

# Quels enseignements d'une quantification des pertes et gaspillages alimentaires par l'approche métabolique, à l'échelle d'une ville (métropole) ?

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# Background

- Cities as « consumption hotspots » for food : massive life cycle environmental impact (« urban food print ») (Weisz et Steinberger 2010, Goldstein et al. 2016; Billen et al. 2012)
- Total material flows to, from and across cities (« urban metabolism ») : overall intense, linear and externalized (Barles 2015)
- Food loss and waste overall 30 % globally (FAO 2011), at distribution and consumption stage 17 % of total food production globally (UNEP Food Waste Index). In Europe, total food loss and waste represents 20%, and 14 % alone are generated at distribution and consumption (Stenmarck et al. 2016).
- Food waste reduction (avoidance, prevention) appears as an important enabler for the socio-ecological transformation of food systems, along with diet change (demand-side change).
- More and more cities are committing to food waste reduction as part of sustainable food system policies (Milan Urban Food policy, *Plan de lutte contre le gaspillage / Ville de Paris*). Yet, food waste specifically in cities has been underresearched so far.

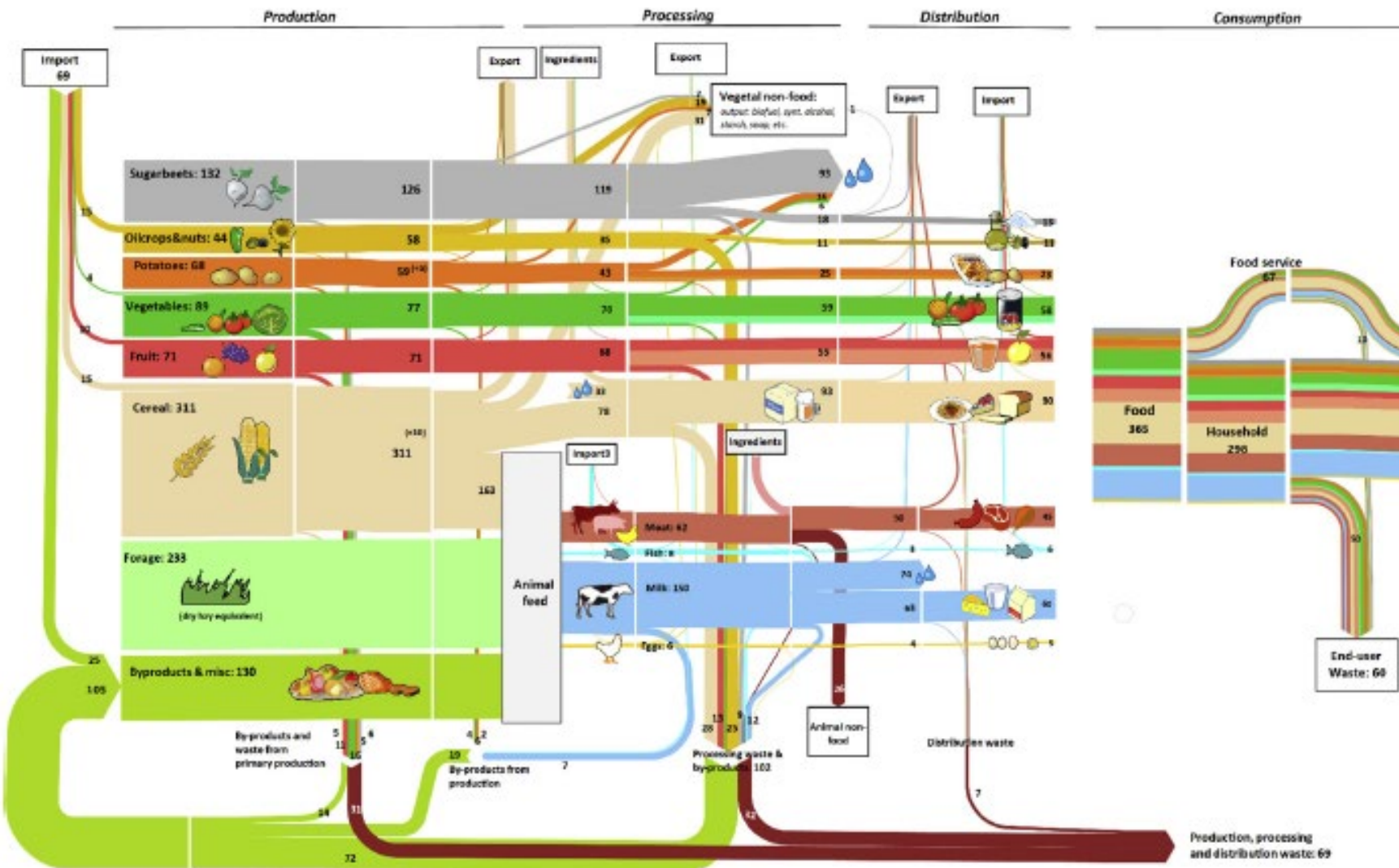
# Objectives:

## **Characterizing and quantifying food and food waste flows in cities:**

- Analysing food and food waste flows across urban food system activities : Opening the « black box » of the urban system (EUROSTAT EW MFA accounting)
- Developing methods based on material flow analysis to analyze food flows at the scale of cities

...in a perspective to evaluate the appropriateness of food waste reduction and urban food policies, and discuss opportunities for food waste reduction

# EU food flows in 2011, wet mass (Mt)



	Available (Mt)	Food waste (Mt)	Share of food waste (%)
Total available	638	60+69	20
Consumption	365	60	16

Caldeira et al. 2019

Note : Sankey diagram including feed flows, excluding soft drinks, mineral water and some non perishable food (salt, coffee)



# Method (2): Adjustments to EUROSTAT method

	EUROSTAT method EW-MFA	Method in this study
Material category	biomass	food
Livestock	Transformation activity of the economy	Part of food and food input
Urban consumption	Derived ; DMC domestic material consumption = input - export	<b>Direct assessment : « eating population » x food intake</b>
Waste	Part of consumption	<b>Separate output flow</b>

# Case study: Paris Ile de France

French capital region, 2% of French metropolitan area, 18% of French population; 28% of GDP; center of political, cultural and intellectual life in France

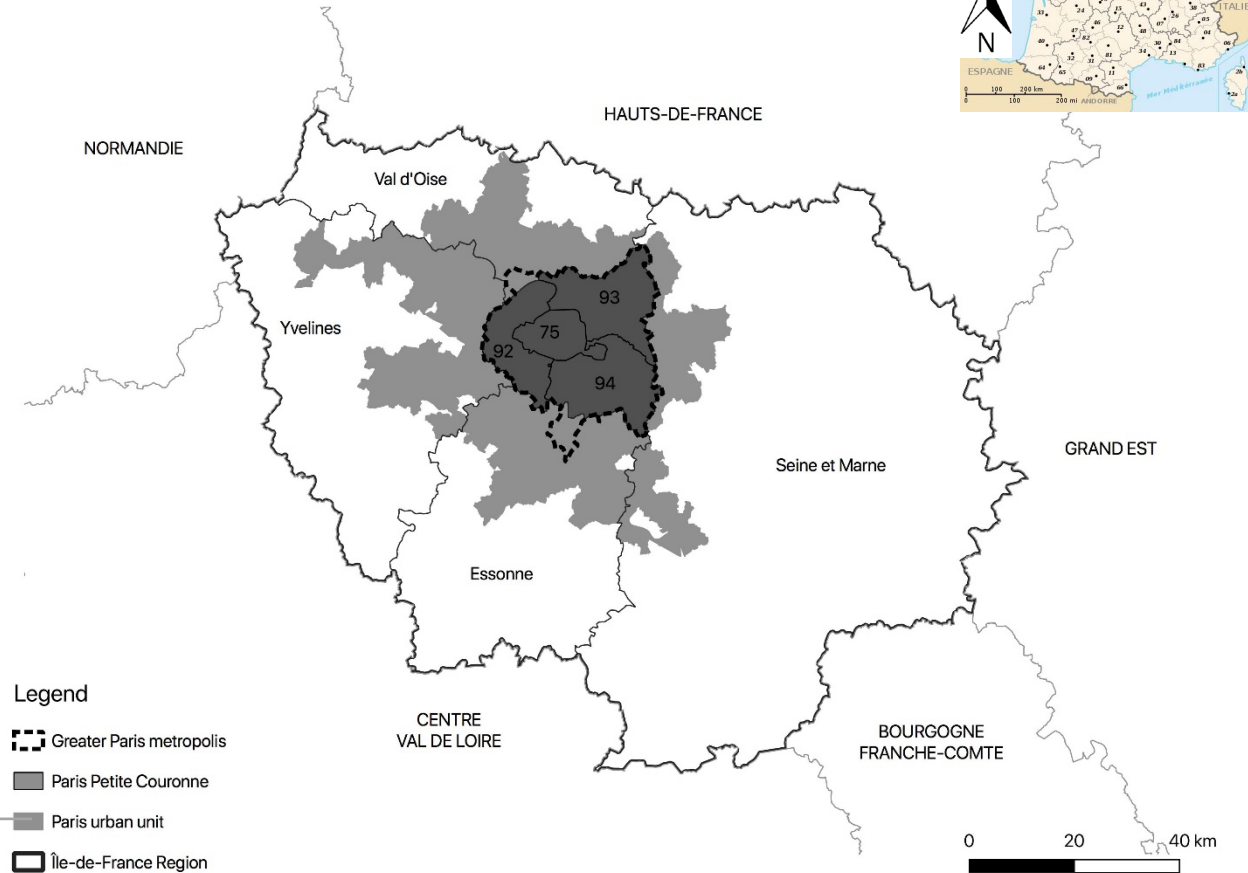
Two study areas:

- **Paris Petite Couronne (PPC)** : Paris capital and department (75) + 3 neighbouring departments (92, 93, 94)
- **Ile de France (IdF)** : PPC + 4 neighbouring departments (77, 78, 91, 95)

reference year 2014

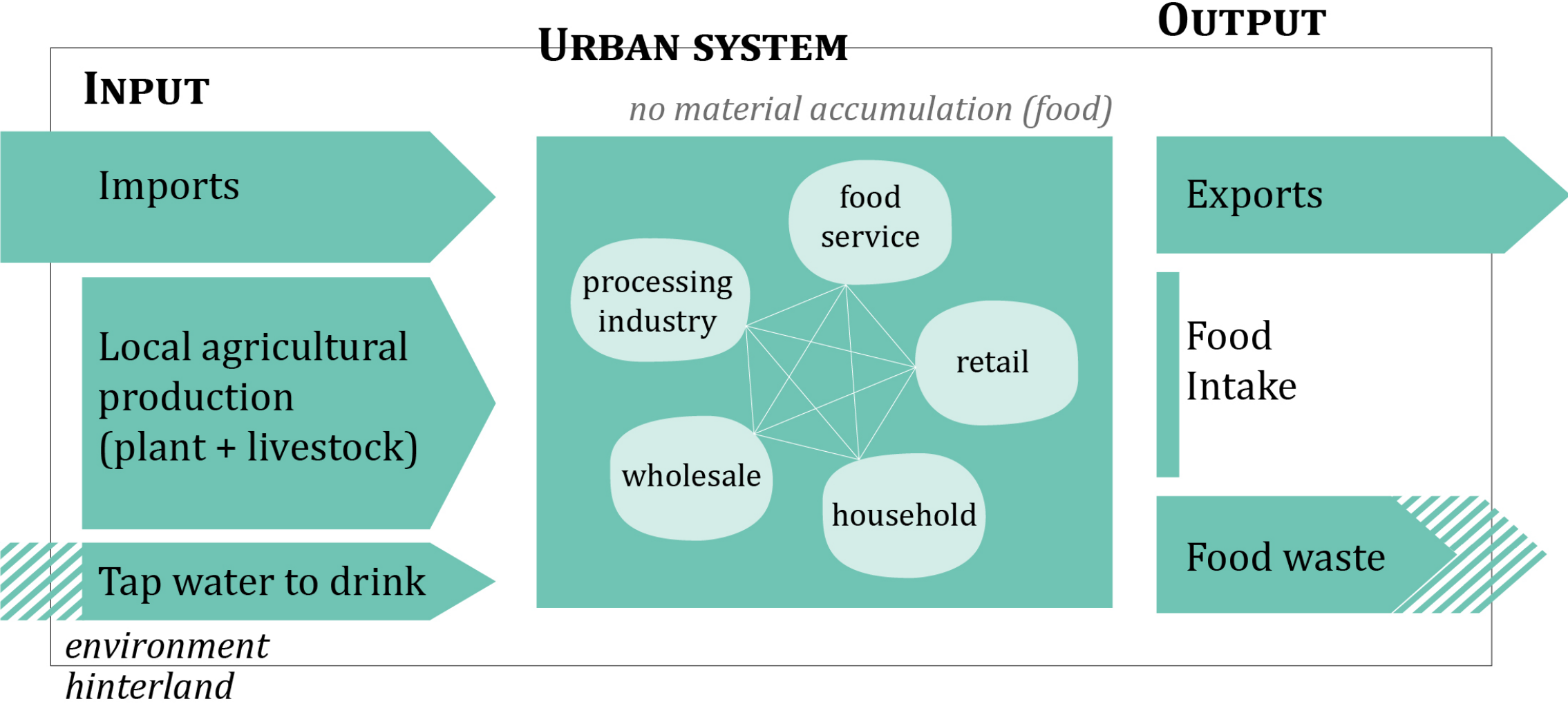
area	population	Surface (km <sup>2</sup> )	cap/km <sup>2</sup>
Paris	2 220 445	105	21 067
PPC	6 754 282	657	6 901
Ile de France	12 027 565	12 012	1 001

Source: INSEE, 2014

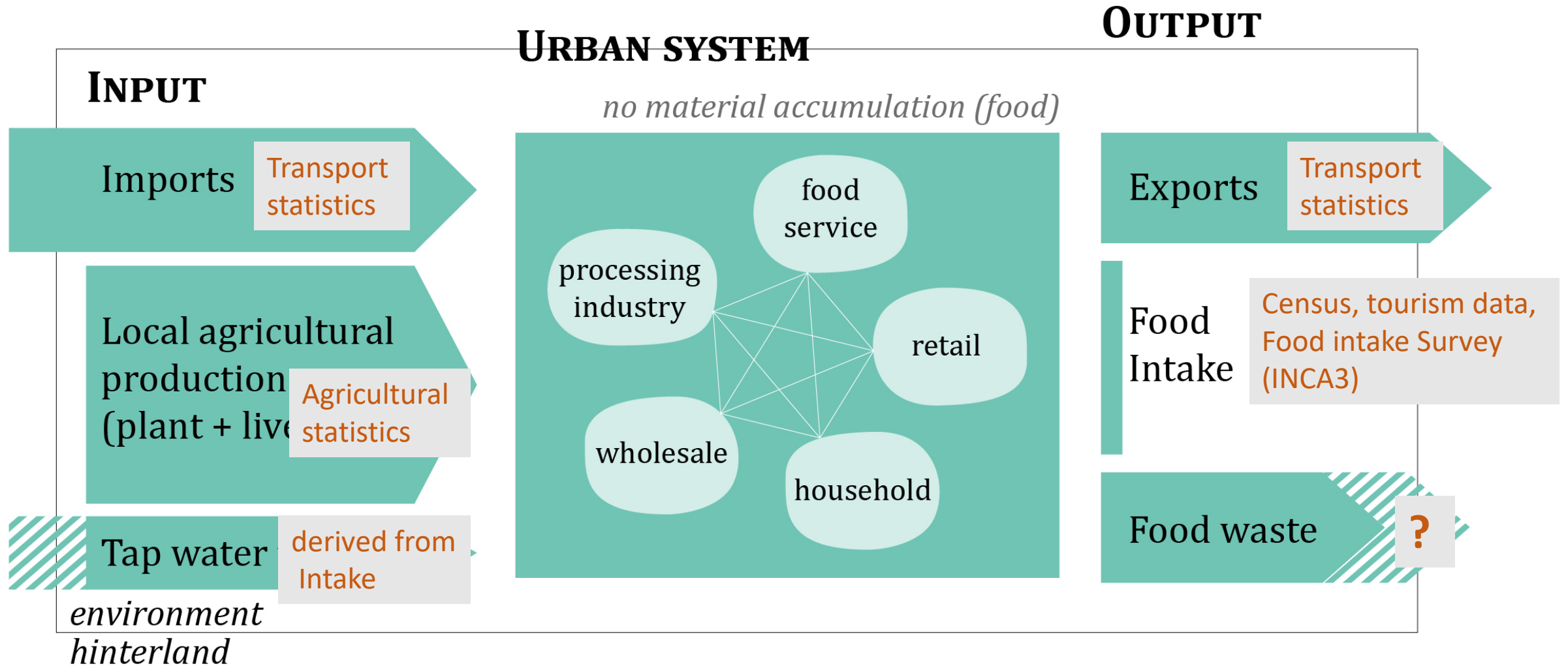




# Schematic illustration of scope

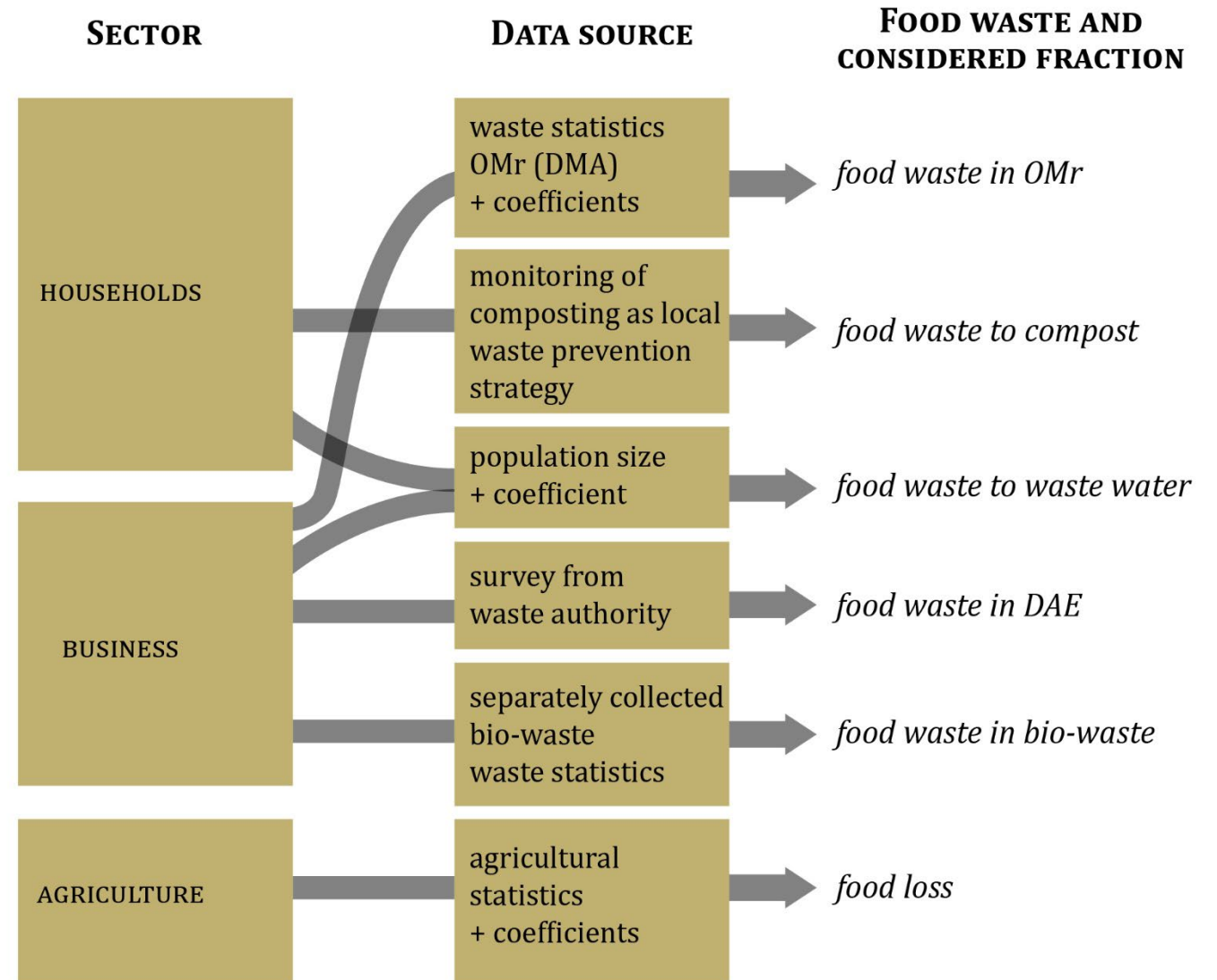


# Data sources (1) – urban system food flows

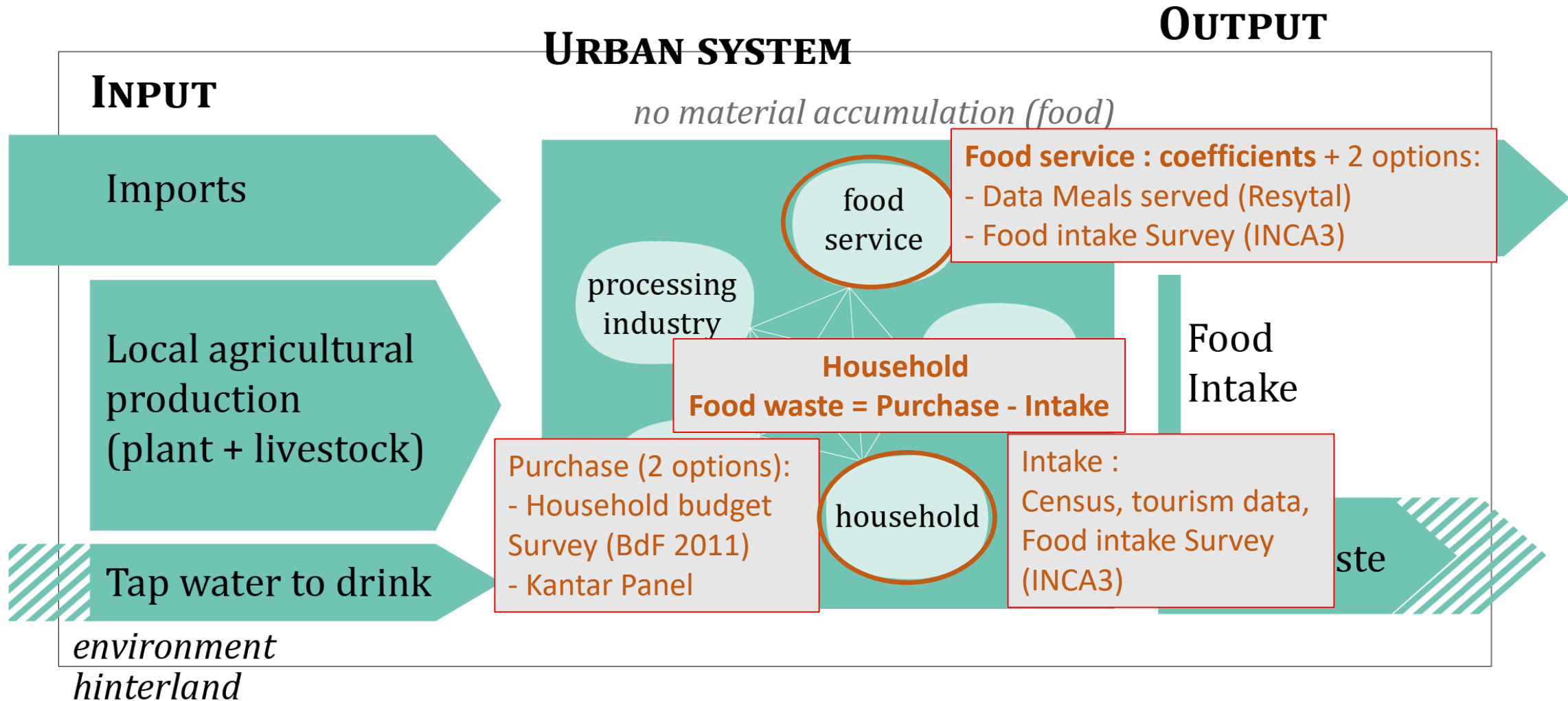


# Data sources (2) – urban system food flows

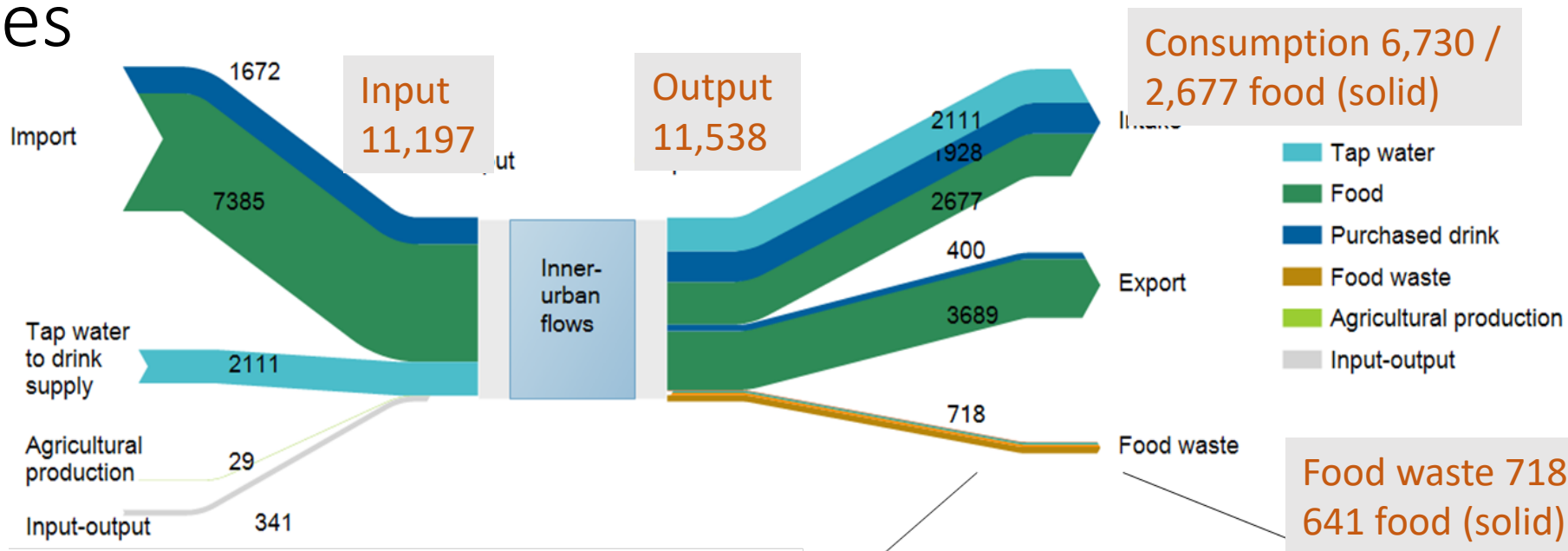
- **Food waste data**
- (Solid) Waste statistics: No category on its own
- Food waste = organic or biodegradable waste
- Liquid food waste not covered
- A range of data sources (waste statistics, agricultural production statistics, coefficients, technical reports)



# Data sources (3) – Inner-urban food flows

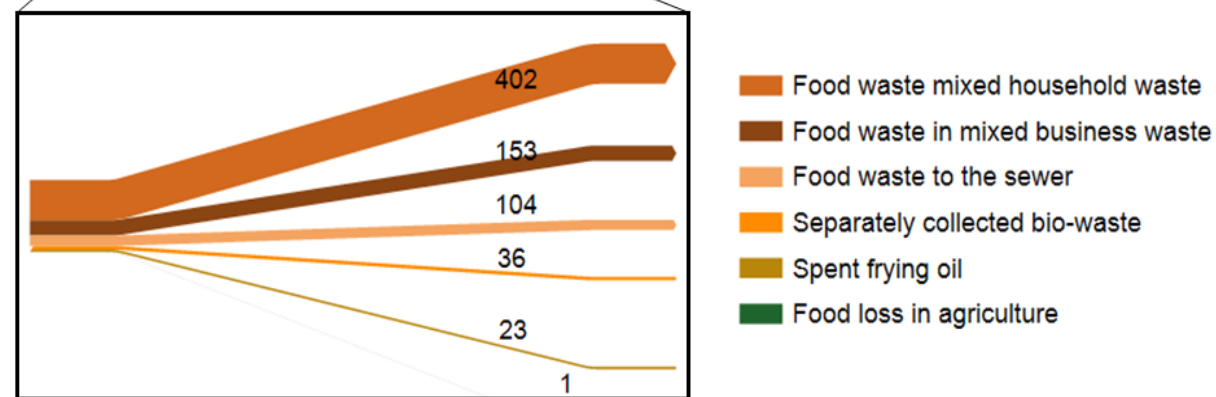


# Urban food and drink flows, Paris Petite Couronne, 2014, in kilotonnes

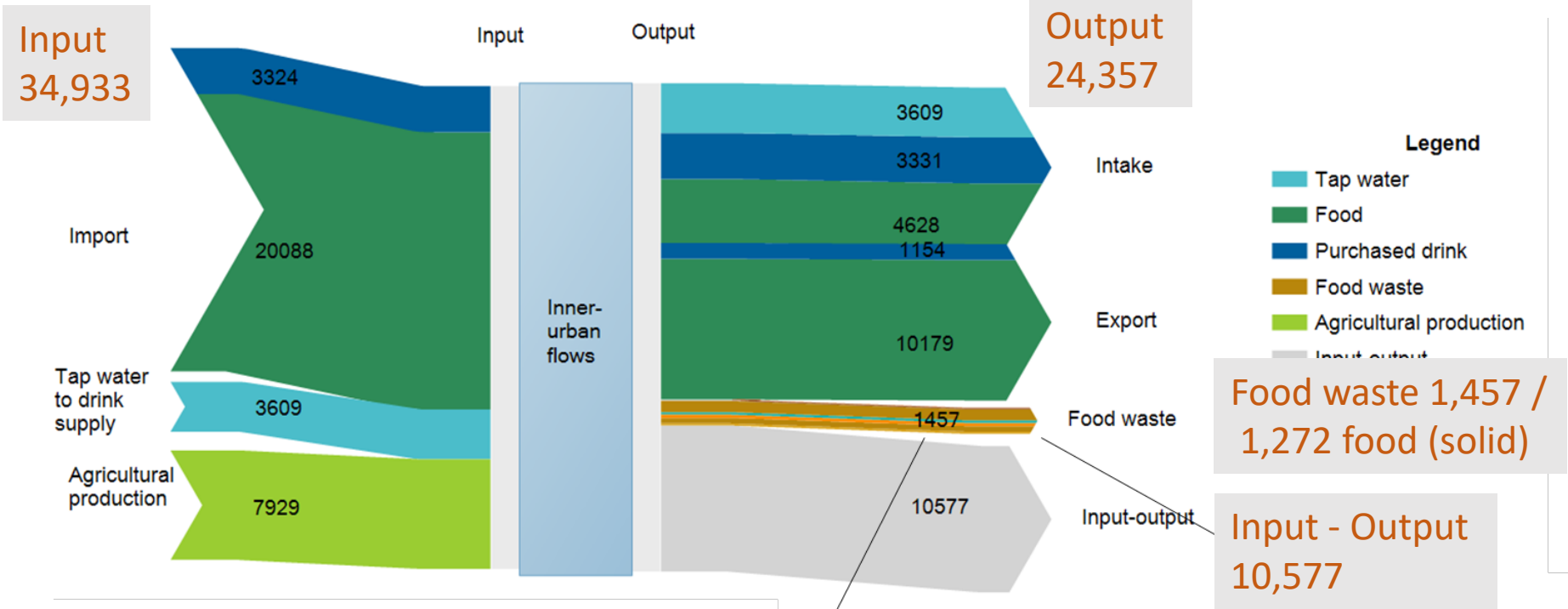


## Key results food waste :

- 19 % food waste (no drink) compared to supply to consumption (intake + waste)
- 36 kt food waste collected as bio-waste (loi Grenelle 2) (5 % of total food waste) directed to compost/anaerobic digestion
- Wasted food / gaspillage ? Estimate : half of food waste in mixed household waste (Ademe 2019), other sectors?

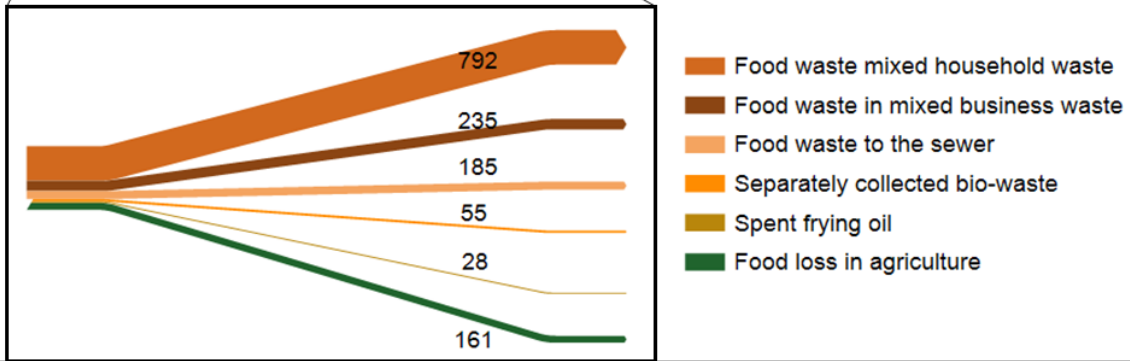


# Urban food and drink flows, Île-de-France, 2014, in kilotonnes



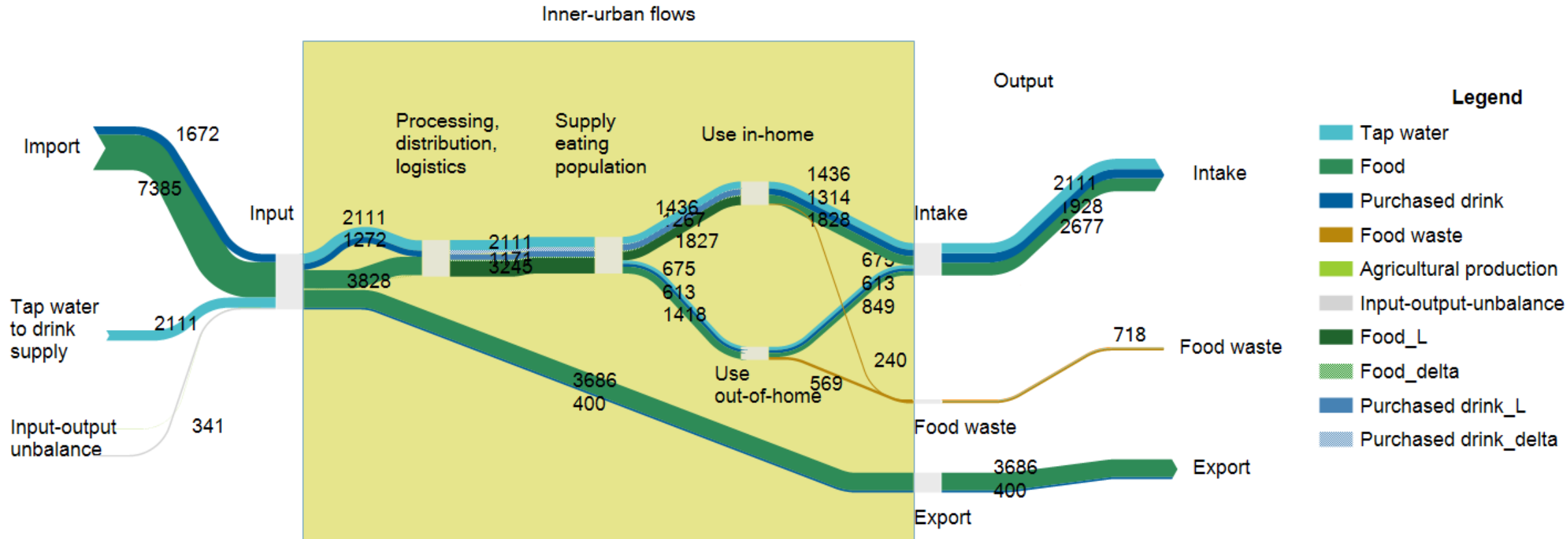
## Key results food waste :

- 22 % of supply to consumption (intake + waste)
- 55 kt food waste collected as bio-waste (loi Grenelle 2) (4 % of total food waste) directed to compost/anaerobic digestion



# Integration of inner-urban flows remains unachieved : Paris Petite Couronne...

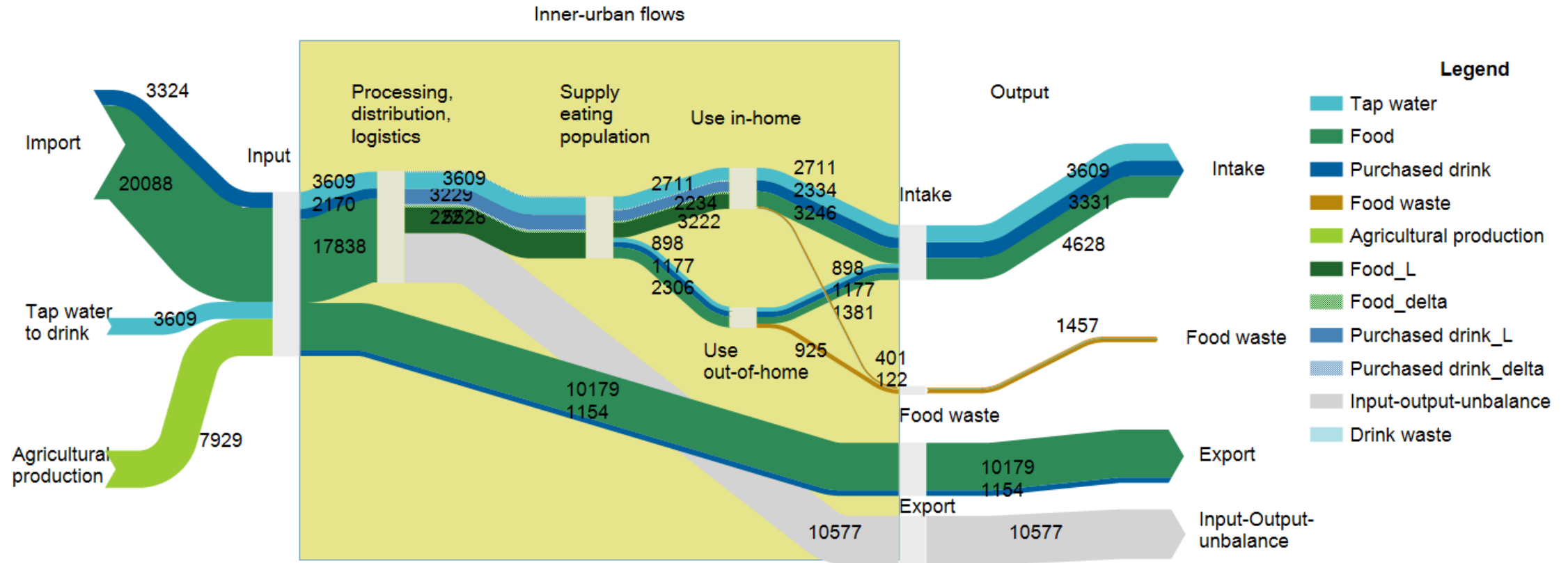
Urban food and drink flows, Paris Petite Couronne, 2014, in kilotonnes



(Solid) food	Inner-urban Flows (consumption)	Urban System Flows
Food waste	499 or 809	641

# ...Unachieved for Île-de-France

Urban food and drink flows, Île-de-France, 2014, in kilotonnes



(Solid) food	Inner-urban Flows (consumption)	Urban System Flows
Food waste	847 or 1326	1272



# Discussion

- Total food waste could be slightly underestimated : for (solid) food, 19 % et 22 % of urban food waste compared to supply for consumption to PPC and IdF respectively
- Scarce littérature to discuss the results at the scale of cities
- Missing food waste flows from business ?
- Wasted food / pertes et gaspillages? No quantification except for rough estimates at consumption stage

# Conclusions and perspectives

- Flow analysis according to our hybrid approach proves effective to connect data from food system sectors within the metabolism concept (otherwise handled separately or invisible) - **open the black box of the urban system, but:**
  - General lack of mass data for food system sectors and of food waste data
  - Food waste flows = hidden flows? Cf invisibility of food waste (D. Evans, 2013)
  - Difficulty to overcome established concepts and how they direct the focus : Food ≠ agricultural products, waste ?
- Focus on wasted food (*pertes et gaspillages*), avoidable fraction, an opportunity to analyze the « upstream » metabolism : by whom is food wasted and at what extent ? Opportunities for waste prevention policies in contrast to waste recycling or valorization (renewable energy policies) ?

**MERCI POUR VOTRE ATTENTION!**