

Bioeconomy and household food waste in France

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Context: household food waste and the ecological transition

Why recycle organic waste?

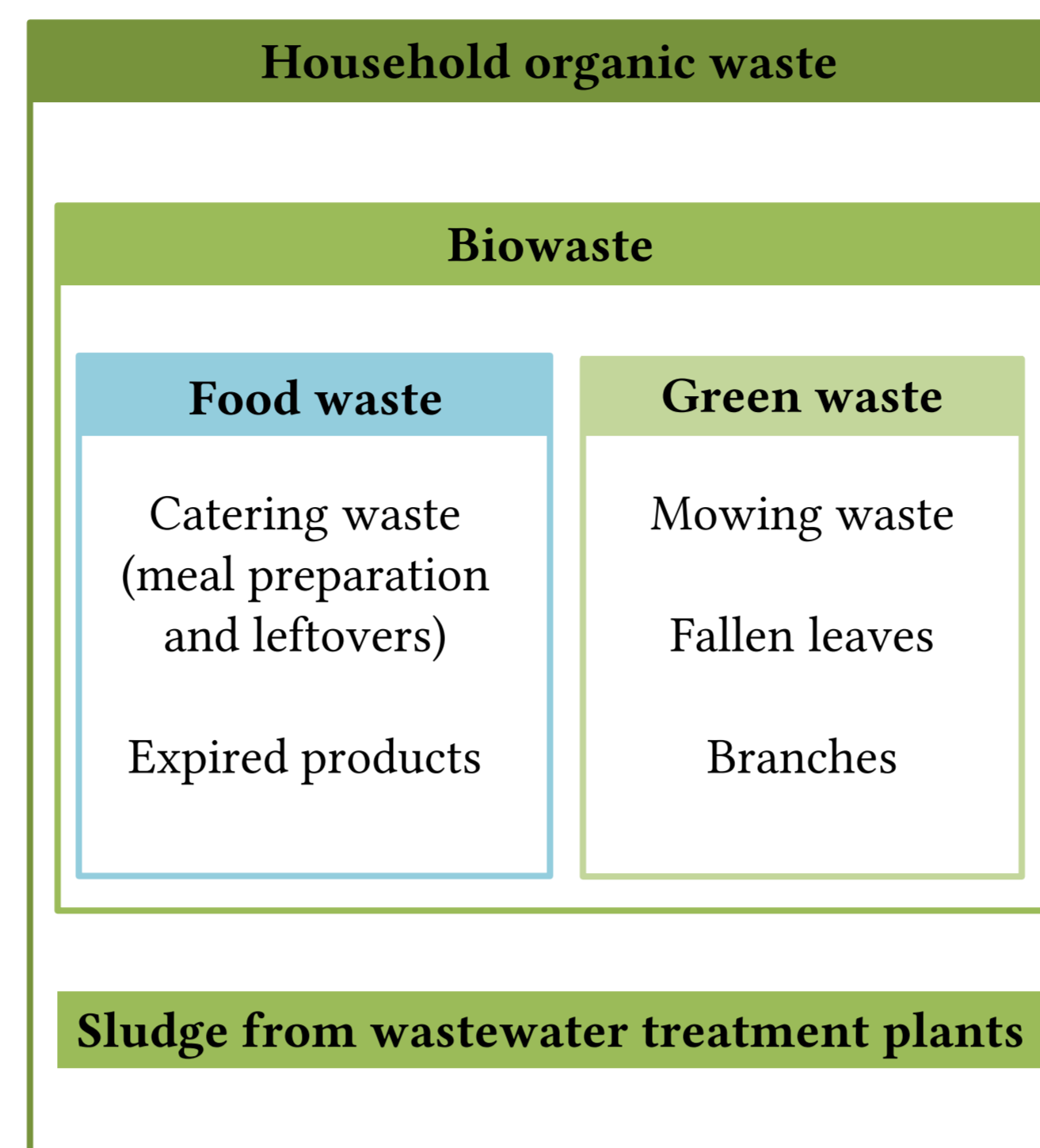
Organic waste's current management (mainly incineration and landfilling) takes part into two problems:

- Ecological degradation, especially pollution (from leachate) and climate change (from waste transportation and biowaste fermentation in landfills).
- Resource depletion:
 - The destruction of organic waste participates in the worsening of soil quality especially as it contributes to the opening of nitrogen and phosphorus cycles at the global scale, which is one of the **planet boundaries** (Röckström et al., 2009).
 - As a biomass, organic waste could also be used to produce goods within a **bioeconomy** framework, which can be described as aiming for the **transition** from non-renewable carbon (= from fossil resources) to renewable carbon (= from biomass), in order to create bioproducts such as biofuels, bioplastics, biofertilizers, etc. Residual biomass makes up a minority of total biomass but is seen as a way to **make bioeconomy more circular** and to **alleviate the tension** it may put on **agricultural land use**.

Why focus on household food waste?

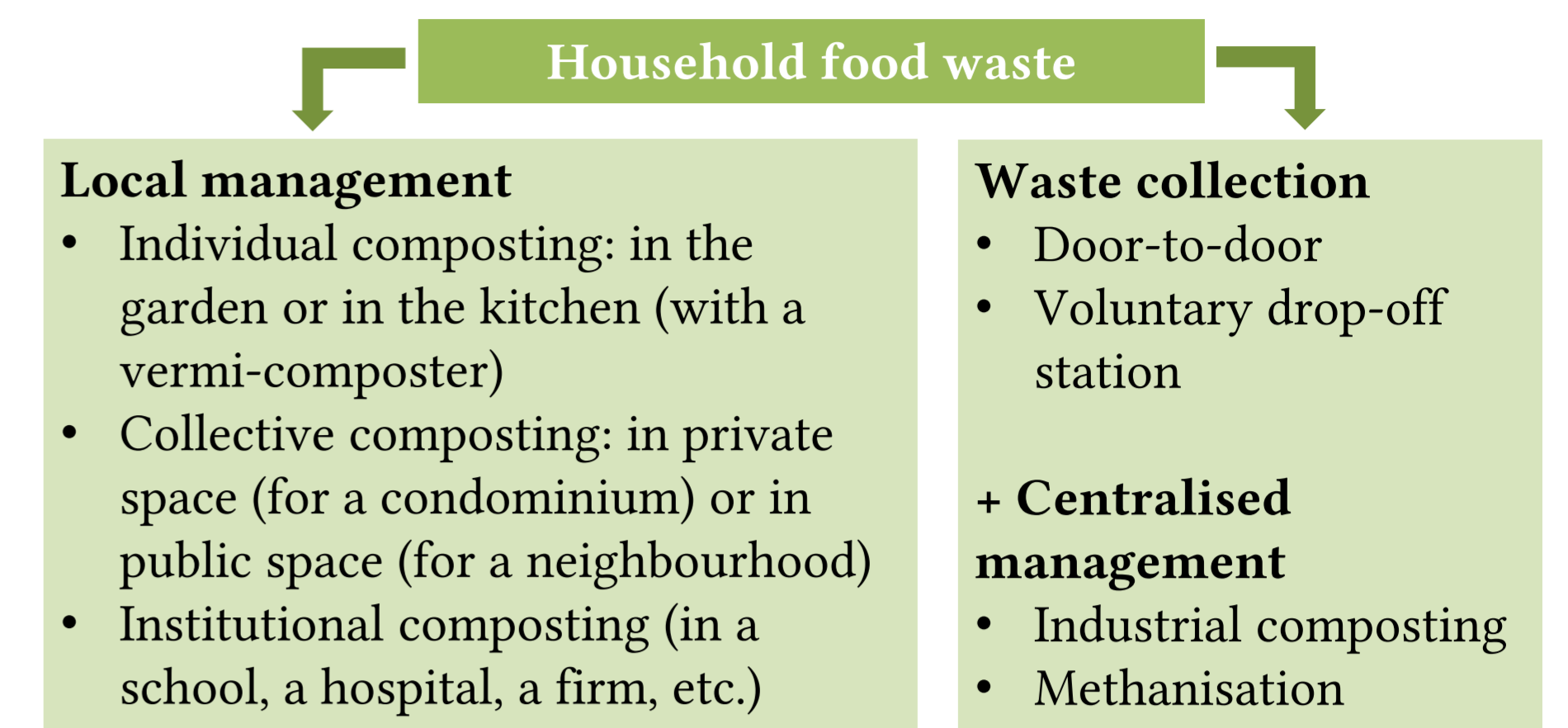
- Household waste is managed by public services since the 1975 law, so household food waste poses **policy issues**.
- Household biowaste makes up to **30% of total household residual waste**, making it the biggest waste flow in the bin (ADEME, 2020). Thus, sorting biowaste out of the residual waste bin would help reducing the latter.
- Following a European directive, the French law made **biowaste source-sorting mandatory starting from December the 31st 2023** for every producer, including households.
- Household green waste source-sorting is already well enforced but that is not the case for household food waste.

Figure 1. What is household food waste?



Non-household organic waste includes organic waste produced by farms, food industries, firms, etc.

Figure 2. What are the existing solutions for recovering household food waste?



Composting is also called **aerobic digestion** and produces **compost**, a soil improver. **Methanisation** is also called **anaerobic digestion** and produces **biogas** and **digestat**, a soil improver.

Each type of solution comprises of a great diversity of infrastructures of varying size, geographical situation, technologies, management, etc. Other marginal solutions are also developed: biorefineries, pyrogasification, entomococonversion, etc.

Methodology

This poster is based on a **review of grey literature** and an **exploratory fieldwork** as part of the first year of the thesis:

- Eight exploratory interviews with bio-waste project managers and officials from ADEME or INRAE;
- Eleven ADEME webinars where local authorities provided feedback on the implementation of biowaste source sorting;
- Two observations of professional events.

A. Legal challenges: 'waste' is a legal status and conditions must be met to exit it and to transition to a 'product' status

In France, waste is **legally defined as the product of abandonment**. This means that there is uncertainty about the nature and characteristics of the waste (Lupton, 2017). A **precautionary principle** applies. In order to become a marketable product again, conditions must be met to exit from the legal status of waste.

Food waste is likely to contain or have been in contact with meat waste. Therefore, it falls under **sanitary regulations on animal by-products** (*sous-produits animaux, SPAN*). This entails **additional costs** and **limits the possibility of using pre-existing recovery facilities**.

- Industrial composting and methanisation units must get a sanitary approval which implies that food waste is sanitized at some point in the process.
- Pre-collection bins and collection trucks must be watertight.
- Small composting platforms (less than 1 ton of waste per week) are exempted from sanitary approval. But compost cannot be sold unless it goes through a standardization procedure (NFU 44051 norm).

B. Social challenges: waste is subject to social norms

Waste is not a socially neutral object.

- It is still mostly negatively connoted and associated with dirtiness, disorder, danger, immorality, as something to hide and keep away.
- On the contrary, some actors rehabilitate waste to varying degrees within the framework of the ecological transition and the search for alternative lifestyles that go beyond waste recovery or prevention.

This **social embeddedness of waste can have consequences at different steps of a food waste-based value chain**:

- **At the source-sorting step**: this step is crucial for the rest of the sector.
 - If it is not done, the biomass deposit cannot be collected at all.
 - If it is badly done, the collected biomass varies in quantity and quality, which is detrimental to the next steps of the value chain.
- **At the collection and transformation steps**. There are possibilities of opposition to implementation projects:
 - Due to alleged or real nuisances (odor, noise, pests).
 - Due to the defense of alternative solutions for food waste recovery.
- **At the final products selling step**. The sector's viability depends on the existence of outlets. However, increasing the use of digestat or compost in agriculture may prove difficult owing to the bad reputation of urban waste-based fertilizers that suffered from the failure of mechanical-biological sorting facilities (TMB) in the past.

Main question

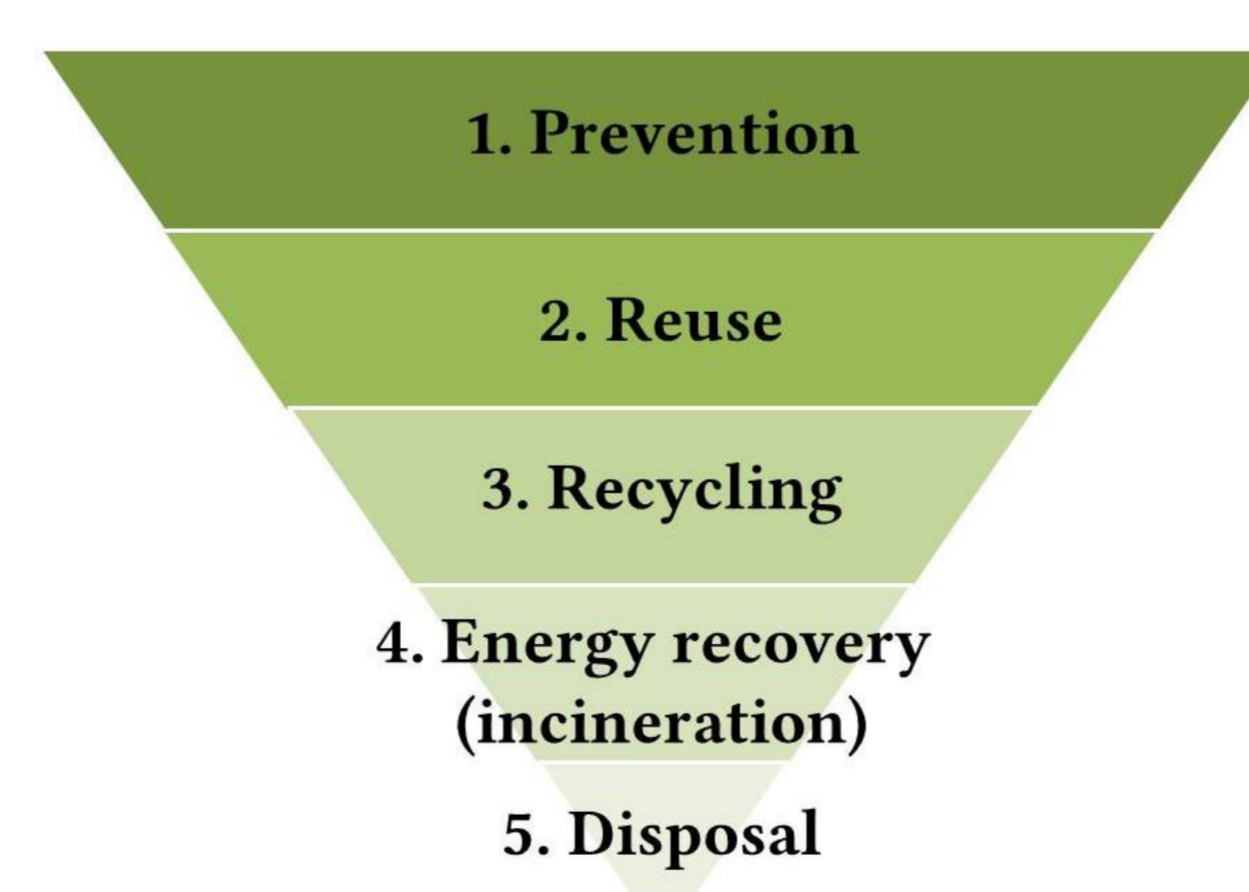
What challenges may a bioeconomy of household food waste face due to the residual nature of this biomass?

C. Economic challenges: turning waste into a product may require new business models

Waste is defined by economists as a **good with no or negative economic value**. It is the waste collection and treatment service that is economically valued. Thus, material and monetary flows go in the same direction (Lupton, 2011). Turning waste into a product with positive economic value entails rebuilding business models of waste actors. Historical precedents exist in the 19th century and between the 1950s and 1970s (Barles, 2005; Dufour, 2023).

A difficulty arises regarding household waste as its management takes place within a **mixed economy** framework that involves both public and private actors (Bertolini, 2005). This complicates the transition of the sector and the emergence of new sectors. Some biowaste project managers within local public authorities call for the creation of an extended producer responsibility scheme to ensure financial equilibrium of biowaste collection and recovery activities. However, in the case of biowaste, the identification of the biowaste producer and therefore financial responsibility allocation seem difficult.

Figure 3. The waste management hierarchy



This graph is based on the European Directive n°2008/98.

D. Policy challenges: waste management policies may run counter to a food waste-based bioeconomy

Waste management takes place within certain principles that may conflict the development of a household food waste recovery economic sector. Below are two examples of ways one of these principles, the **waste management hierarchy** (Figure 3), **may run counter to the development of a food waste-based bioeconomy**.

1) Increasing constraints weigh on landfilling and incineration of household waste in order to favor their recovery or prevention:

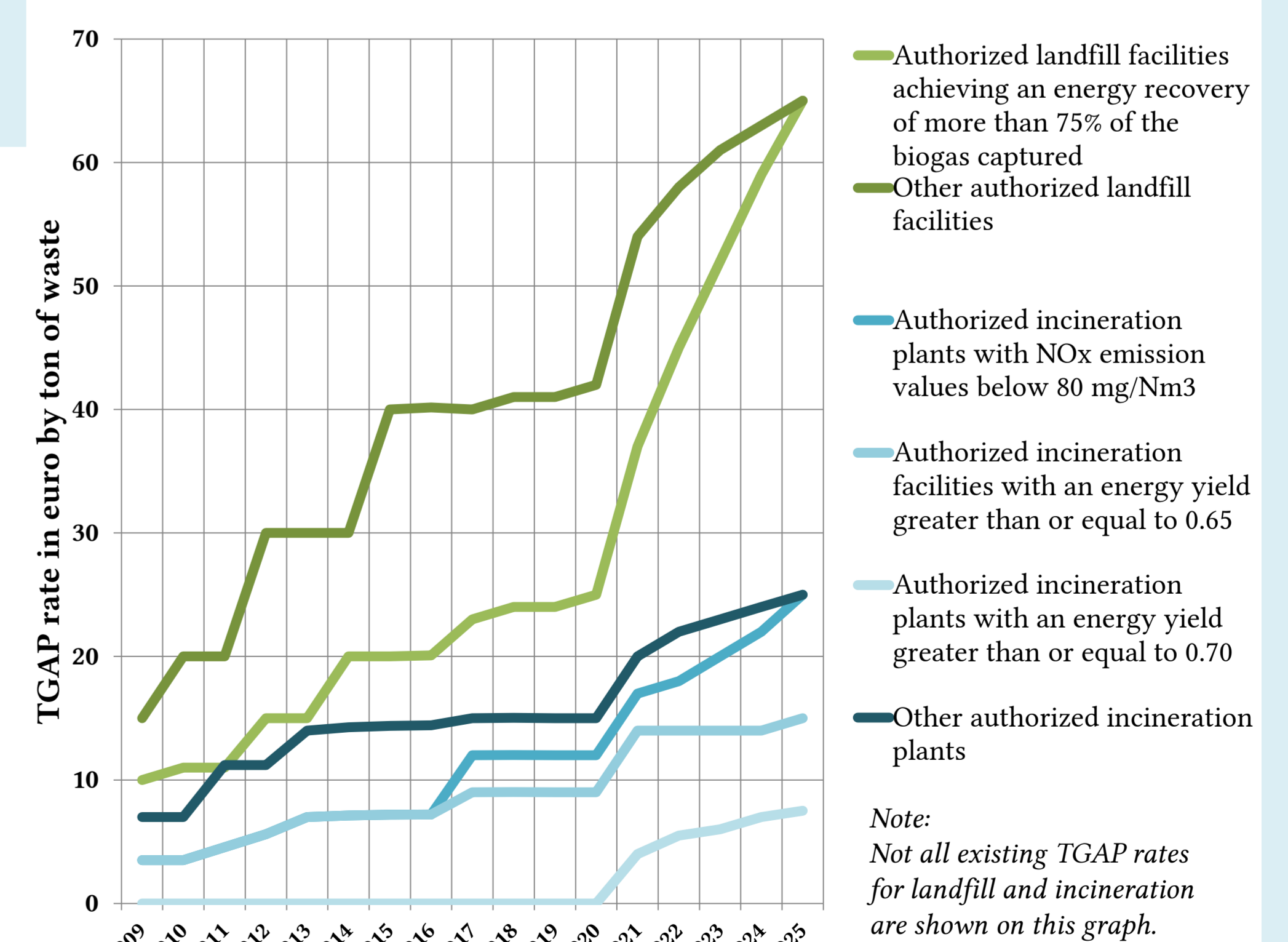
- The general tax on polluting activities (*taxe générale sur les activités polluantes, TGAP*) rates are undergoing a significant rise (**Graph 1**);
- The French law introduced limitations to the volume of certain waste admitted in incineration of landfilling facilities (law of February the 10th, 2020).

Consequently, it appears that the implementation of (soon-mandatory) biowaste source-sorting by local authorities seems **less motivated by the will to recover organic matter and to value it, and more by the need to divert flows away from residual household waste**. Thus, the viability of outlets for food waste-based products (compost, digestat) are often a secondary preoccupation in existing experiments.

2) Waste prevention policies exist for food waste in the form of the fight against food waste (*lutte contre le gaspillage alimentaire*).

- If prevention policies are effective, they could **affect the biomass resource availability** for the food waste recovery activities.
- Conversely, the development of such activities could create a **"vacuum" effect** and compromise prevention policies.

Graph 1. TGAP rates on landfill and incineration



Note: Not all existing TGAP rates for landfill and incineration are shown on this graph.



Bibliography:

- ADEME (2020), *Déchets chiffres-clés. Édition 2020*
- Barles S. (2005), *L'invention des déchets urbains. France 1790-1970*, Champ Vallon
- Bertolini G. (2005), *Économie des déchets : des préoccupations croissantes, de nouvelles règles, de nouveaux marchés*, Éditions Technip.
- Dufour É. (2023), « Entre le regain et l'incendie : l'étape oubliée du compostage industriel, voie médiane abandonnée du traitement des ordures ménagères (Île-de-France, années 1940 – années 1990) », *Flux*, n° 131, p. 32-50.
- Lupton S. (2011), *Économie des déchets : une approche institutionnaliste*, De Boeck
- Lupton S. (2017), « Markets for waste and waste-derived fertilizers. An empirical survey », *Journal of Rural Studies*, n°55, p. 83-99.
- Rockström J. et al. (2009), « A safe operating space for humanity », *Nature*, vol. 461, n° 7263, p. 472-475.