Separate collection of biowaste – is it technically, economically and environmentally practicable?

Brussels, 6th September 2017

ECN | Biowaste in the Circular Economy
Workshop / Brussels / 6 September 2017

Michele Giavini
CIC – Consorzio Italiano Compostatori
Italian Composting and Biogas Association

www.compost.it

TEEP in the WFD: the evolution

- Directive 2008/98/EC
  - Art. 4: Member States shall take into account the general environmental protection principles of precaution and sustainability, **technical feasibility and economic viability**, protection of resources as well as the **overall environmental**, human health, economic and social impacts,
  - Art. 10 – 2 (see recital 28): Where necessary to comply with paragraph 1 and to facilitate or improve recovery, waste shall be collected separately **if technically, environmentally and economically practicable** and shall not be mixed with other waste or other material with different properties.
  - Art. 22 (biowaste): Member States shall take measures, as appropriate, and in accordance with Articles 4 and 13, to **encourage** (a) the separate collection of bio-waste…
    - The Commission shall carry out an **assessment** on the management of bio-waste with a view to submitting a proposal if appropriate… (also recital 35)

TEEP in the WFD: the evolution

- Withdrawn proposal 2.7.2014:
  - Art. 10 unchanged
  - Art. 22: In order to minimize contamination of waste materials, Member States shall **ensure** separate collection of bio-waste by 2025.
  - The Commission shall carry out an assessment…
- EC Proposal 2.12.2015: art. 22
  - 'Member States shall **ensure** the separate collection of bio-waste **where technically, environmentally and economically practicable** and appropriate to ensure the relevant quality standards for compost and to attain the targets set out in Article 11(2)(a), (c) and (d) and 11(3).
  - They shall take measures, as appropriate, and in accordance with Articles 4 and 13, to **encourage** the following:

    (a) the recycling, including composting, and digestion of bio-waste;…

TEEP in the WFD: the evolution

- EP amendments March 2017

Text proposed by the Commission	*Amendment*
Member States shall ensure ***the*** separate collection of bio-waste ***where technically, environmentally and economically practicable and appropriate to ensure the relevant quality standards for compost and to attain the targets set out in Article 11(2)(a), (c) and (d) and 11(3).***	***1.*** Member States shall ensure separate collection ***at source*** of bio-waste***, in accordance with Article 10(2).***

(Justification: «*The introduction of technical, environmental and financial limits has allowed numerous exemptions, rendering application of this principle impossible*")

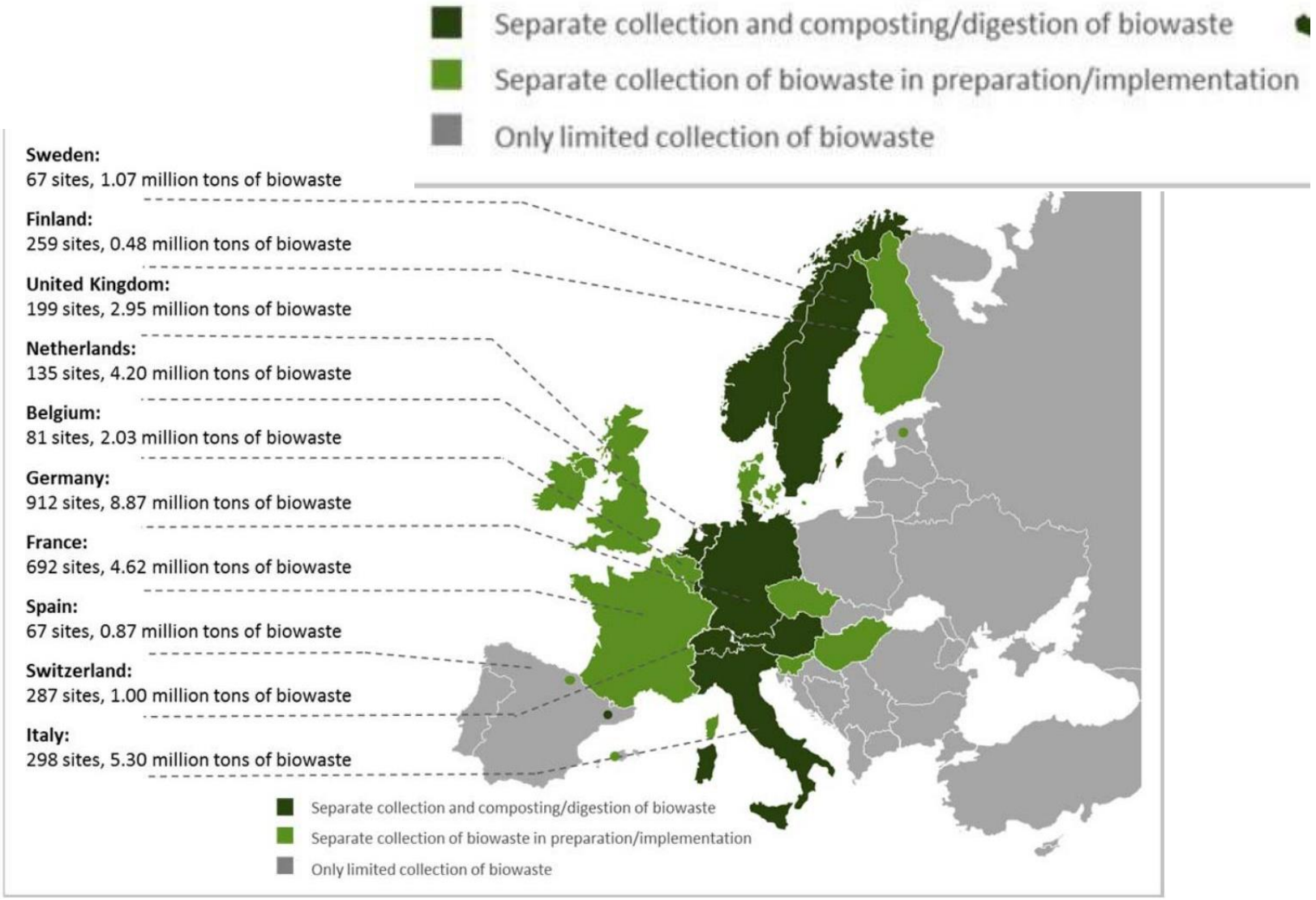
TEEP in the WFD: the evolution

- EP amendments March 2017 – Art. 10 (2)

Original 2008/98/EC	Approved amendment March 2017
Art. 10 (2). Where necessary to comply with paragraph 1 and to facilitate or improve recovery, waste shall be collected separately if technically, environmentally and economically practicable and shall not be mixed with other waste or other material with different properties.	Art. 10 (2). In order to comply with paragraph 1 and to facilitate or improve recovery, waste shall be collected separately and shall not be mixed with other waste or other material with different properties. By way of derogation from the first subparagraph, Member States **may exclude sparsely populated areas** where it is demonstrated that separate collection does not deliver the best overall **environmental** outcome taking into account life-cycle thinking. Member States shall notify the Commission of their intention to make use of this derogation. The Commission shall review the notification and assess whether the derogation is justified, (…)

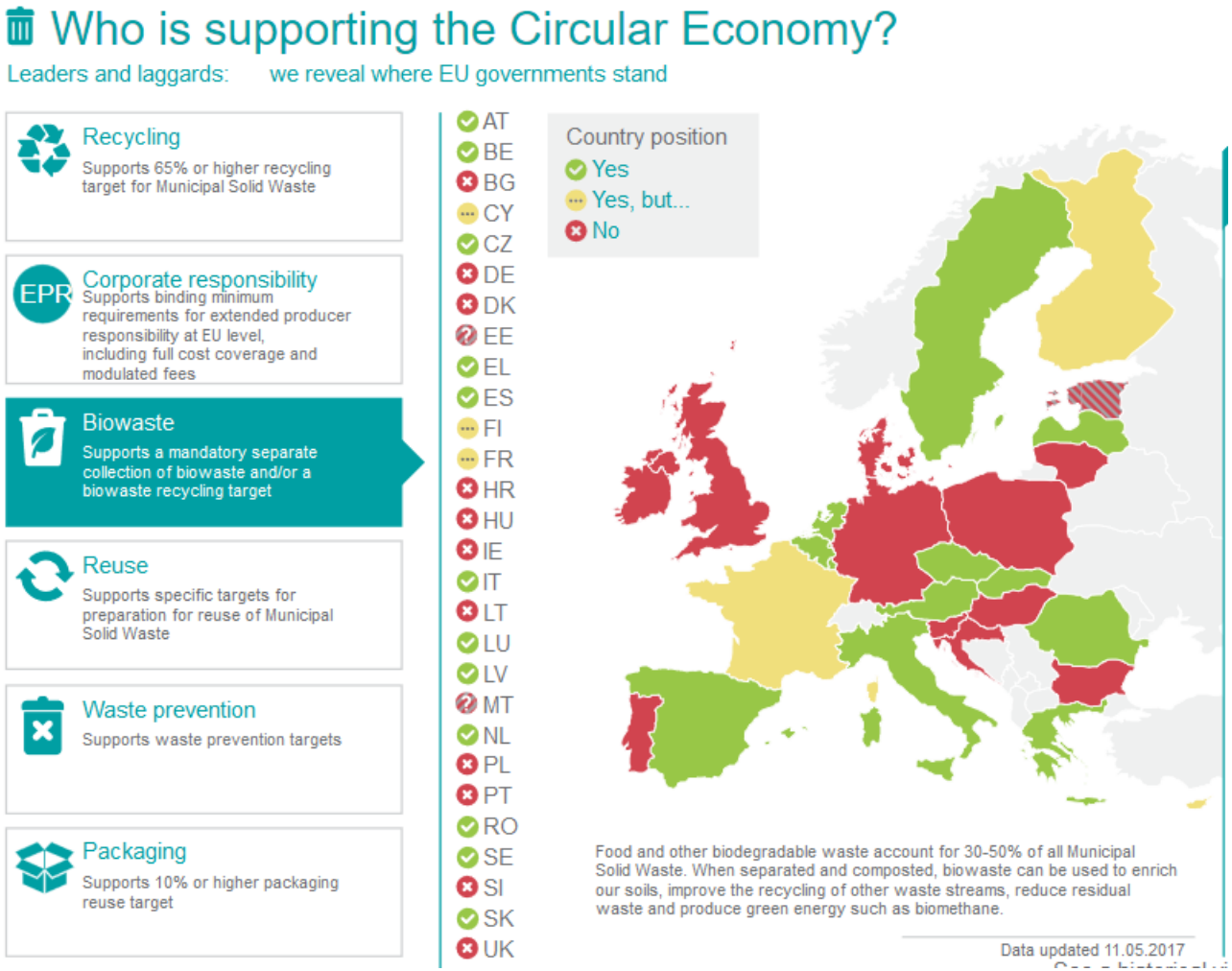
WHY BIOWASTE

Separate Collection of Biowaste in Europe



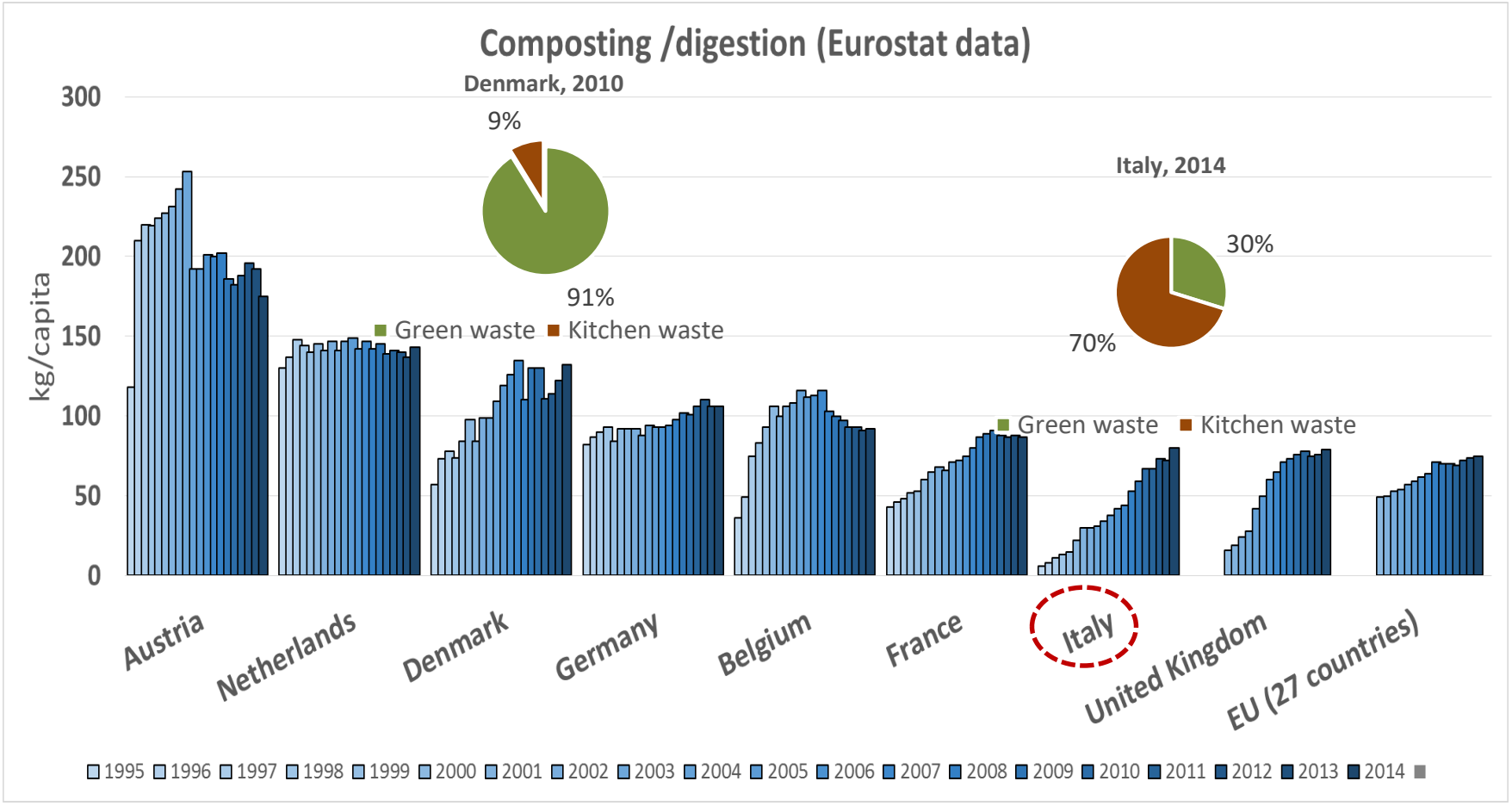
Source: ECN, 2017

Leaders and laggards



- Source EEB, updated May 17

Eurostat: biowaste treatment (composting / AD)



Just food waste separately collected

www.compost.it

CIC elaborations, 2016

Highest share in MSW

- Food waste (excluding garden waste) represents about 45% of municipal waste of domestic generators

Source: Agència de Residus de Catalunya, link

Biowaste

- Represents the highest share in MSW recyclables -> **has to be collected** to achive high recycling targets!
- Does not benefit from EPR schemes -> **has to be supported**
- Generates the highest environmental impact when landfilled -> **has to be diverted**

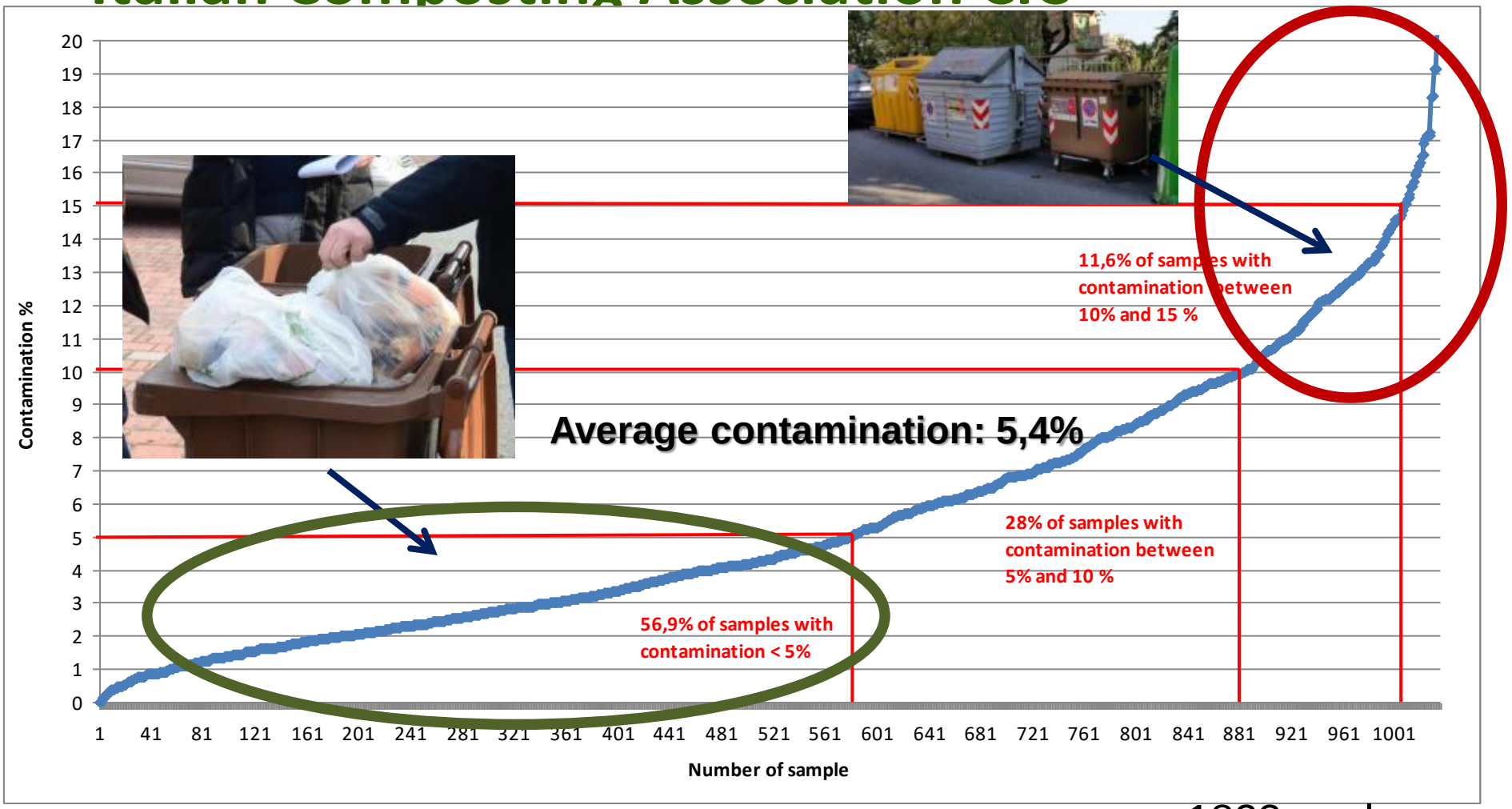
TECHNICALLY PRACTICABLE?

Biowaste collection: key elements

Food waste: the easiest path from the kitchen to the bin

Pictures: M. Giavini and Novamont

Quality: characterizations performed by the Italian Composting Association CIC

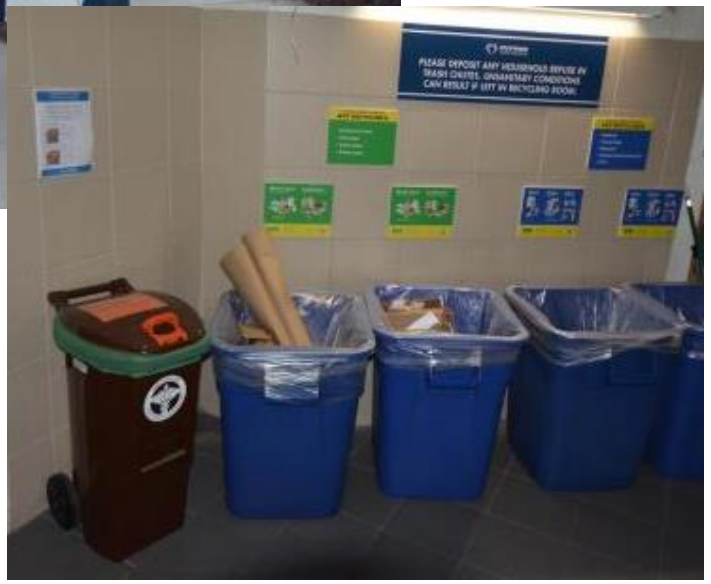


- 1823 analyses

Dense areas / large cities

- Munich
- Milan
- Ljubljiana
- More coming (Madrid, Paris)
- (CH: Geneve)

New York, 2017



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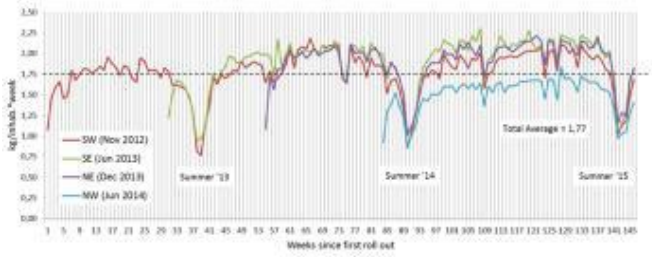
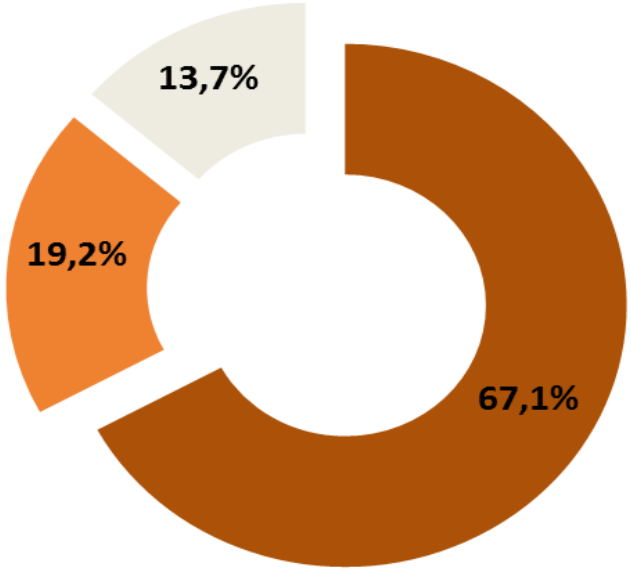
Food waste collection programme in Milan: summary results



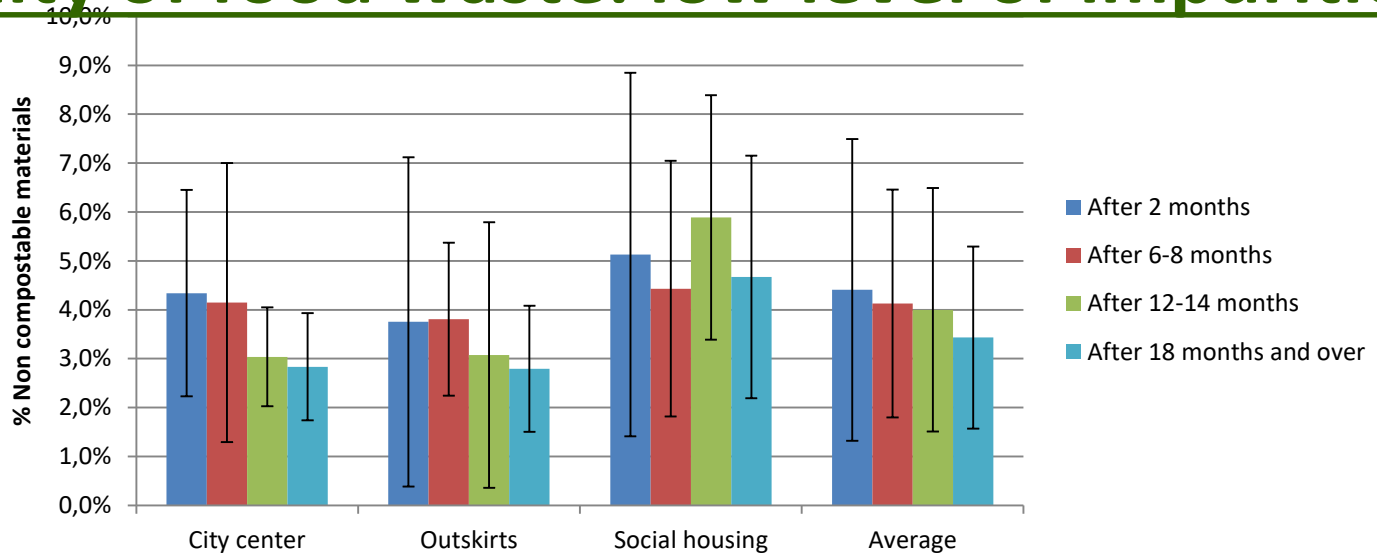
- Commercial and households food waste collection→ **103 kg/capita/yr**

- **Purity of foodwaste** from sep. collection:
  - average **non-compostable content 4.5%**

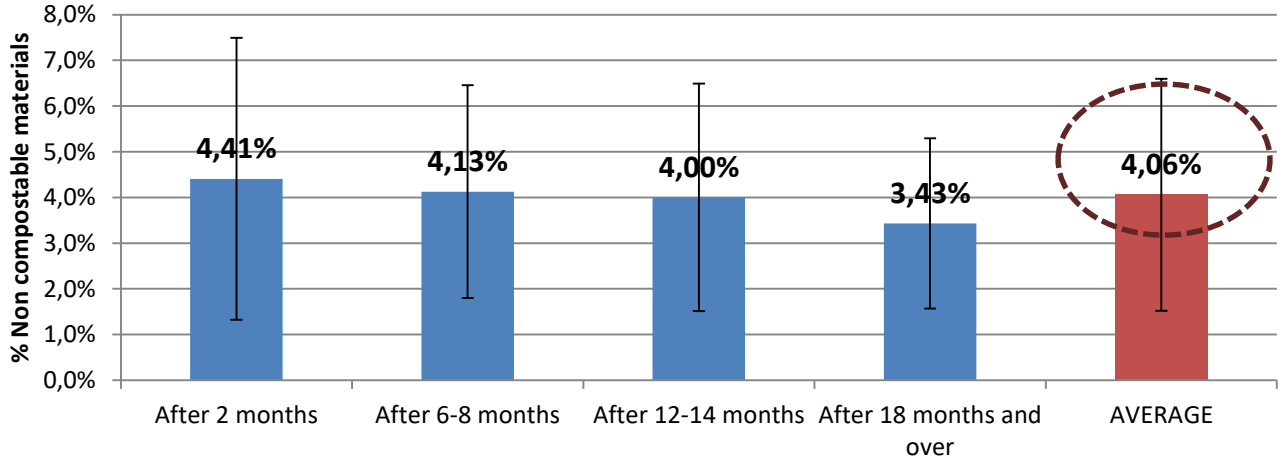
- **Diversion of foodwaste from residual waste**
- About 130,000 t/year of food waste are now collected separately and sent to AD for organic recycling saving 8,760 t of CO 2 /year**
  - Calculated by CIC, the Italian Composting and Biogas Consortium based on the Defra (UK) tool, 2011



Quality of food waste: low level of impurities



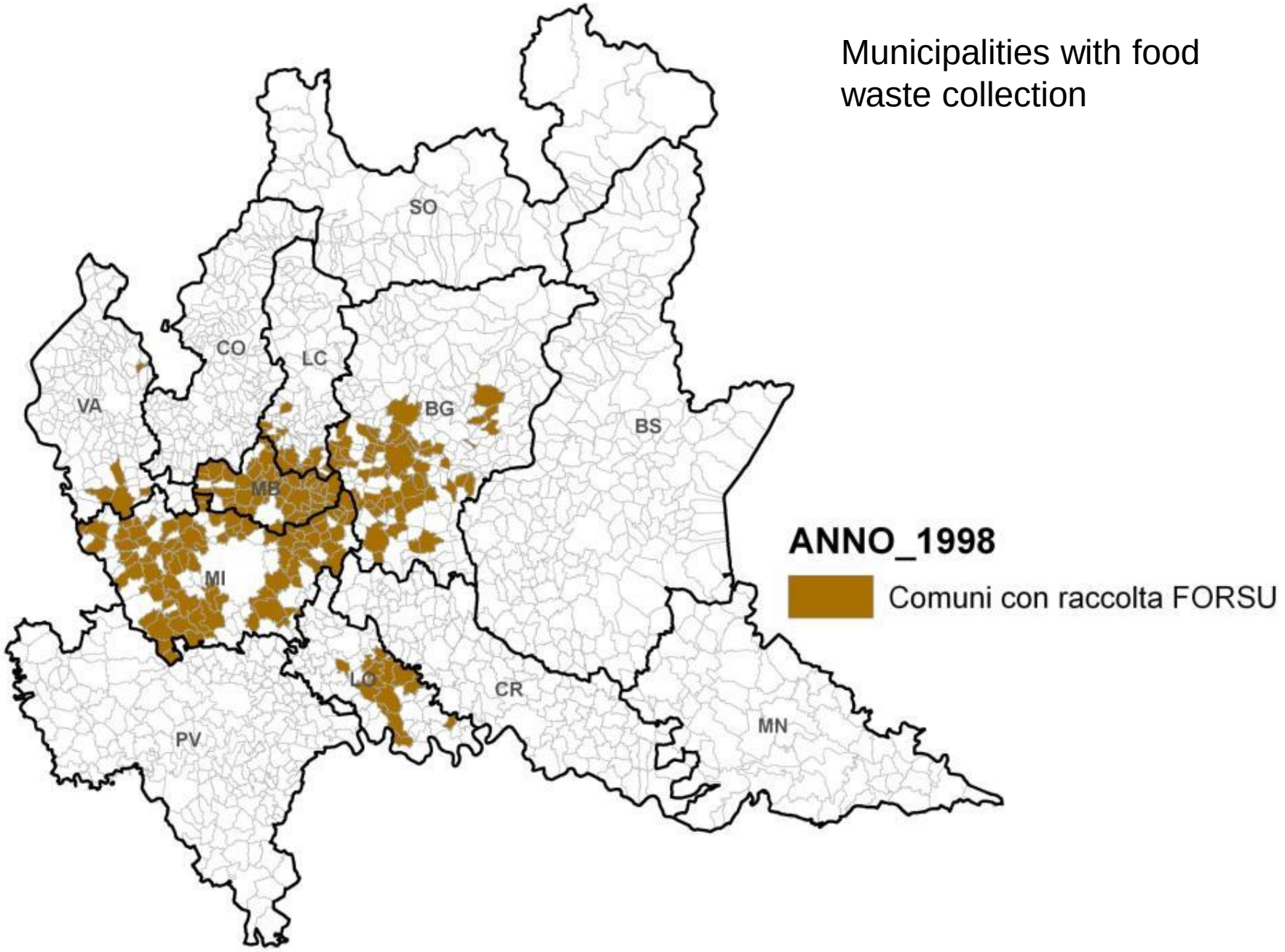
Non compostable materials - average trend



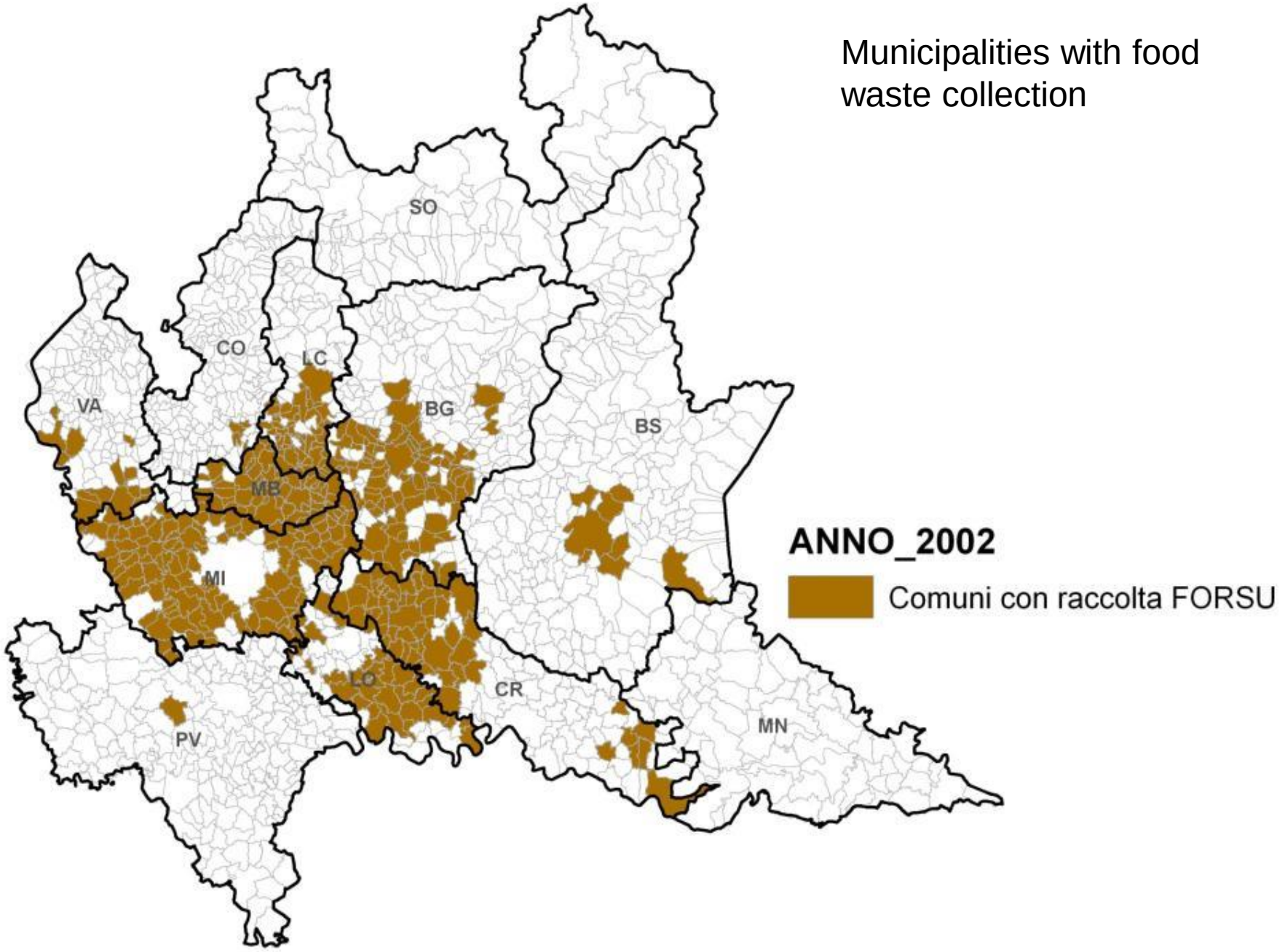
Source: analyses performed by CIC for AMSA / Novamont

DOMINO EFFECT: FOOD WASTE COLLECTION IN LOMBARDY

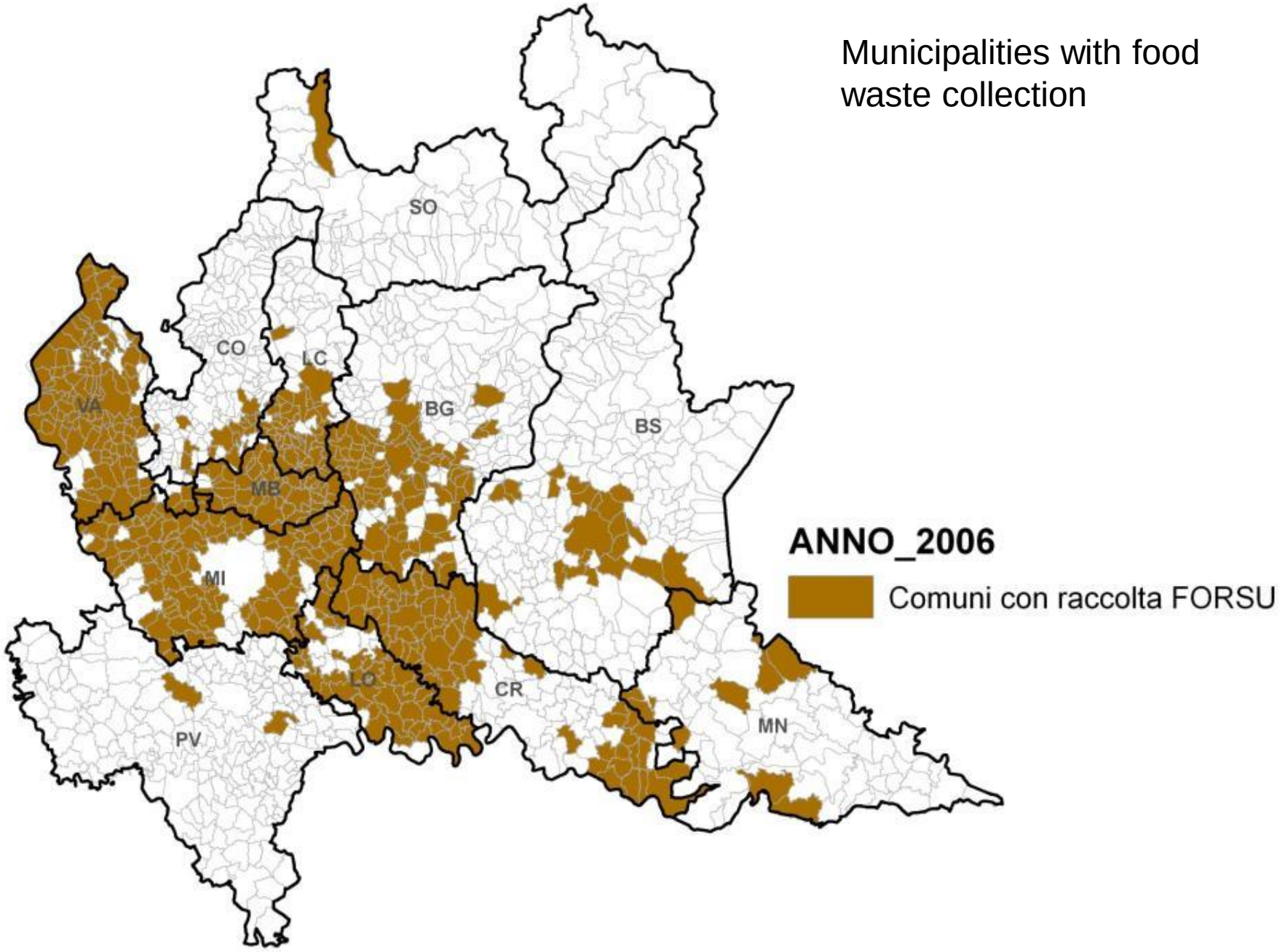
Municipalities with food waste collection



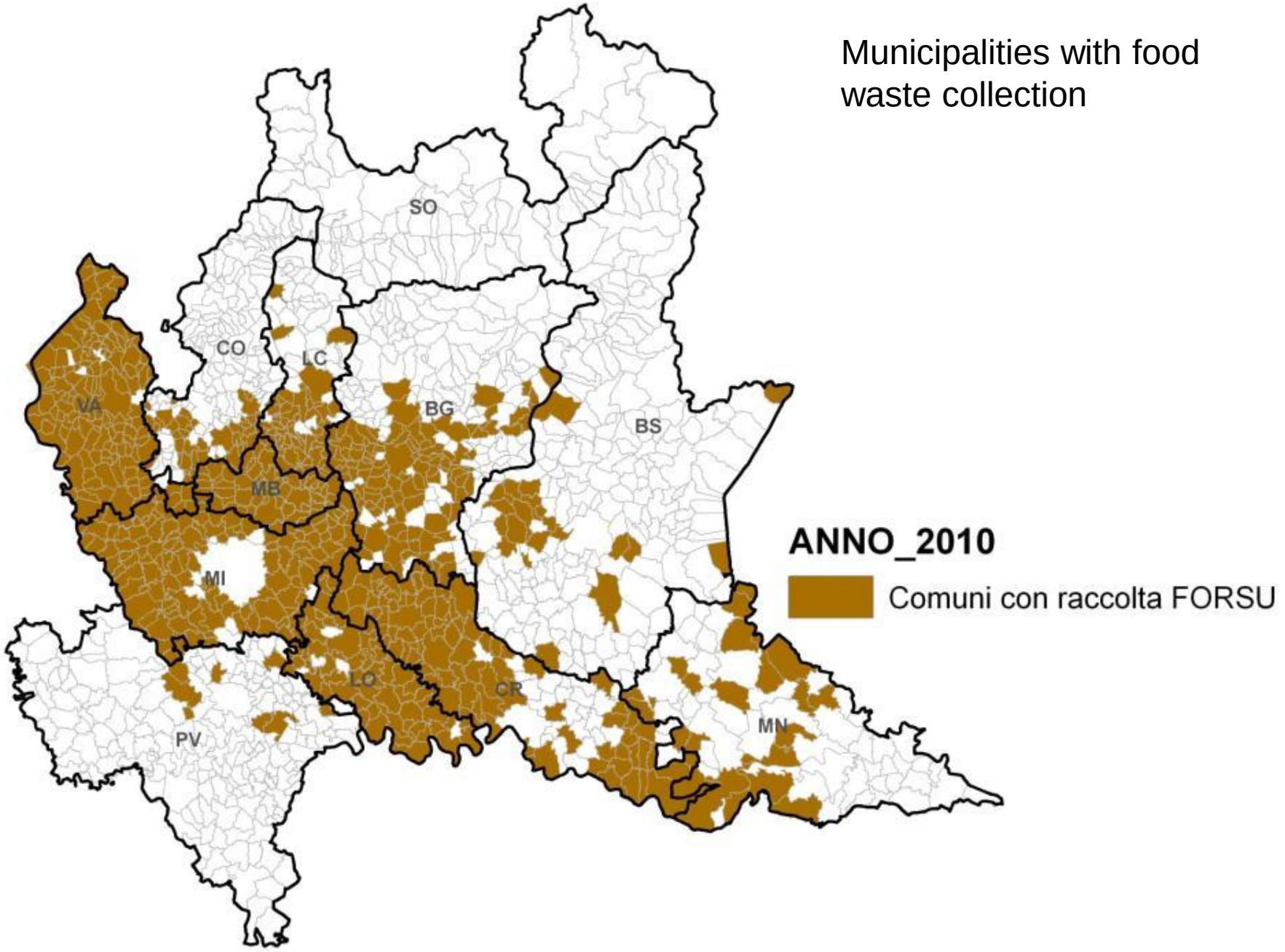
Municipalities with food waste collection



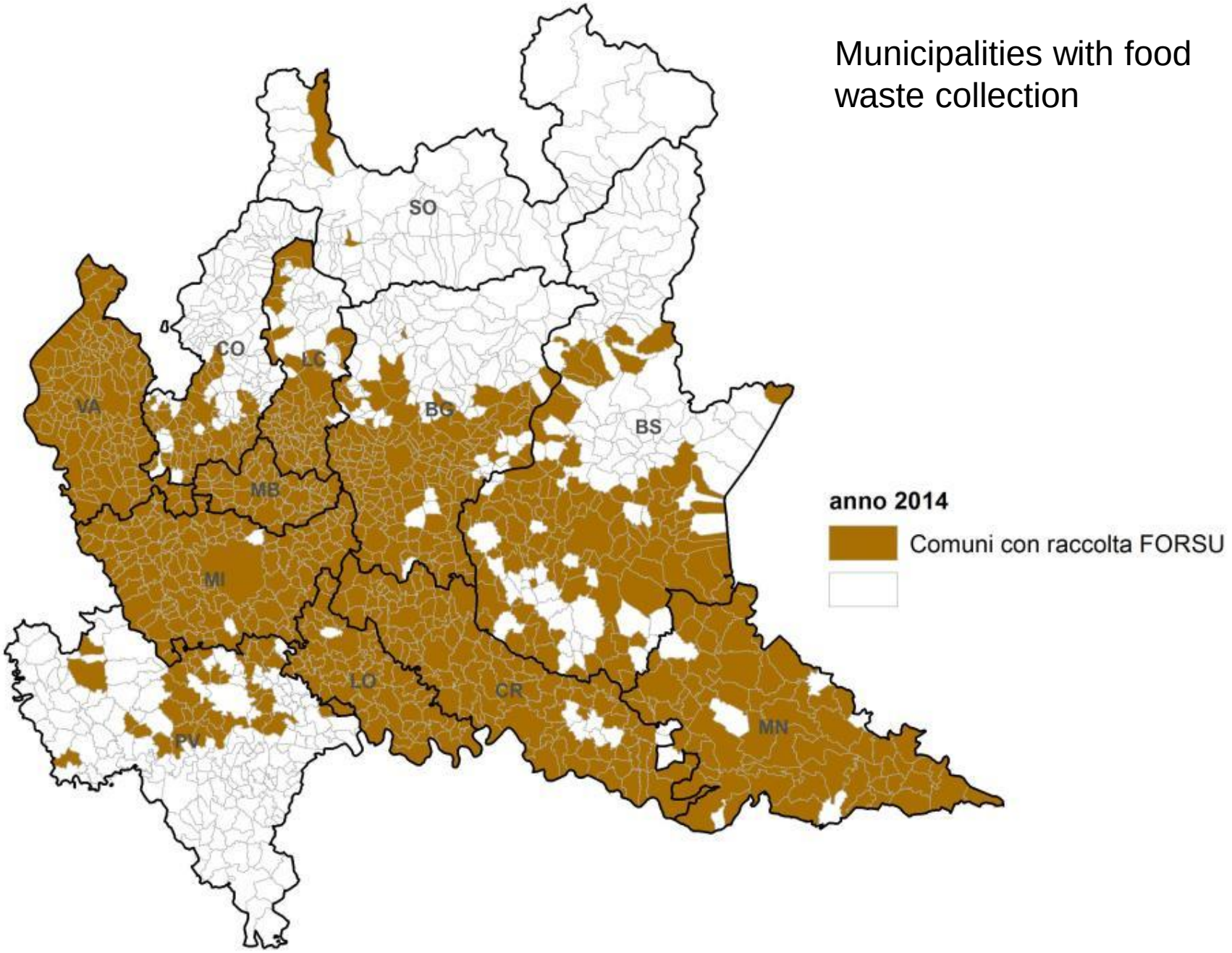
Municipalities with food waste collection



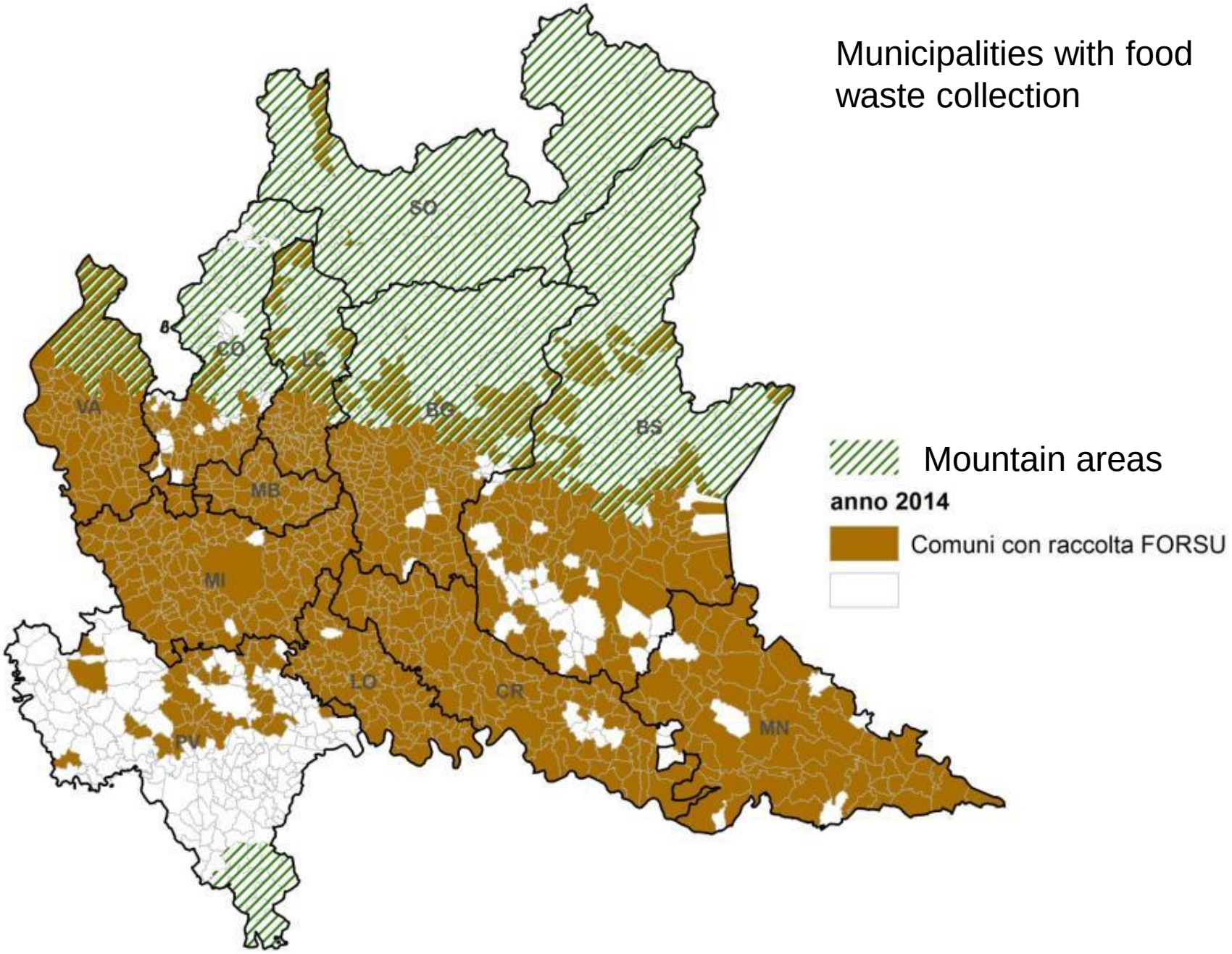
Municipalities with food waste collection



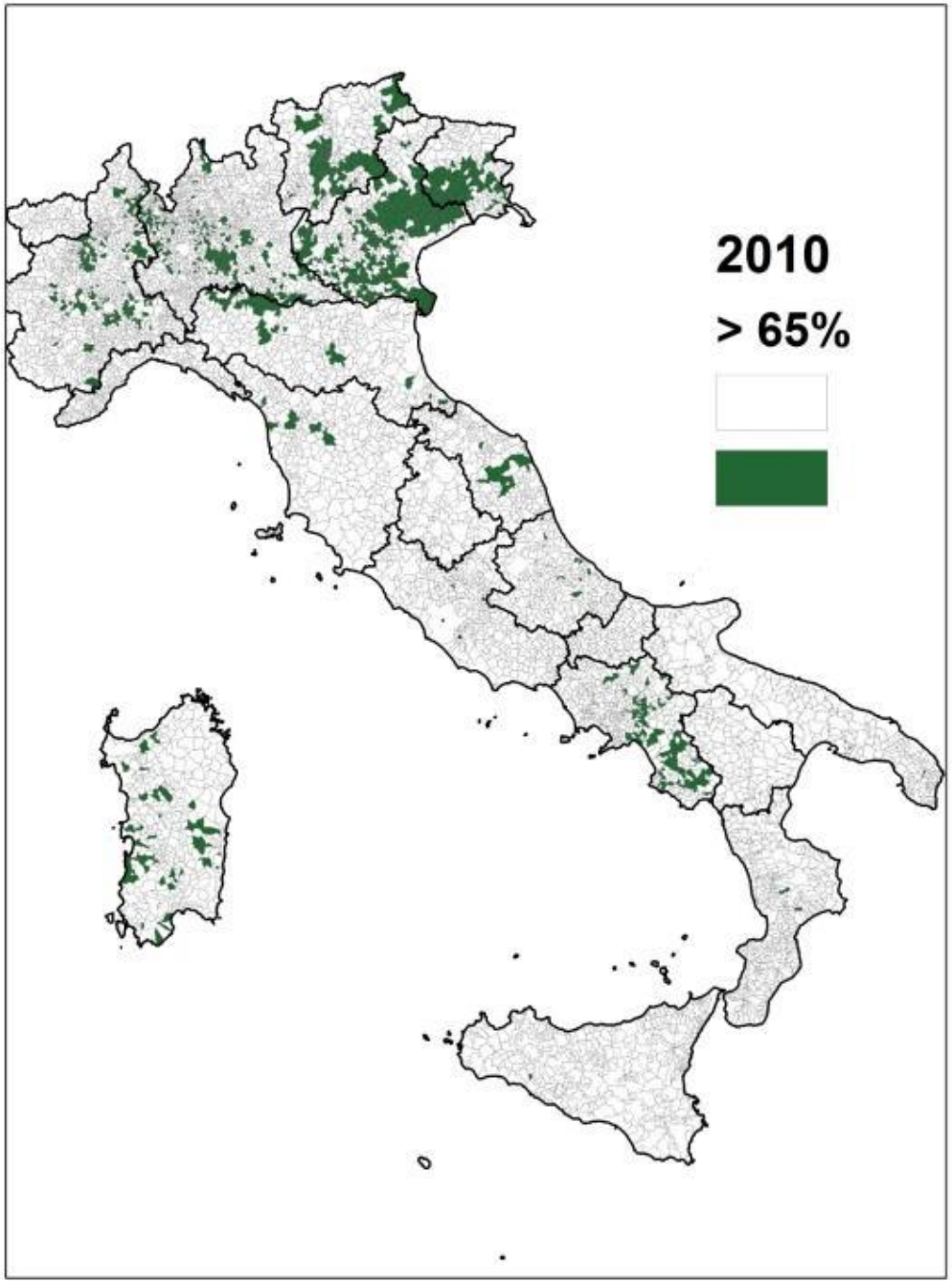
Municipalities with food waste collection



Municipalities with food waste collection



Frontrunners and replication effect



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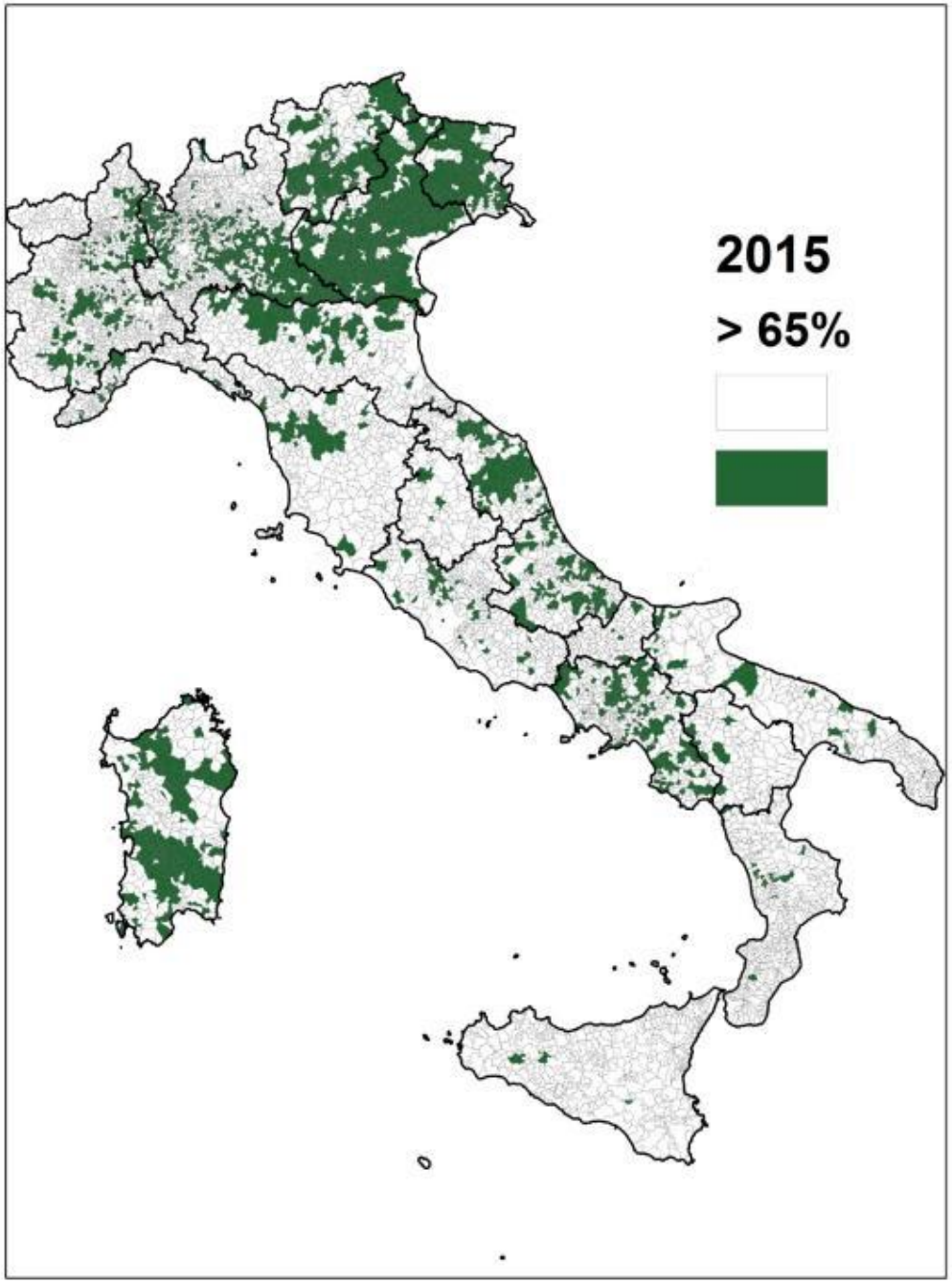

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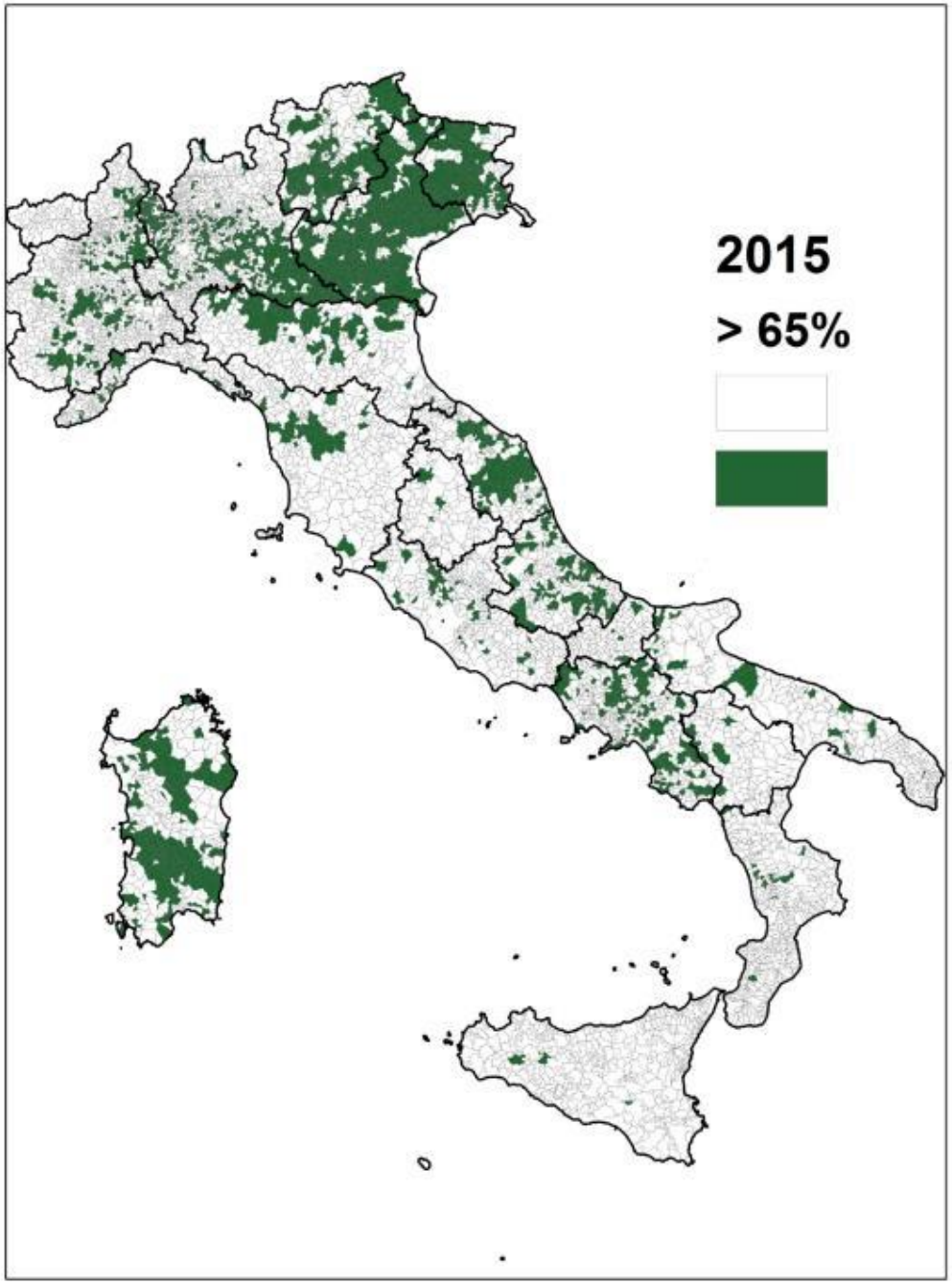
- At least one best practice in each Region!
- -> High recycling (with biowaste collection) is possible **everywhere**
- Rely on and support the **frontrunners**



Optimization tools for rural areas

- Light trucks with splitted tank for the collection of food waste and residual waste at the same time

Optimize transportation with low cost transfer stations

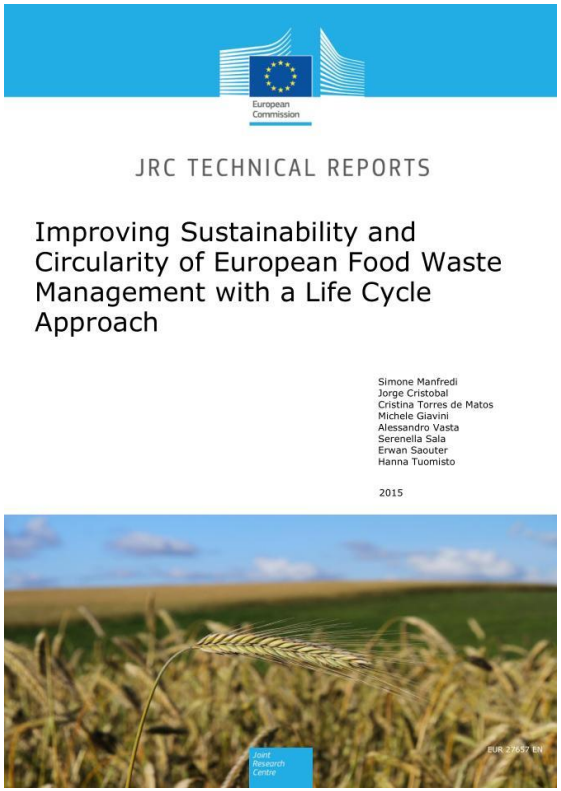
Contarina (IT)

Other options for rural areas: community composting / micro scale plants

- Effective way to engage people
- Be careful to ensure high participation (> 60%)
- Higher sense of civic duty needed (low impuritiy level)
- Avoid **expensive** machinery with **low participation**

ENVIRONMENTALLY PRACTICABLE?

Many studies published



Simone Manfredi
Jorge Cristobal
Cristina Torres de Matos
Michele Giavini
Alessandro Vasta
Serenella Sala
Erwan Saouter
Hanna Tuomisto

2015

Link:
http://publications.jrc.ec.europa.eu/repository/bitstream/JRC99238/lbna27657enn.pdf

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eunomia
research & consulting

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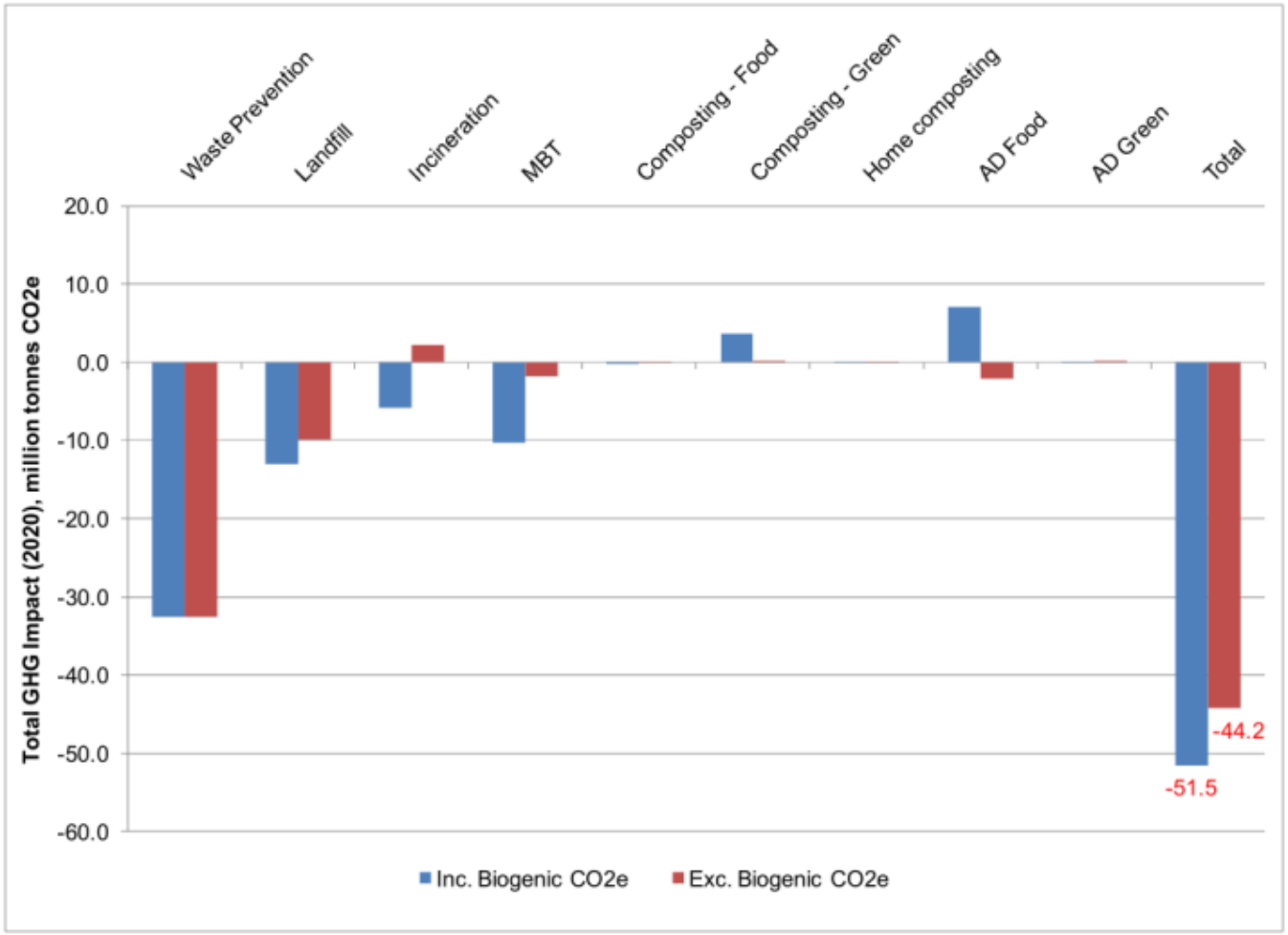
Link:
http://ec.europa.eu/environment/waste/compost/pdf/ia_biowaste%20-%20final%20report.pdf

EC assessment Arcadis-Eunomia, 2009

Table 9-4: Key Assumptions Underpinning Scenario 2a

	Key Assumptions
Scenario 2a	• 7.5% waste prevention of biowaste arisings • 60% food waste capture by 2020 • 90% garden waste capture by 2020 • **Food waste treated by option with best greenhouse gas emissions outcome for each country**

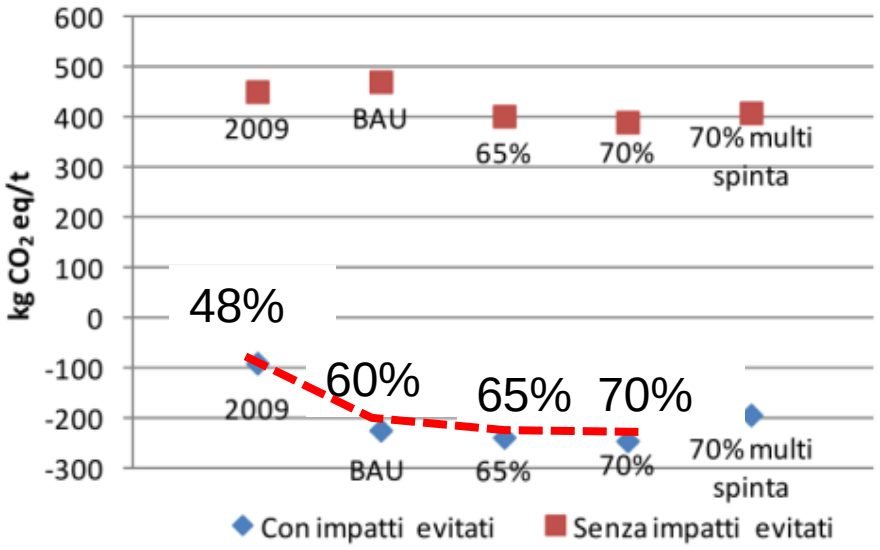
Figure 9-14: Total Greenhouse Gas Implications of Scenario 2a for the Year 2020 (Including & Excluding Biogenic CO_2 eq Impacts)



New Lombardy Waste Management Plan

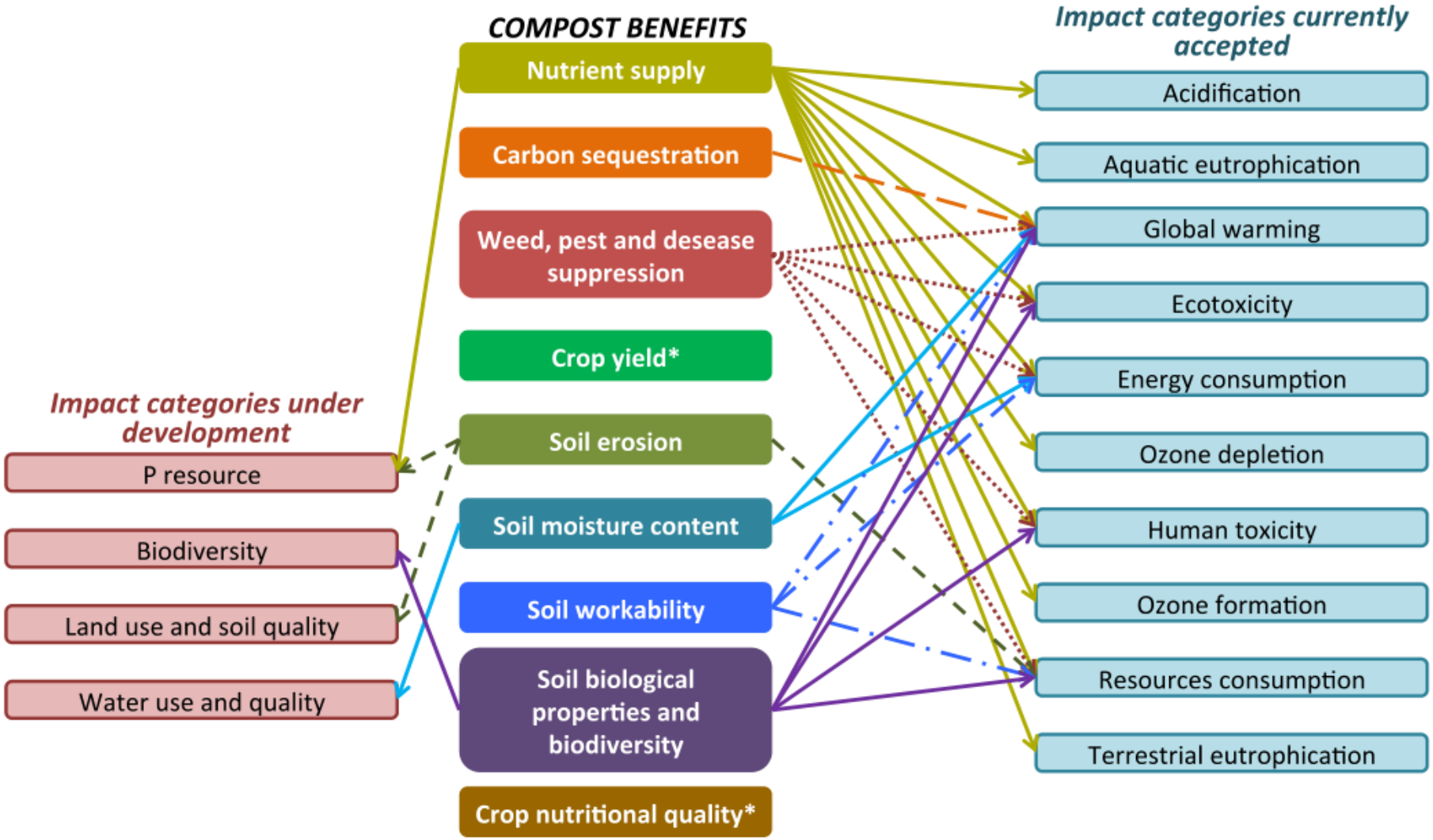
- High recycling, with more than 65% separate collection (including biowaste) leads to higher environmental benefit

Global warming potential



Environmental benefits

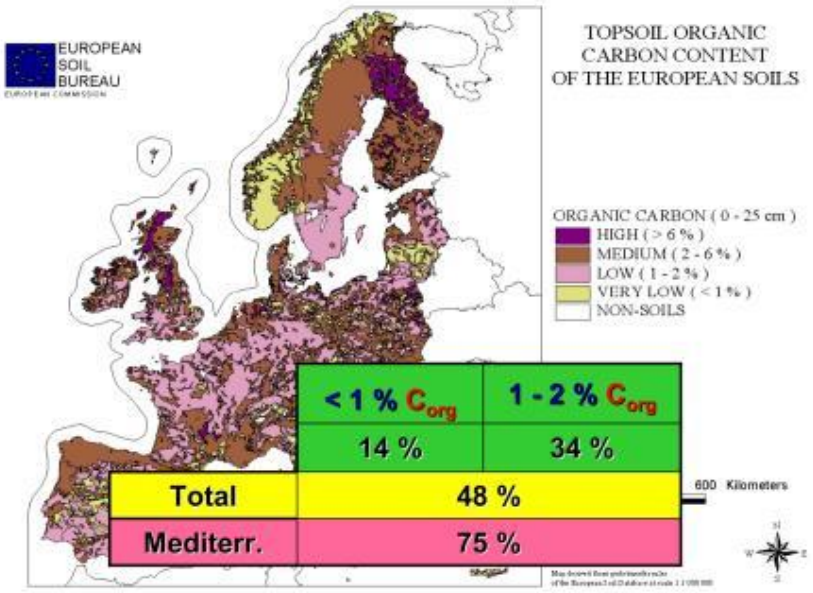
- Anaerobic digestion probably qualifies as the most preferable option
- Compost used as a substitute of mineral fertilizers and peats brings benefits. However, without AD, composting can be in some cases energy intensive
- **Do not neglect additional benefits** (soil porosity, water retention etc.): need for research / better estimations



From: C. Lazcano et al. Environmental benefits of compost use on land through LCA – a review of the current gaps, 2014, link

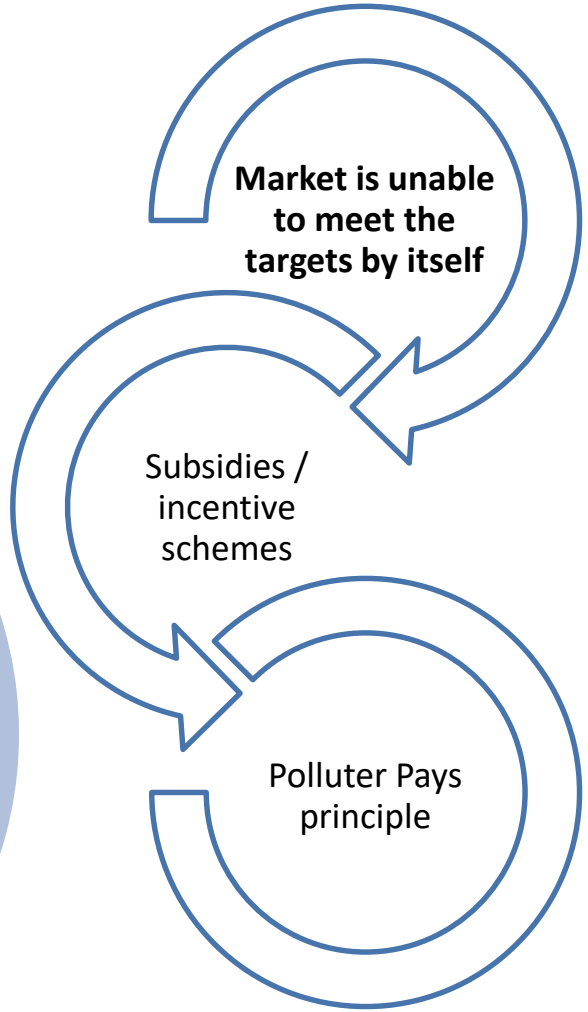
Carbon sink

- a quick calculation (Favoino, 2008): overall yearly CO2 emissions from a whole nation as Italy (541.542 Gg CO2 7 year) can be equaled by a lock-up of just 0,14% organic carbon in soils.



ECONOMICALLY PRACTICABLE?

Practicable / unpracticable (if not supported …)



Example: EPR on packaging

- Packaging: Average fees charged to producers range from 14 €/t to 200 €/t, average of 92 €/t
- Results: Best performing ≠ most expensive schemes

Figure 6: Cost effectiveness of EPR schemes for packaging (2010 or 2011)

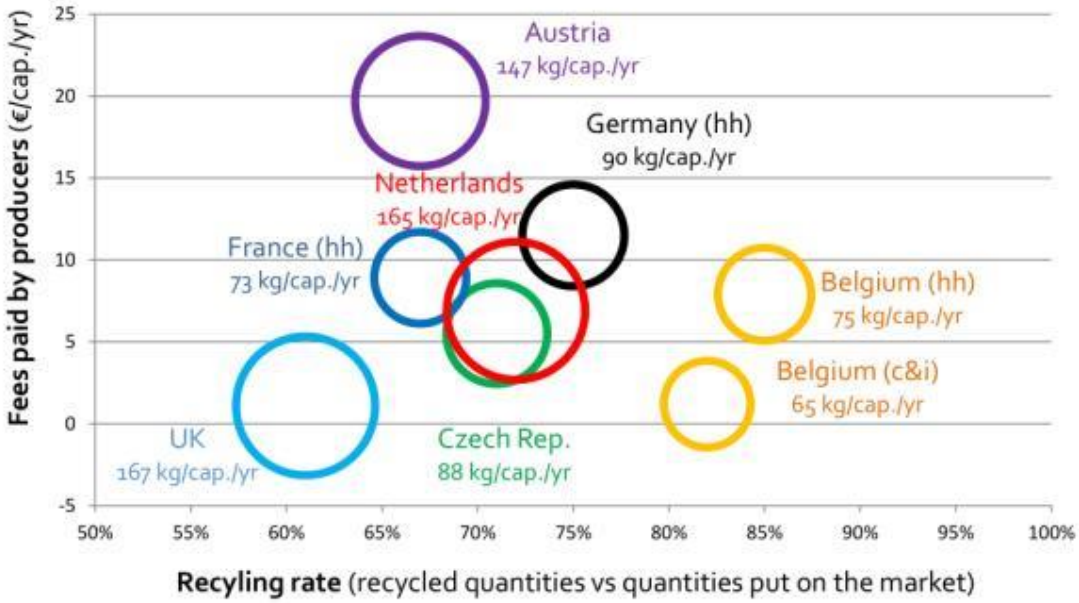
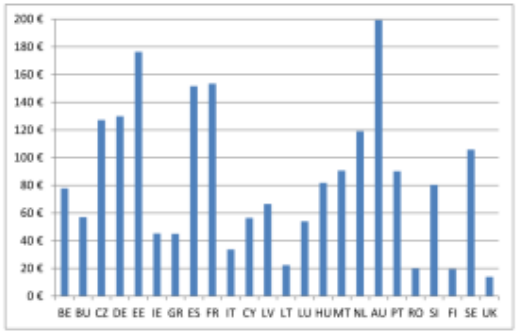


Figure 11: Average fee charged to producers per tonne of household packaging put on the market[30]



Source: Guidance on EPR, BIO/EC, 2014

Biowaste and economics

- Collecting biowaste is cheaper than collecting packaging, but:
  - Not subsidized with EPR
  - Alternatives?
    - Landfill tax (combined with a return scheme, see Catalonia)
    - Subsidies on biogas from food waste AD
    - Incentives on compost use
    - Carbon credits?

Source: Utilitalia, 2016

«Zero cost» incentive schemes

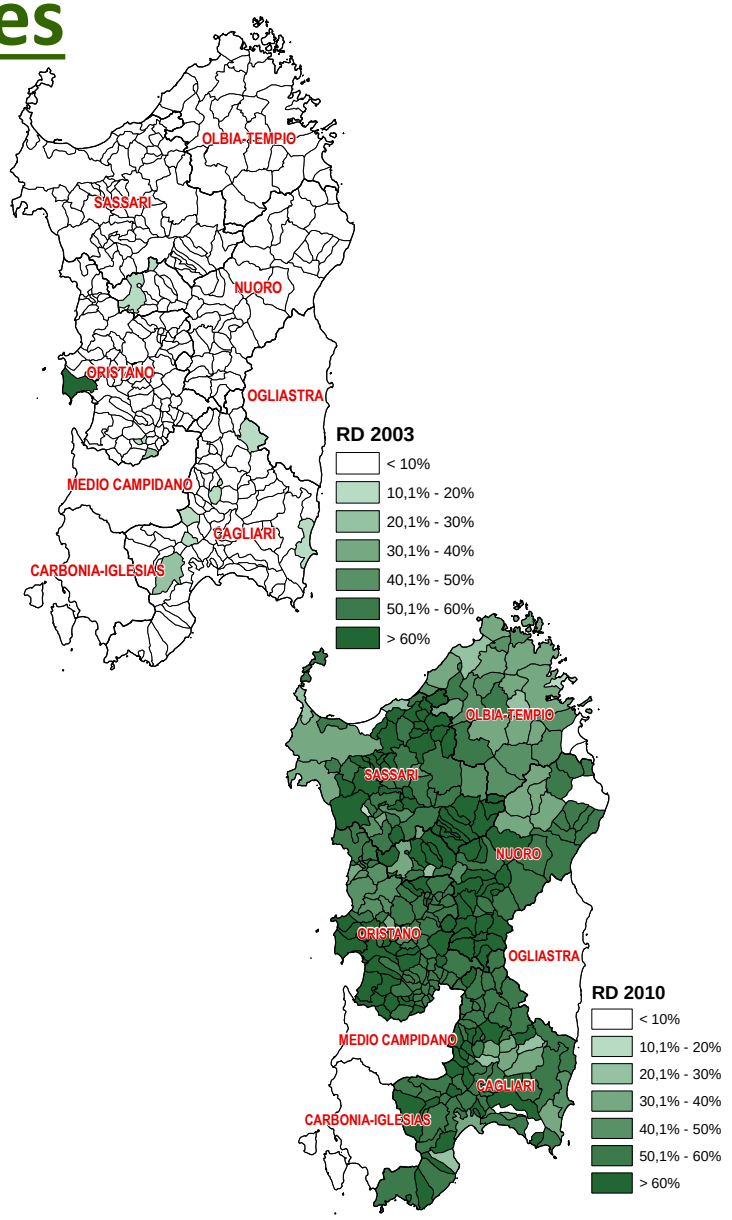
- Sardinia, 2003-2012
- Catalonia, 2004-ongoing

PREVISIÓ DE RETORN DEL CÀNON PEL 2013

INGRÉS *	Tn	Import unit. €/tn	Ingrés cànon €	% total
Residus Municipals Deposició	1.870.008	12,7	23.749.102	86,8%
Residus Municipals Incineració	621.751	5,8	3.606.153	13,2%
TOTAL	2.491.759		27.355.255	100,0%

RETORN	Tn	Import unit. €/Tn	Retorn cànon €	% total ingrés
1.1 Tractament de la FORM (gestió) NOVETAT	430.000	34,0	12.721.533	46,5%
1.2 Caracteritzacions i analítiques			635.000	2,3%
1.3. Optimització i millores de procés de plantes			1.000.000	3,7%
2.1. Reducció rebuig dipòsit controlat	690.000	4,0	2.760.000	10,1%
2.2 Reducció rebuig valorització energètica	220.000	1,5	330.000	1,2%
3. Impuls i comercialització del compost NOVETAT	70.000	4,5	315.000	1,2%
4. Tractament de la fracció vegetal	60.000	2,5	150.000	0,5%
Subtotal Tractament FORM			**17.911.533**	**65,5%**
5. Recollida selectiva FORM	430.000	9,0	5.471.956	20,0%
6. Recollida selectiva del paper i cartró	240.000	2,0	480.000	1,8%
7. Gestió residus especials a les deixalleries	3.000	700	2.100.000	7,7%
8. Autocompostatge NOVETAT			197.555	0,7%
9. Foment de la bossa compostable	20.000	5,0	100.000	0,4%
10. Despeses de gestió ARC			1.094.210	4,0%
Subtotal Recollides i Altres			**9.443.722**	**34,5%**
TOTAL			27.355.255	100,0%

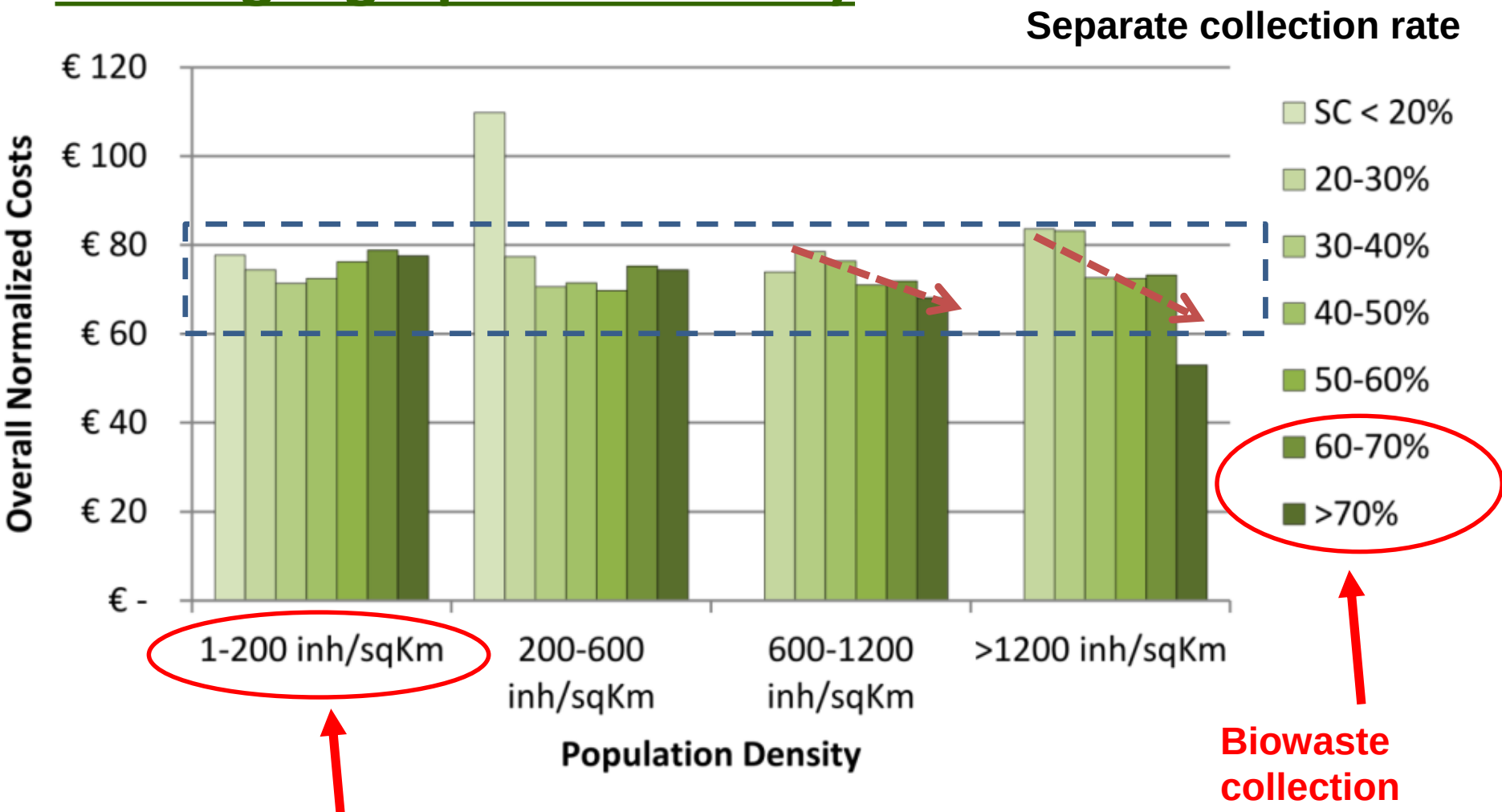
* El nou import del cànon sobre la disposició del rebuig dels residus municipals per l'any 2013 serà d'aplicació en el moment d'aprovació de la nova Llei de mesures fiscals i financeres. Mentre no s'aprovi la nova Llei, seran d'aplicació els imports definits en la Llei 5/2012, de 20 de març, de mesures fiscals, financeres i administratives de 12,4 i 5,7 €/tn per dipòsit i incineració respectivament.



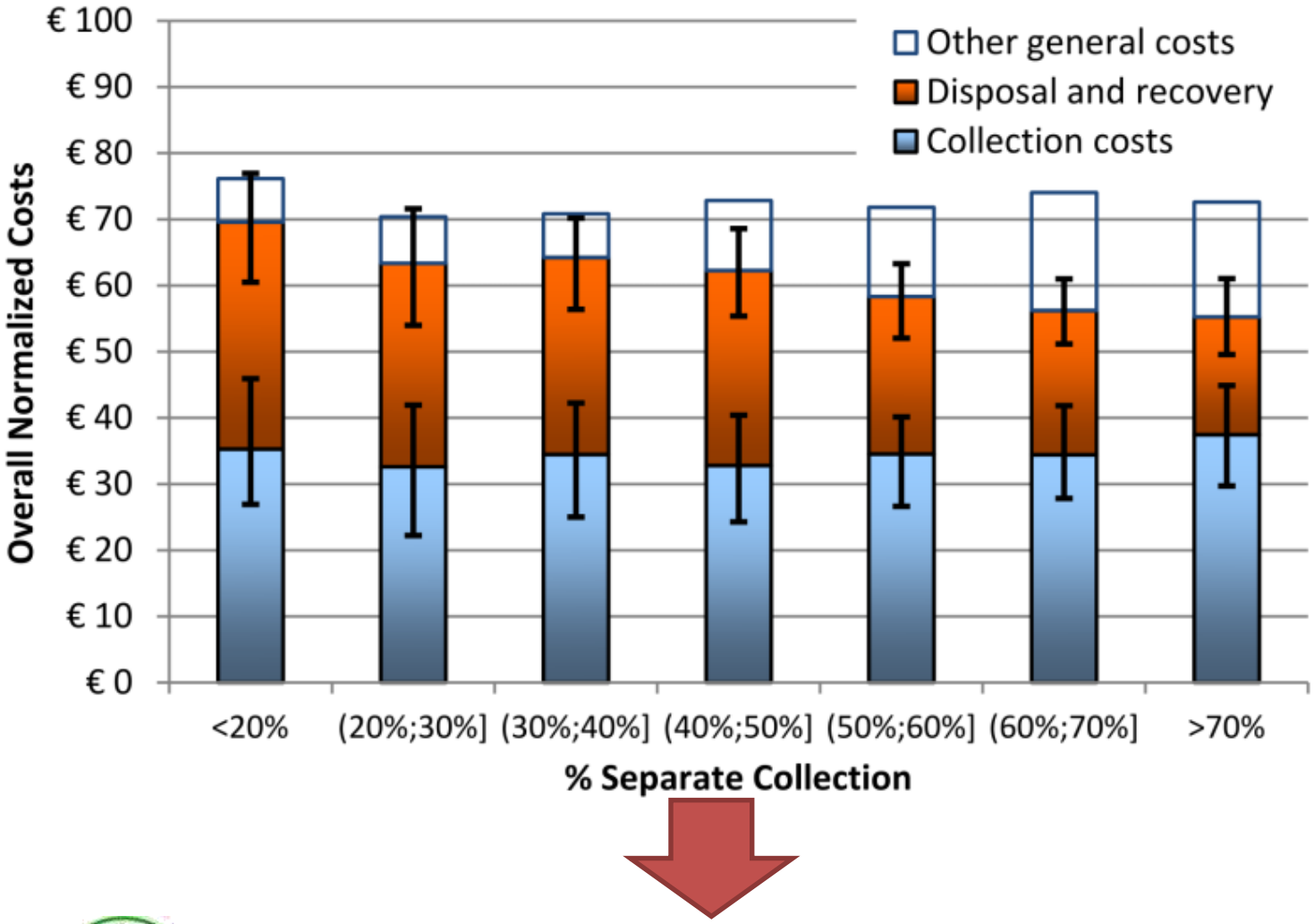
Economics: be careful when comparing data

- Compare the overall scheme (collection + treatment, not only collection. €/inhabitant, not €/tonne.
- E.g. Lombardy Region (2010-2014): a new comparison **indicator** was built in order to compare overall costs between **more than 1500 municipalities**, with strong differences in:
    - Collection schemes (e.g. road containers, kerbside)
    - Tourism
    - Presence of non domestic activities producing waste accounted into the urban waste stream
    - Population
    - Population density
    - Waste from road cleaning activities

Costs: geographic variability



Lombardy, overall costs: Low vs. high recycling

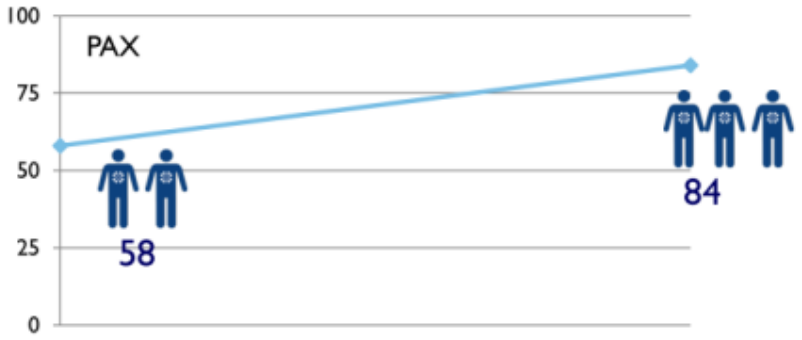


Higher recycling (including biowaste) does not lead to higher costs

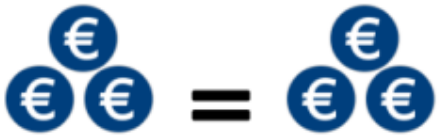
Additional benefits: green jobs

‘Green jobs’ means growth

Contarina Staff



Total costs
(management + disposal)



Waste quality

Source Contarina (IT), 2014

Additional benefits: The value of compost

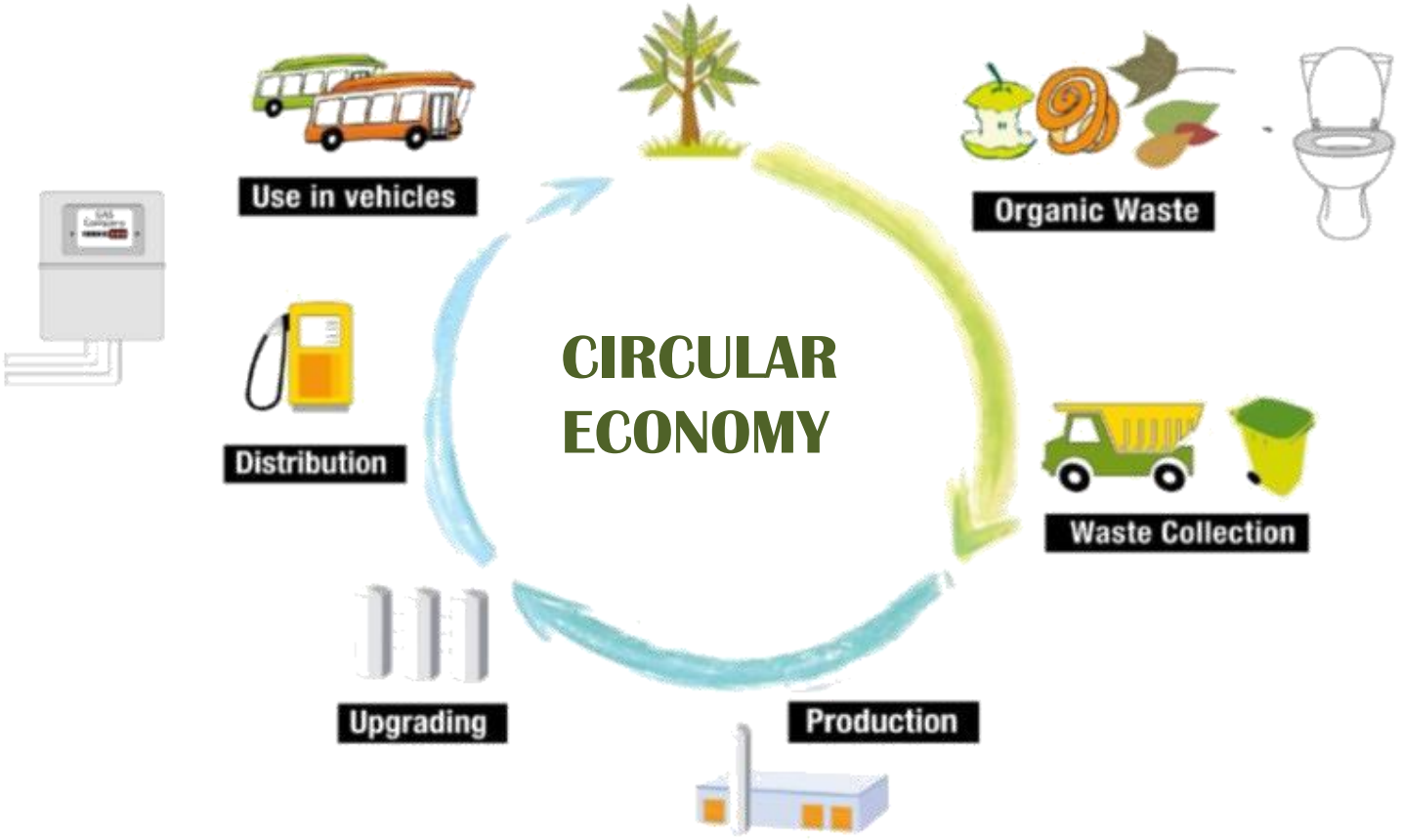
- Substitution value of mineral fertilizers
  - €/kg: N = 0,64 , P_2O_5 = 0,55 , K_2O= 0,67, CaO = 0,07; Humus-C : 0,17 (*)
- Currently in Italy we are producing 1,500,000 t/y of compost: substitution value **€ 21,000,000 / year**;
- the value of humic Carbon for the soil accounts at least for **another €20,000,000/year**

27 € / t «not considered»

*(Monetary assessment of plant nutrients and organic substances in RAL-quality assured compost and digestion products)

Additional benefits: food waste -> biomethane for transportation

- Biomethane genarated from food waste is potentially sufficient to fuel ALL waste collection vehicles (for all waste fractions)

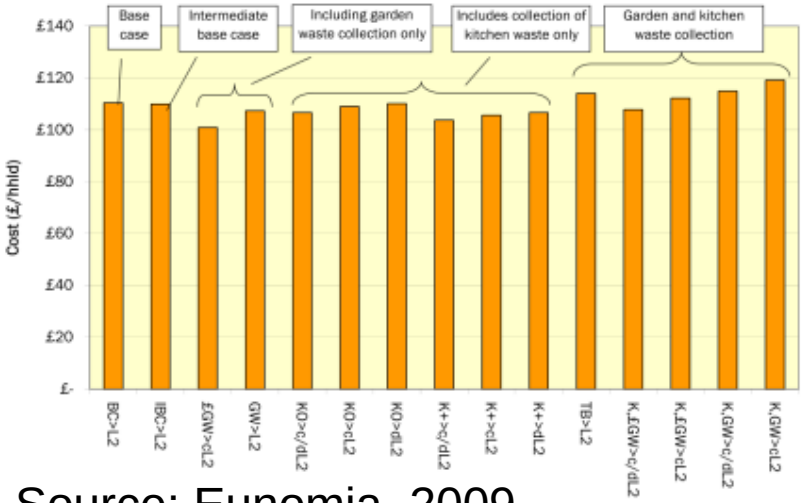


Biowaste collection and cost saving

- A lot of optimizations allow to **keep overall costs low**:
  - Focus on **kitchen waste**, avoid intensive garden waste collection
  - **Light vehicles**, driver only, bi-compartment, door to door
  - Use low cost **transfer stations** in rural areas
  - **Reduce collection frequencies** of residual waste to a minimum (alternate weekly) and adapt those of food waste to seasonality

Picture M. Giavini

Figure 2: Updated Results Summary



Source: Eunomia, 2009

Conclusions

- TEEP in Article 22 ‘Member States shall ensure separate collection where technically, environmentally and economically practicable and appropriate’ leaves too much room for interpretation.
- This is not necessary, as experience across Europe shows that separate collection of biowaste is feasible in both urban and rural areas, under various geographic and climatic conditions.
- Capitalize on the experience of the frontrunners relying on the ripple effect pushed by simple incentive schemes -> presentation by F. Giró, ARC Catalonia

Thanks

Michele Giavini
CIC - Consorzio Italiano Compostatori
Italian Compost and Biogas Association
headoffices: via Cavour, 183/A, Rome, Italy
giavini@compost.it
+39 – 02 9501 9471

www.compost.it

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ECN | Biowaste in the Circular Economy

Workshop / Brussels / 6 September 2017

Hosted by

European Committee of the Regions

The contribution of economic tools (landfill & incineration taxes) in promoting the separate collection of biowaste. The experience of Catalonia. 2003-2017

Generalitat de Catalunya

Francesc Giró i Fontanals
Director of Strategic Planning
Waste Agency of Catalonia

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General Information

- **CATALONIA**

  - 948 municipalities
  - 42 small regions
  - 7,522,596 inhabitants
  - 22.2 M tourists (2016)
  - 31.895 km²
  - 27.613 € per capita

Generalitat de Catalunya

- **Catalan Waste Agency**
  - Public Agency depending on the Ministry of Planning & Sustainability (Catalonia Government)
  - Competences on waste management in Catalonia
  - Work areas: planning, legislation, inspection, promotion, subsidies & investment, awareness, etc.
  - Linked to:

ACR+ · European Compost Network ECN (Organic Resources and Biological Treatment) · Ellen MacArthur Foundation (Rethink the future) · MedCompost mediterranean network · EURELCO (European Enhanced Landfill Mining Consortium)

Strategies used to make possible the progress in the field of waste

Separate Collection of Municipal Waste
1993 → 1.4 %
2016 → 38.5 %

BIOWASTE

LEGAL OBLIGATIONS (Laws)

SEPARATE COLLECTION TARGETS (Programmes)

PLANNING THE NET OF INFRASTRUCTURES

ECONOMIC TOOLS

- Economic Support (Subsidies)
- Environmental Taxation
  - Taxes & Taxes Refund
  - Pau as you Throw (PAYT)

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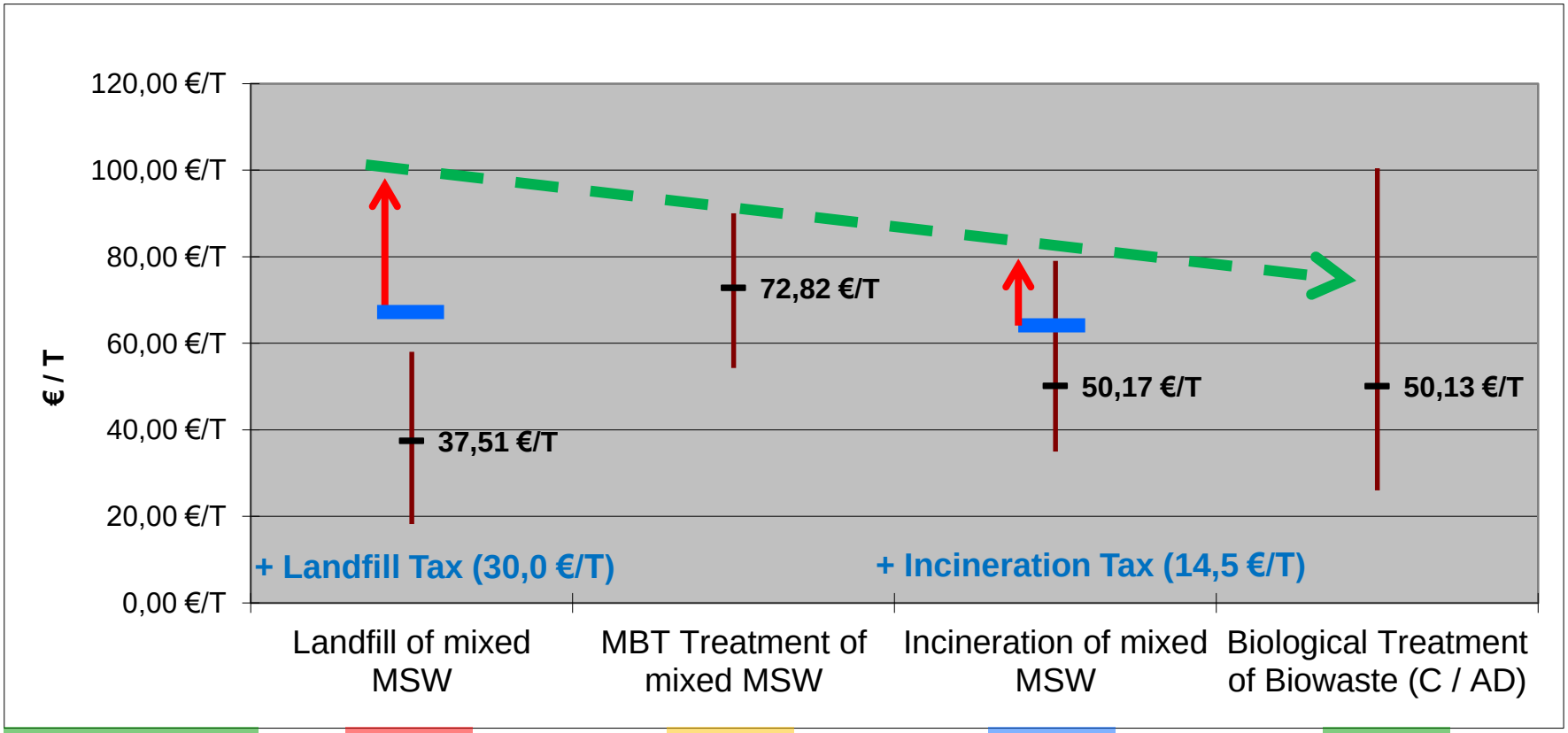
Treatment Fees of different waste management options in Catalonia



Number of Plants 2015	23	12	4	27

Generalitat de Catalunya

The use of Environmental Taxation to Stimulate the Separate Collection

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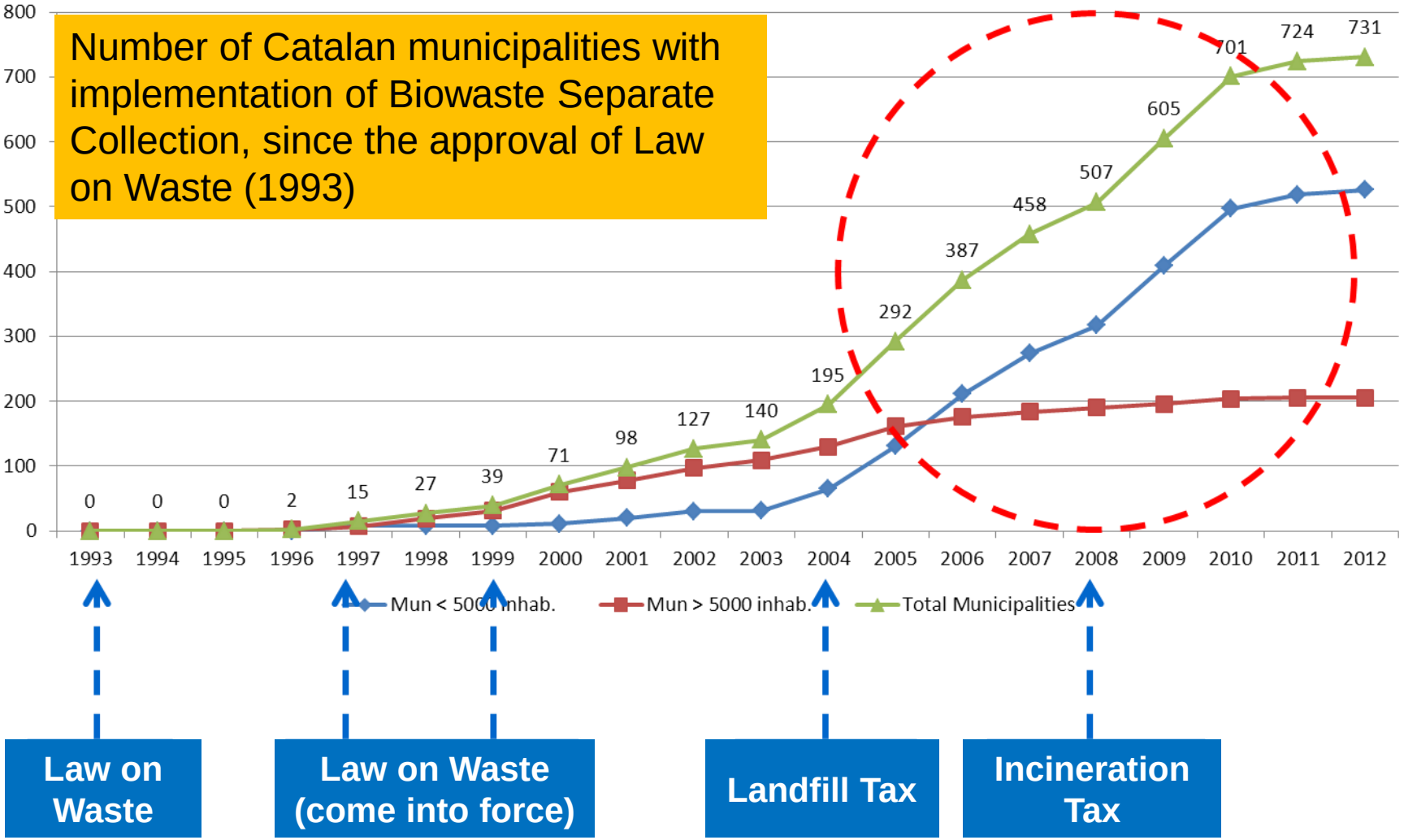
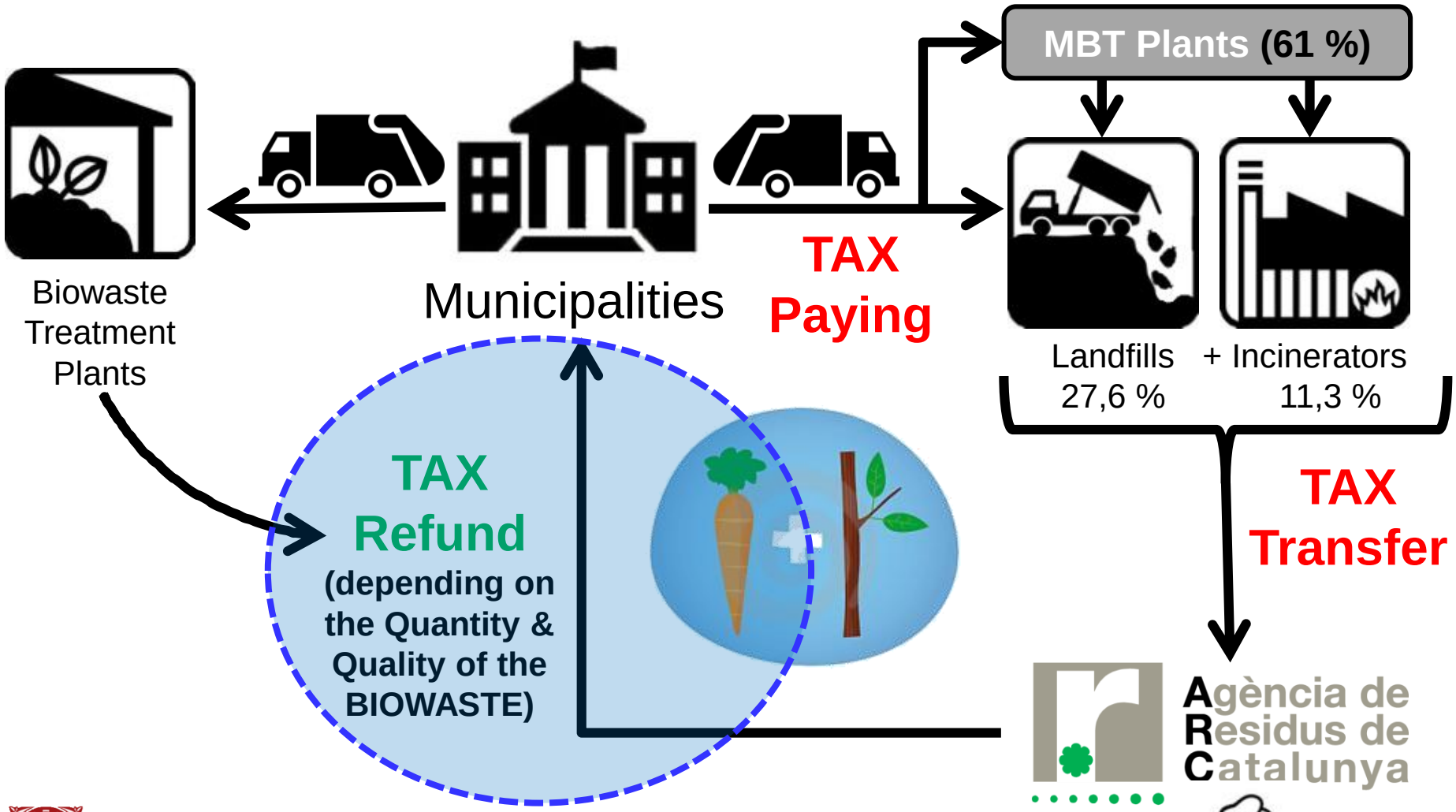
Number of Catalan municipalities with implementation of Biowaste Separate Collection, since the approval of Law on Waste (1993)



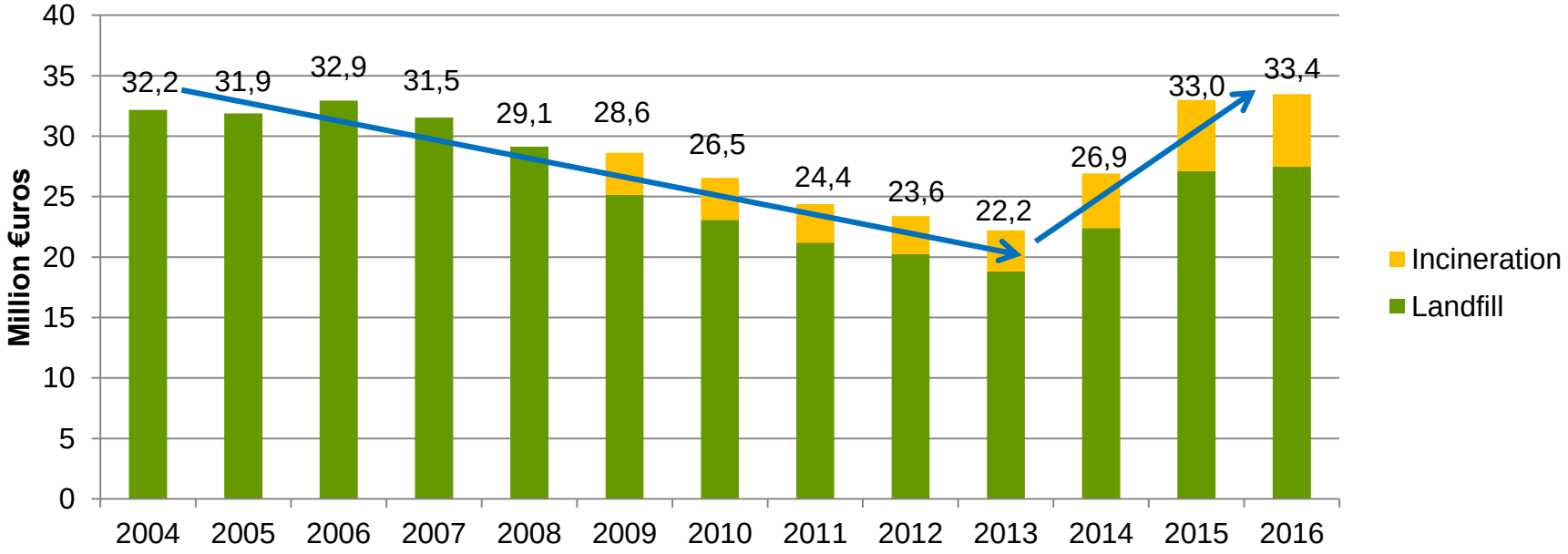
The Sticks & Carrots Strategy. Punishing + Encouraging Policy



Singular Experience in Europe

Evolution of Landfill & Incineration Tax. 2004 - 2016

Tax Rate (€/T)	2004-2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Landfill Tax	10	10	10	12	12,4	12,4	15,8	19,1	19,1	**30,0**
Incinerator Tax	---	5	5	5,5	5,7	5,7	7,4	9,0	9,0	**14,5**



376 M€UR collected since 2004 !

361 M€UR (96%) refunded to muncipalities

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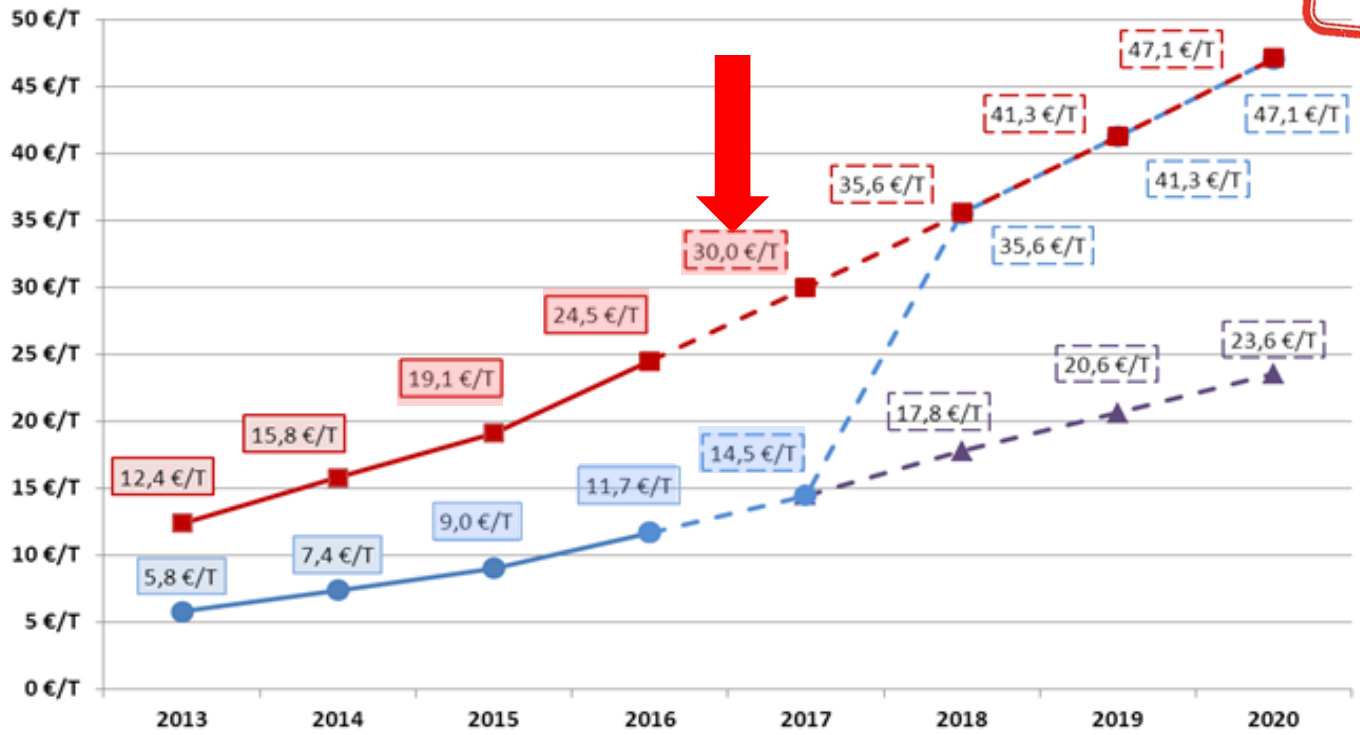
Reactivating the Environmental Taxing to achieve recycling targets

A large agreement has been achieved between ARC & the associations of municipalities for increasing, in a progressive way, the landfill tax up to near 50 €/t and the incineration tax up to near 25 €/T in 2020.

Evolution of Landfill & Incineration Waste Taxing



PASSED

It was approved by the Parliament of Catalonia in March 22nd 2017

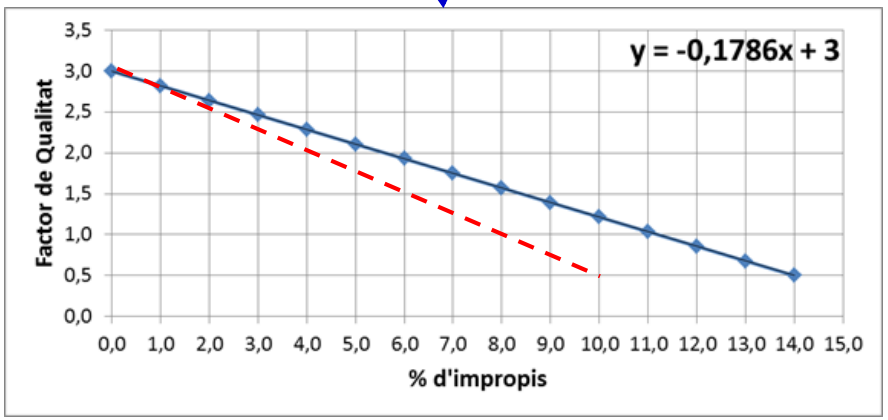
Mechanism of operation of Landfill & Incineration Tax and of Tax Refund

- Tax 30,0 €/T year 2017 (Landfill) (in addition of the fee)
- Tax 14,5 €/T year 2017 (Incineration) (in addition of the fee)

- Guide for local authorities on Law 8/2008, which include the **Criteria for Tax Refund** (yearly reviewed) [2017]:
  - BIOWASTE TREATMENT [34 €/T] (without impurities)
  - BIOWASTE SEPARATE COLLECTION [10 €/T] x f_1 x f_2
  - Quality Factor (f_1)
  - Size Factor (f_2)

Urbana	Semiurbana	Rural
1	1,28	1,5
[a]	[b]	[c]

[a] > 50,000 inhabitants (23)
[b] 5,000 – 50,000 inhabitants (187)
[c] < 5,000 inhabitants (738)



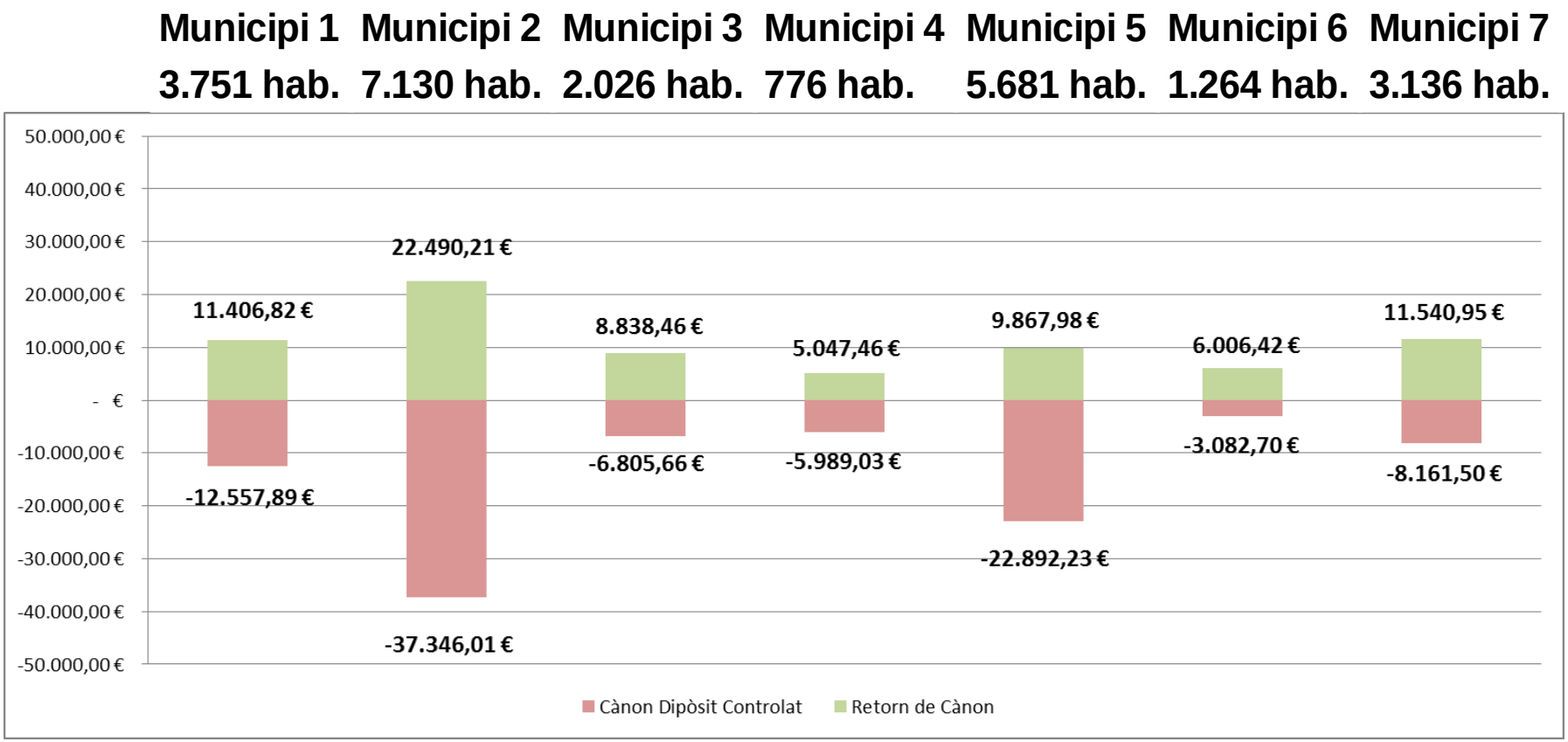
Forecast Balance Income and Returns. Year 2,017

PREVISIÓ DE RETORN DEL CÀNON PEL 2017

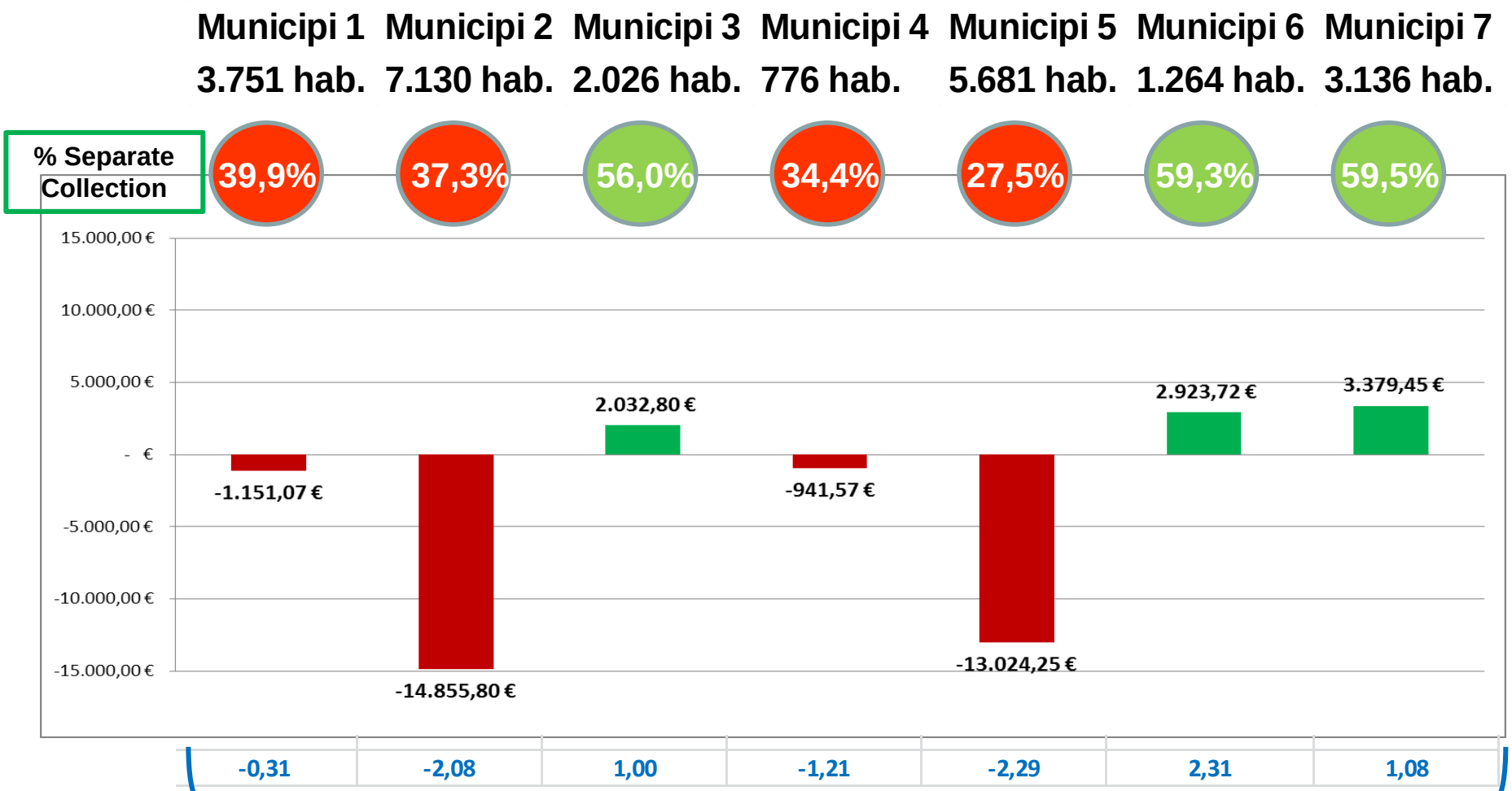
INGRÉS	Tn	Import unit.*	Ingrés cànon	% total
Residus Municipals Deposició	1.380.477	30,0	41.414.302	81,7%
Residus Municipals Incineració	638.391	14,5	9.256.665	18,3%
TOTAL	**2.018.867**		**50.670.967**	**100,0%**

RETORN	Tn	Import unit. €/Tn	Cànon Euros	% total ingrés
1.1 Tractament de la FORM (gestió)	435.000	34,0	13.244.133	26,1%
1.2 Caracteritzacions i analítiques			800.000	1,6%
1.3. Infraestructures			17.843.722	35,2%
2.1. Reducc. Reb. Dipòsit controlat *	530.000	7,0	3.710.000	7,3%
2.2 Reducc. Reb. Valorització energètica *	460.000	7,5	3.450.000	6,8%
3. Impuls i comercialització del compost	70.000	10,0	700.000	1,4%
Subtotal Tractament FORM			**39.747.855**	**77,1%**
3. Recollida selectiva FORM	435.000	10,0	5.023.637	9,9%
4. Gestió residus especials a les deixalleries	2.800	500	1.400.000	2,8%
5. Autocompostatge	-	-	300.000	0,6%
7. Altres actuacions**			2.172.636	4,3%
8. Despeses de gestió ARC			2.026.839	4,0%
Subtotal Recollides i Altres			**10.923.112**	**21,6%**
TOTAL			**50.670.967**	**100,0%**

How system affect municipalities? Balance in 7 Catalan municipalities



How system affect municipalities? Balance in 7 Catalan municipalities



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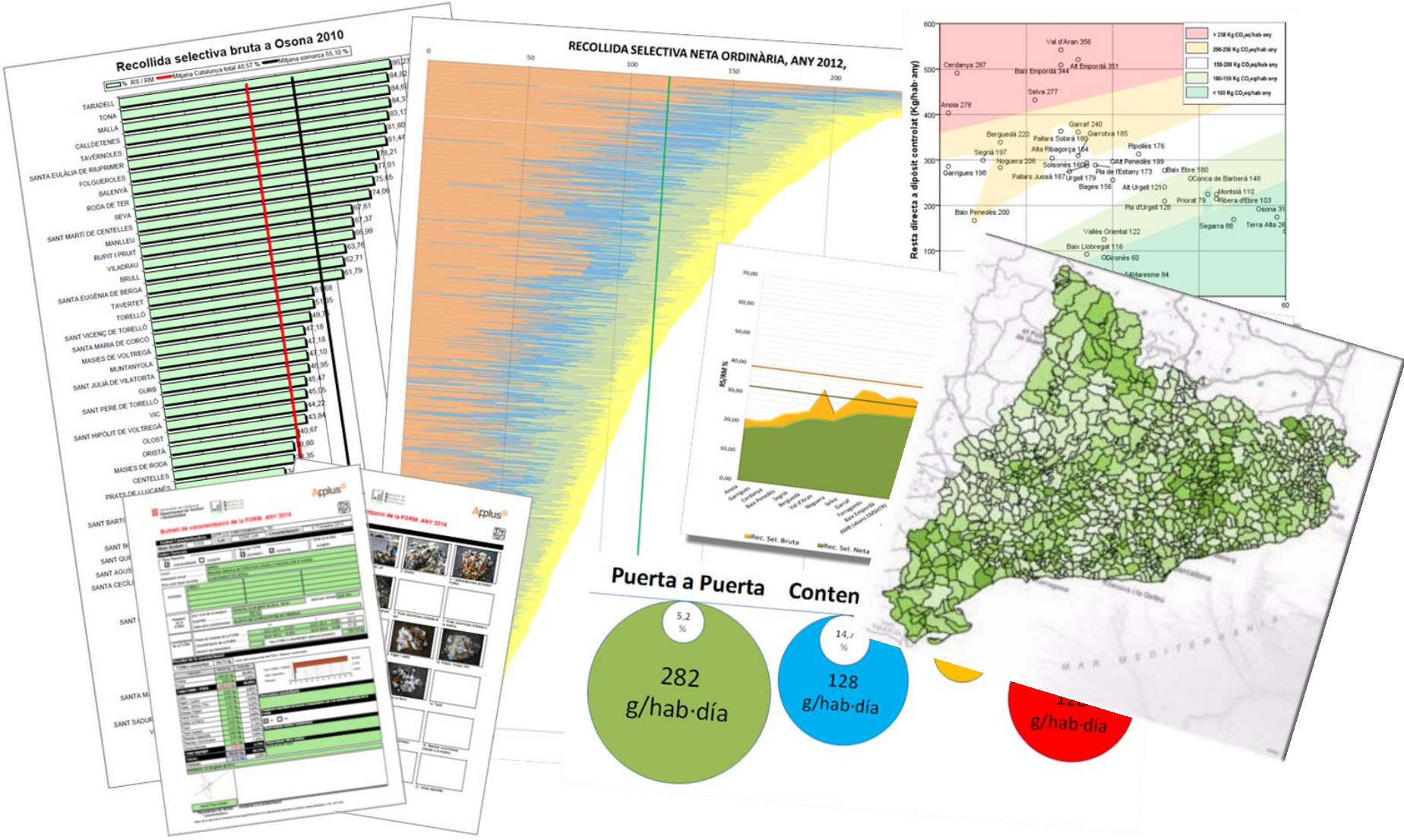
Information Available



More info...

Statistics: http://estadistiques.arc.cat/ARC

Biowaste Quality: https://sdr.arc.cat/cform/ListCaracteritzacions.do

Agència de Residus de Catalunya

Thank you very much for your attention !

Merci beaucoup pour votre attention !

Moltes Gràcies per la vostra atenció !

Muchas gracias por su atención !

Agencia de Residus de Catalunya

C/ Dr. Roux, 80 ● 08017 Barcelona

Tel. +34 935 673 300 Fax. +34 935 673 300

fgiro@gencat.cat

http://www.arc.cat

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