

Planning for Integrated Solid Waste Management in Sub-Saharan African Cities

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Connective Cities Practitioners' Workshop

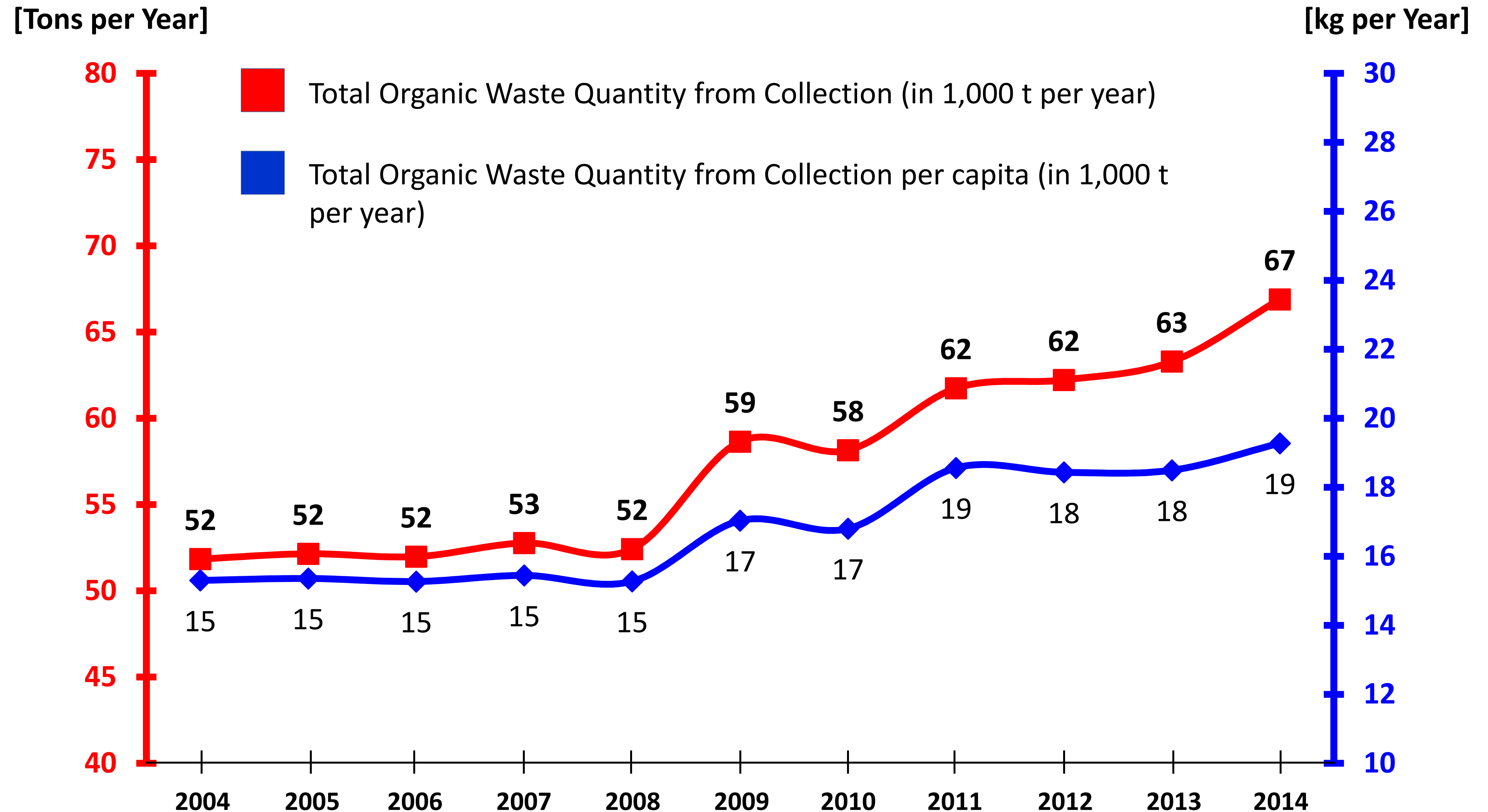
From Waste to Resource

02-04 December 2015

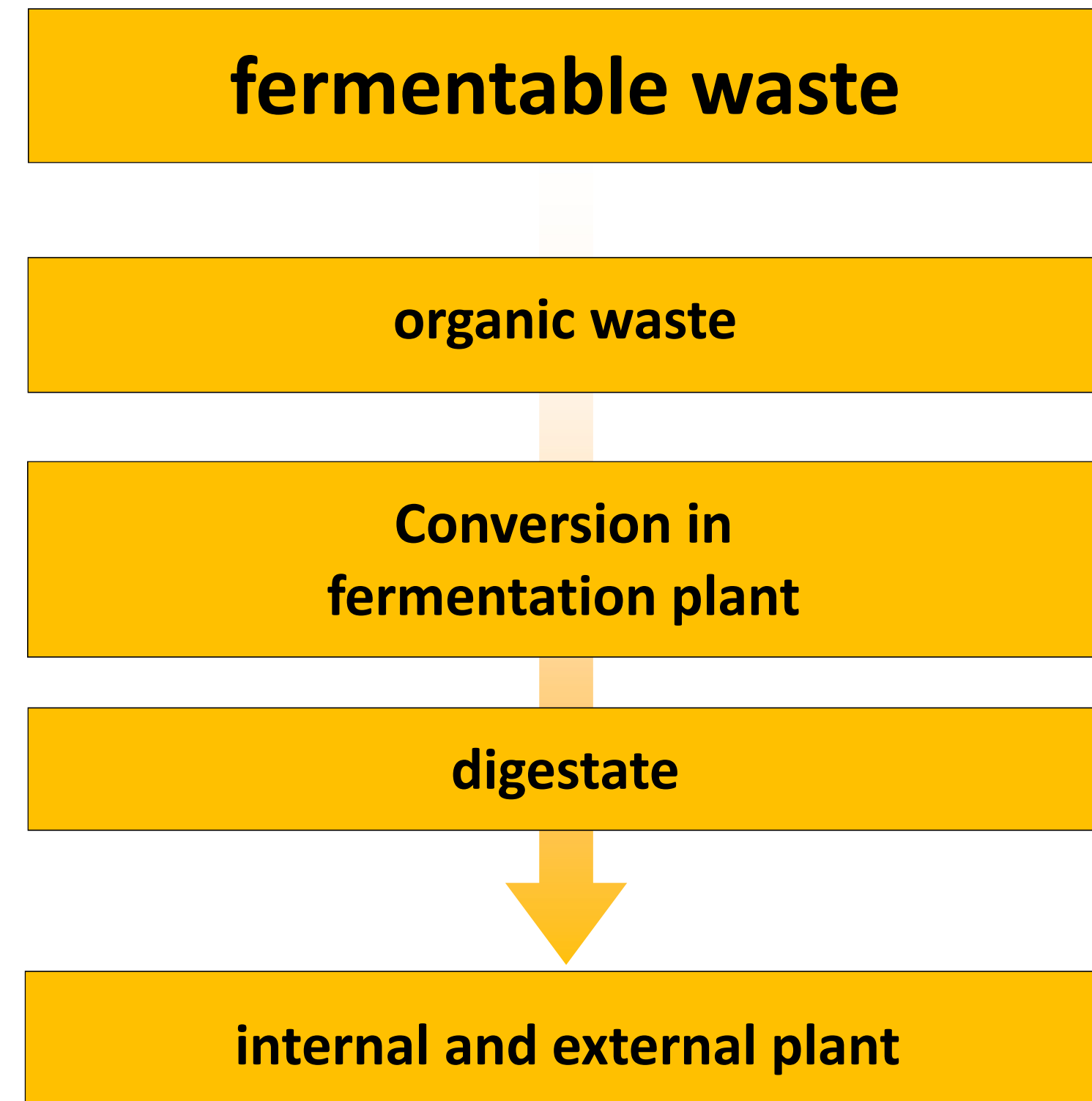
Nairobi, Kenya



Increase of Organic Waste Quantities from Collections



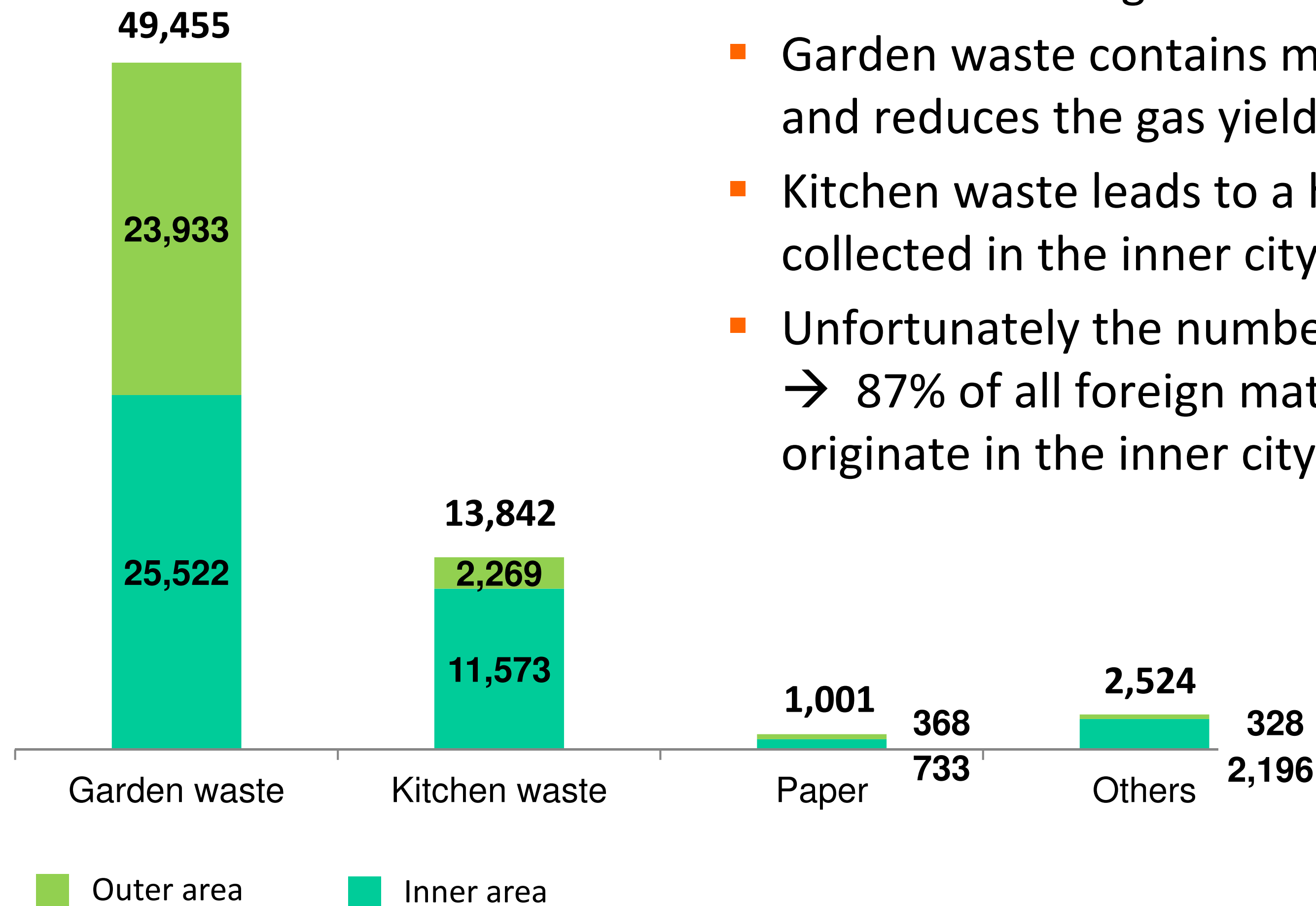
For biogenous waste there are two different kinds of treatment



- Fermentation plants are designed for the treatment of organic waste from household bins (ca. 60,000 tons)
- Further biogenous waste and solid digestate can in future be treated at the already existing composting sites

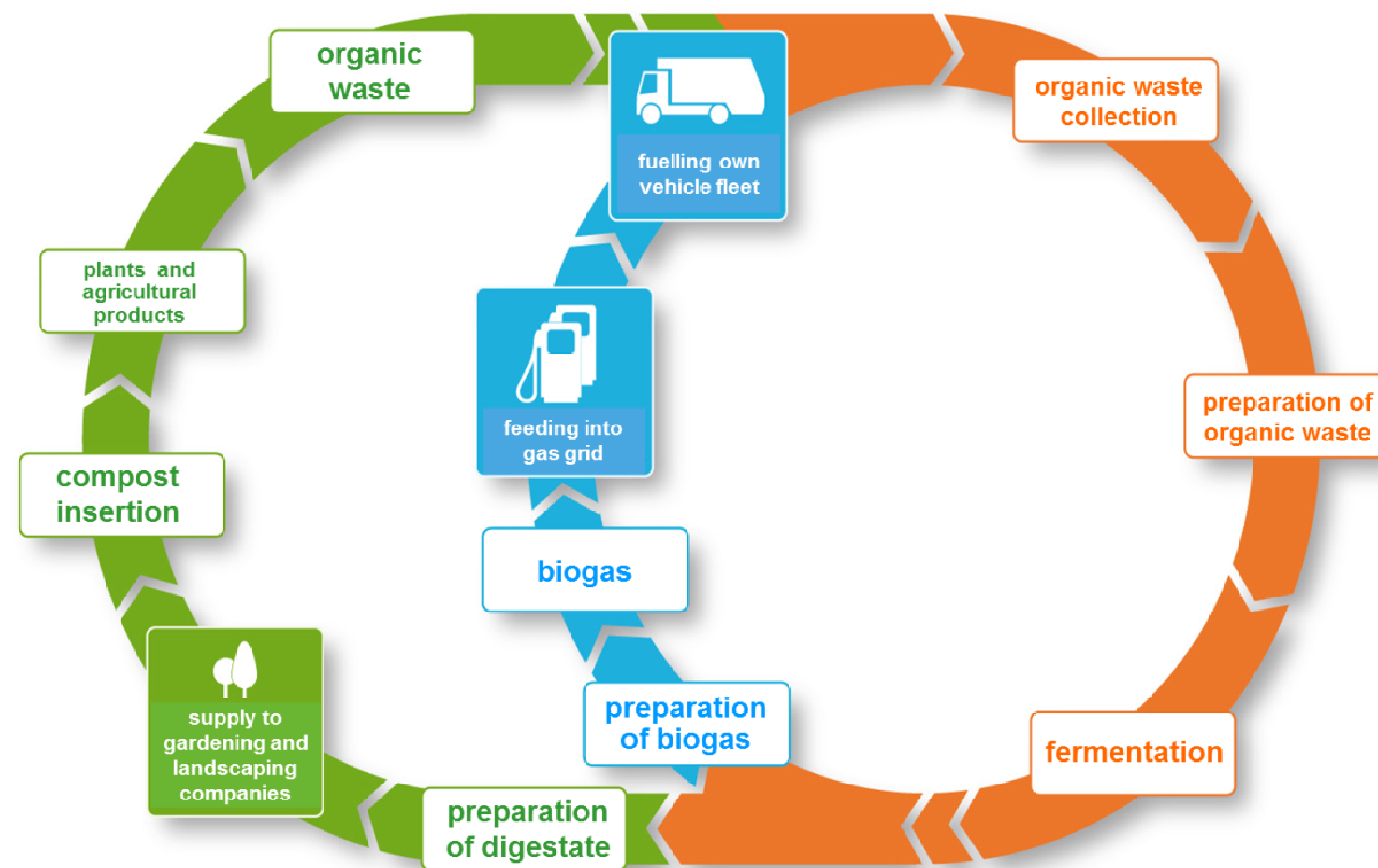
The collected organic waste contains mostly garden waste

all figures in tons per year



- The total amount was about 67,000 tons in 2014
- 75% of which is garden waste
- Garden waste contains more inert material – and reduces the gas yield
- Kitchen waste leads to a higher gas yield, it was mainly collected in the inner city area.
- Unfortunately the number of misses is particularly high
→ 87% of all foreign matter in the organic waste originate in the inner city area.

Closed Cycles in Organic Waste Disposal

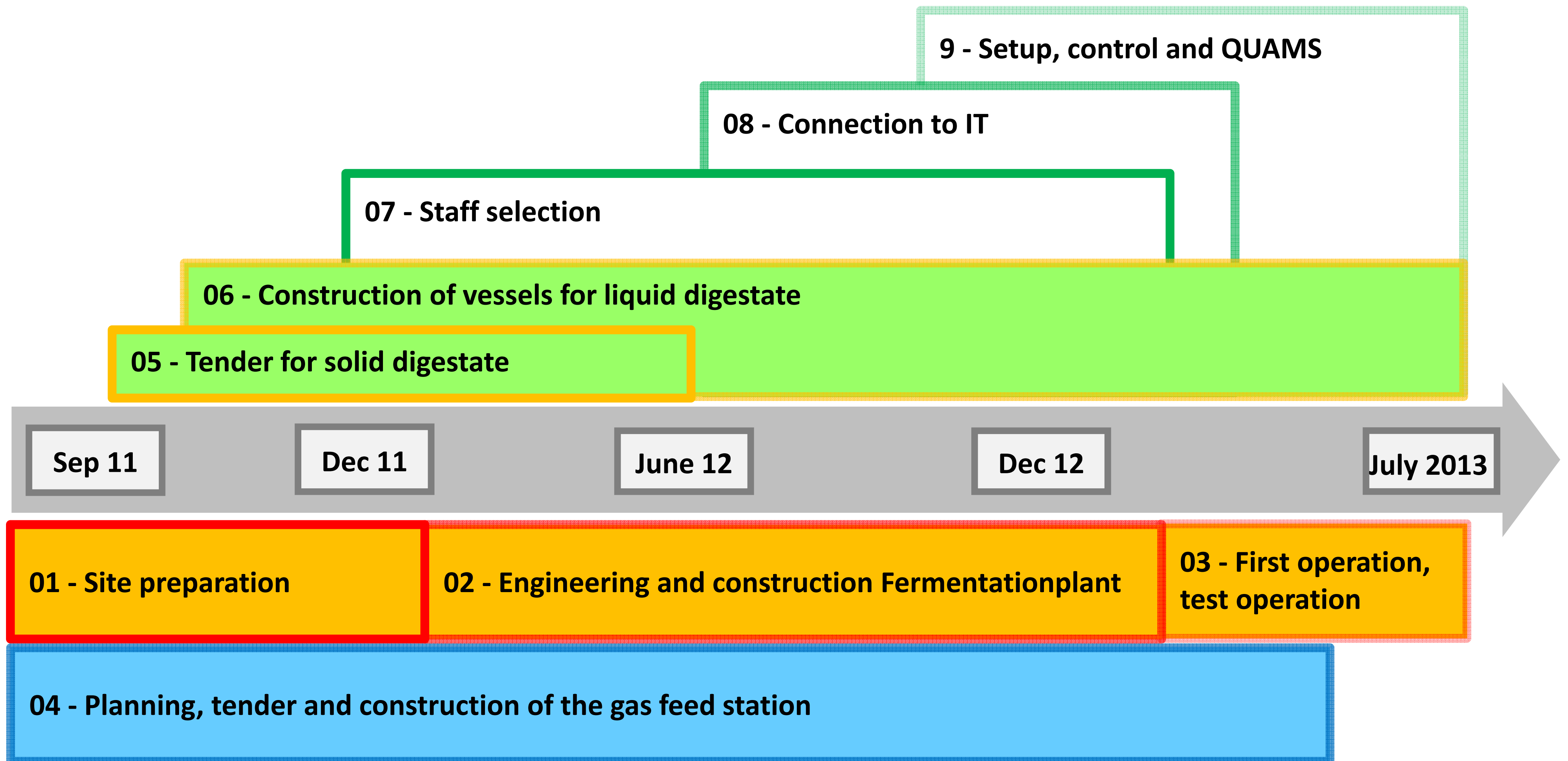


- Investment of almost EUR 40m
- First time of operation 2013
- Biogas production: approx. 25,300 MWh/a
- Substitution of Diesel fuel: 2,5 million litres

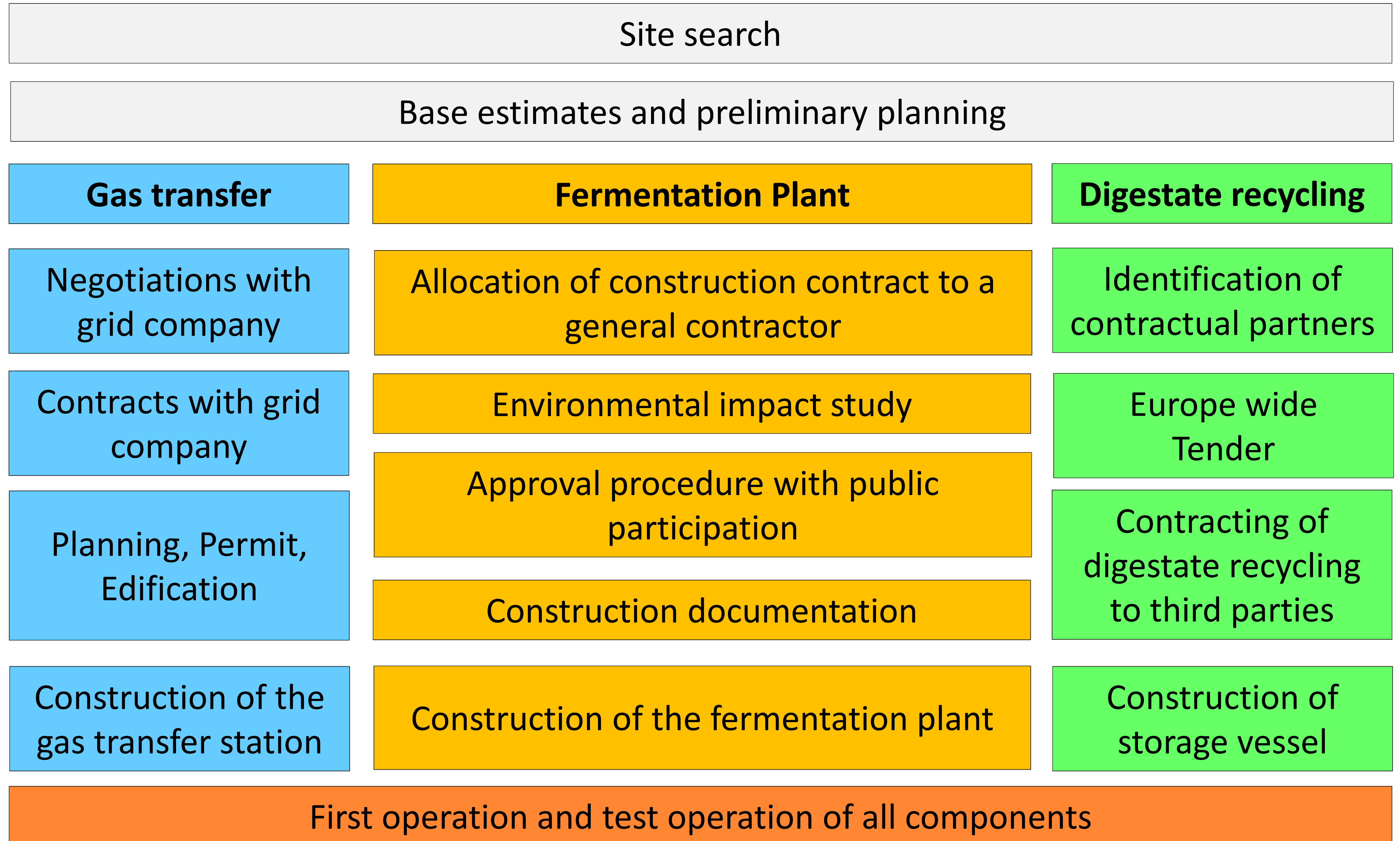
In 2013 we first operated a fermentation plant



The construction of the plant took approximately 2 years



Project Structure



Organisational structure



Conclusion and Prospects

- The current number of contributing households to the organic waste collection (approx. 1.4 million households / 83%) is to be increased
- High ecological standards are already achieved for logistics due to the chosen concept (CO₂, noise, pollution particles)
- The utilisation of biogas as vehicle fuel for our own vehicle fleet maximises ecological and economical aspects
- BSR can react flexibly to an increase in the organic waste collection
- The recycling of digestate improves the humus balance and reduces the need for artificial fertilisers
- **150 CNG - vehicles collect 60% of the waste from Berlin households without additional CO₂ - emissions**
- **Through the treatment of organic waste in fermentation plants, BSR contributes to a future-oriented and sustainable waste management**

Key figures

Input:	60,000 Mg/a organic waste from households
Area:	2.7 ha
Employees:	12
Exhaust air for odourisation:	40,000 m ³ /h
Raw biogas production:	119 m ³ /Mg of Input, with Ø 62 % CH ₄
Raw biogas – annual production:	Ca. 7,140,000 m ³ /a
BioMethane – production:	Ca. 4,301,000 m ³ /a
Net energy production:	Ca. 34 million kWh
Diesel Substitution:	Ca. 2.5 million litres
CO ₂ – reduction potential :	Ca. 6,200 Mg CO ₂ (diesel substitute) plus ~ 6,000 Mg CO ₂ (c-sequestration)
Output solid aerated fermentation residue:	13,400 Mg/a
Output liquid digestate:	32,200 Mg/a