	11 808	9 534	13 396	258
Prod.	0	25 230	0	12 184	0
Use	13 632	0	0	0	1 914
Waste	244	783	2 536	0	0

*In kilotons (kt)*



# Results



*Territorial Metabolism of Alsace through Life-Cycle of Products, B. Ribon, 2017*

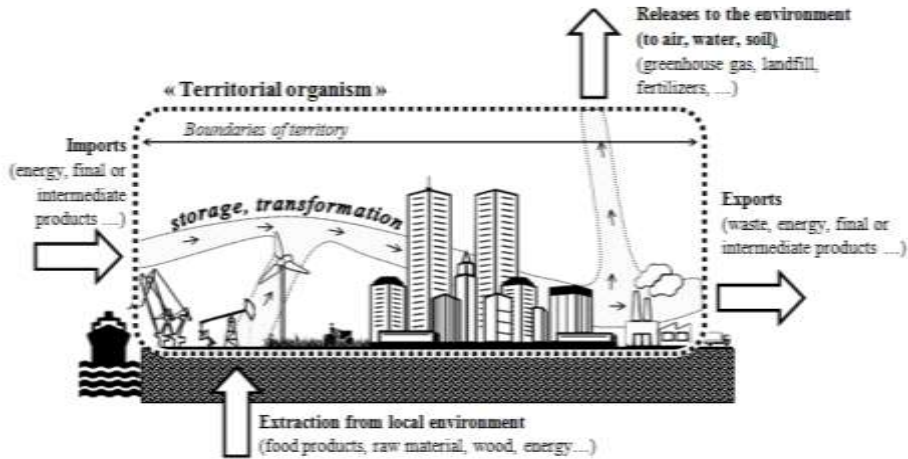
# Discussion & limits (I)

- Territorial metabolism indicators are not easy to understand : “Not Just a Matter of Weight “ (van der Voet et al. 2004)
  - Hidden dynamics: logistics platforms (ex: pipeline, harbour), production (need raw material) vs. consumption (final product), ...
- This life-cycle method allows for a better understanding of the metabolism, by highlighting and relativising some dynamics:
  - Resources in transit, waste management efficiency, self-production

# Discussion & limits (II)

- Freight statistics are highly constrained by the NST 2007 nomenclature:
  - European Commission Regulation No 1304/2007
  - The NST 2007 does not describe well life-cycle stage of products and lead to many assumptions in the data processing.
- **Freight statistics are not well adapted for material analysis, and thus for circular economy ...** *but there is no other available data at region's scale concerning importation and exportation*
- Different stages than Production / Use / Waste could be used
  - Production
  - Transport & logistics
  - Institution & public services
  - Final consumption
  - Waste management

# Thank you for your attention !



**Benoit RIBON**  
PhD. in Geography  
LIVE laboratory, Université de Strasbourg  
ADEME, France  
[benoit.ribon@live-cnrs.unistra.fr](mailto:benoit.ribon@live-cnrs.unistra.fr)

More information on my research : <http://metabolisme-territorial.fr> (in french)

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# **Additional notes**



# Additional notes :

## Data sources

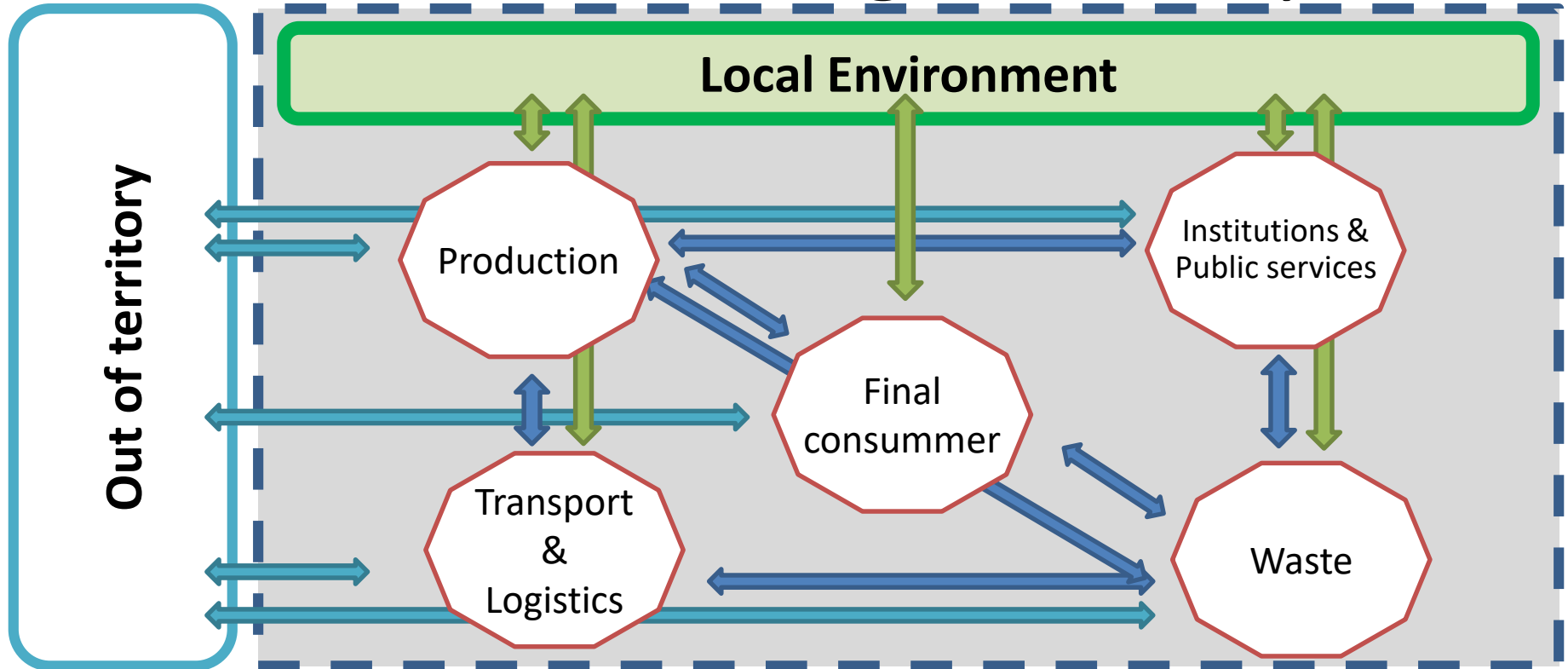
- Systèmes d'information sur les transports de Marchandises (SitraM)
  - Importation / Exportation
  - Truck > 3,5 t (2010) ; River (2010) ; Rail (2005)
  - Commissariat général au développement durable / Service de l'observation et des statistiques (SOeS)
  - List of flows by departement (*Alsace = 67 + 68*)
  - Items classified according NST 2007 nomenclature
- Metabolism study of Alsace, 2015
- All material but water flows
  - Organic, metal, mineral, chemical, ...

# Additional notes :

## Data processing

- Discrimination of NST 2007 items according Life-cycle stage of product
  - Raw & pre-processed material (**Production stage**)
  - Final products (**Use stage**)
  - Waste (**Waste stage**)
- Classification choices :
  - Gaz emission : “Use stage” to “Environment “
  - Solid emission : “Waste stage” to “Environment”
  - Only oil and gaz through pipeline in “Output to Output”
- Neglected:
  - “Use stage” to “outside” (second hand market)
  - “Use stage” to “Production stage”
  - “Waste stage to “use stage” (rehabilitation)
  - “Environment” to “Use stage” (private garden, amateur harvesting)
  - “Environment” to “Waste stage”
- Excluded to reduce complexity:
  - Balancing Input / Output
  - Net Addition to Stock
- Tools
  - Self-developped “Information System for Territorial Metabolism” software

# Additional notes: Metabolism through economy ?



# Requirment

Dear presenting author, We are pleased to welcome you in Luxembourg for LCM2017. You will give an oral presentation in the session “WE-204: Life Cycle Approaches to Sustainable Regional development”. You probably already received some instructions from your session chairs. However, please take note that each session format has been harmonised and therefore we KINDLY ASK YOU TO RESPECT THE FOLLOWING REQUIREMENTS in order to ensure the good running of the session, and to prepare your slides. RUNNING OF THE SESSION

- Your session time schedule and room will be indicated in the conference program book, including the timeslot for your presentation (already downloadable at <http://lcm2017.org/programme>)
- TIME SLOT FOR YOUR PRESENTATION is 15 minutes, INCLUDING 10 minutes presentation and 5 minutes for Q&A.
- Present yourself in the room at least 20 minutes before the session start, in order to meet the chairs and upload your presentation.
- The presentations will NOT be uploaded in advance so it is mandatory that you come in the room with a USB stick in order to transfer your presentation. Our staff will support you.
- Rooms are equiped with one computer managed by a technician. He will collect all presentations (no possibility to switch for your own computer for instance).
- The last 15 minutes of the session will be dedicated to a short discussion panel involving all speakers (the session chairs will prepare some questions) and potential additional questions from the audience. ORAL PRESENTATION - SLIDES PREPARATION
- **You must prepare ppt slides in 16/9 FORMAT using horizontal position (landscape) for all ppt slides.**
- FONT SIZE 24 must be used for the text in their slides, and each figure should be at least half page dimension in order to be readable for the audience.
- Electronic PowerPoint or PDF presentations are the only accepted medium for the platform presentations. The electronic projection equipment provided in each room will include a computer equipped with Operating System Windows. It is highly recommended if you are a MAC user to test your presentation on a PC. There will not be any MAC equipment available. Should you have any question, please contact us at [lcm2017@list.lu](mailto:lcm2017@list.lu)

Best regards, The LCM2017 organising committee -- Life Cycle Management Conference 2017 <https://www.conftool.com/lcm2017/>