Un'introduzione all'economia dei rifiuti

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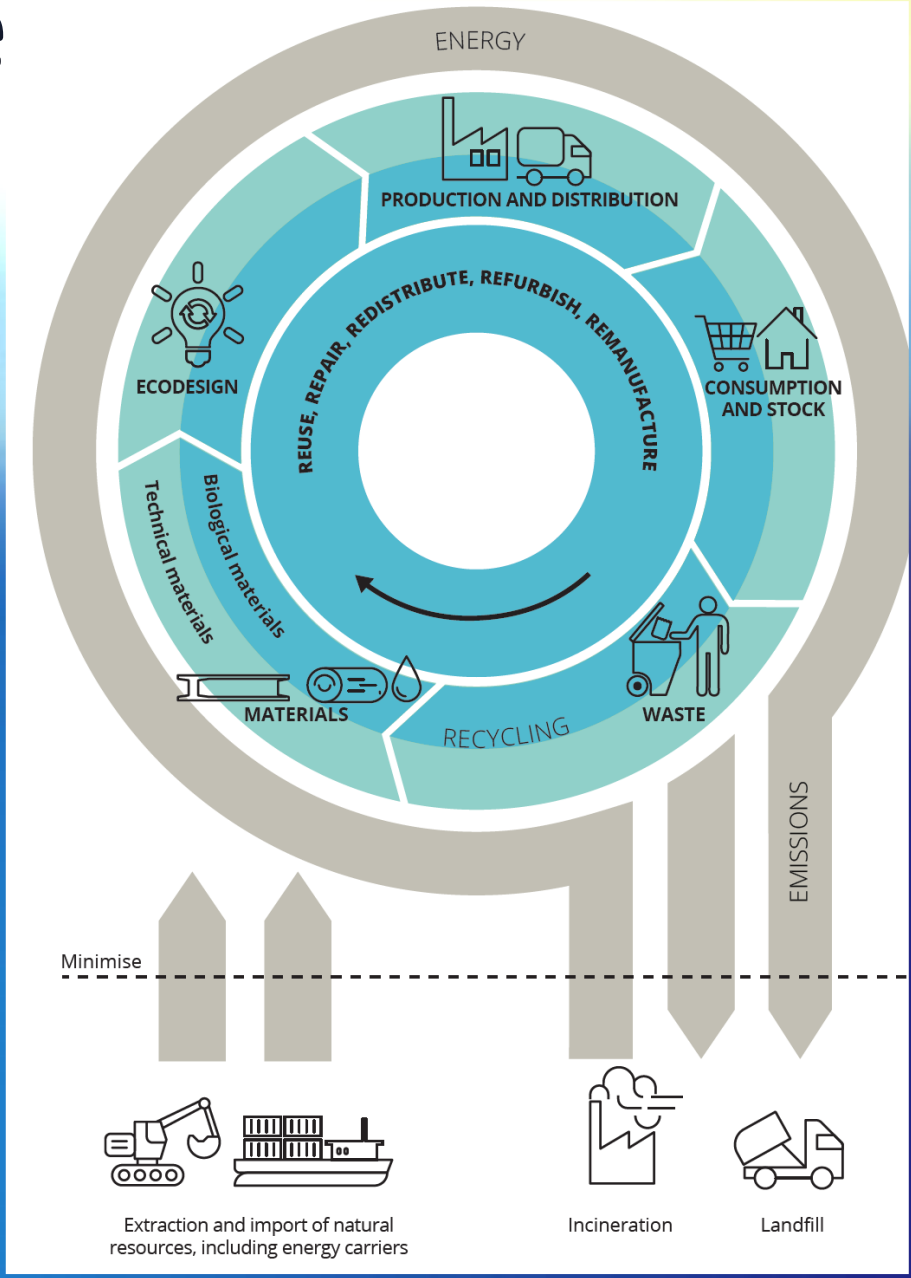
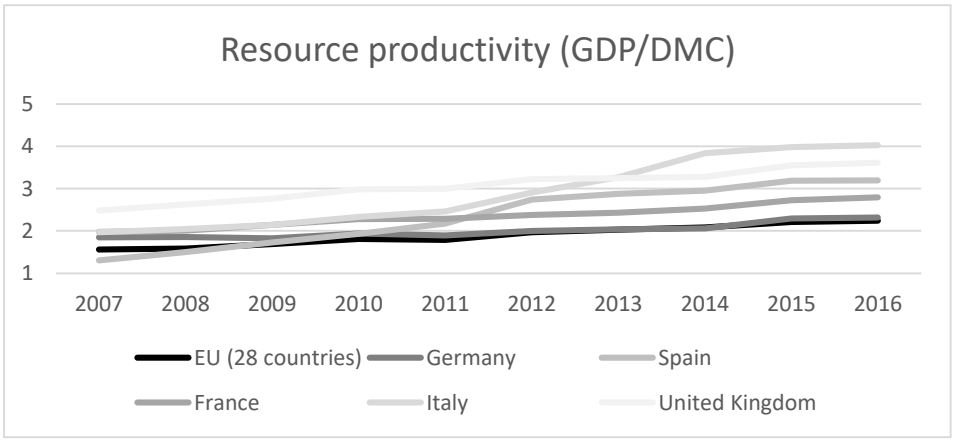
Economia circolare

"A circular economy is an alternative to a traditional linear economy (make, use, dispose) in which we keep resources in use for as long as possible, extract the maximum value from them whilst in use, then recover and regenerate products and materials at the end of each service life." **UK WRAP.**

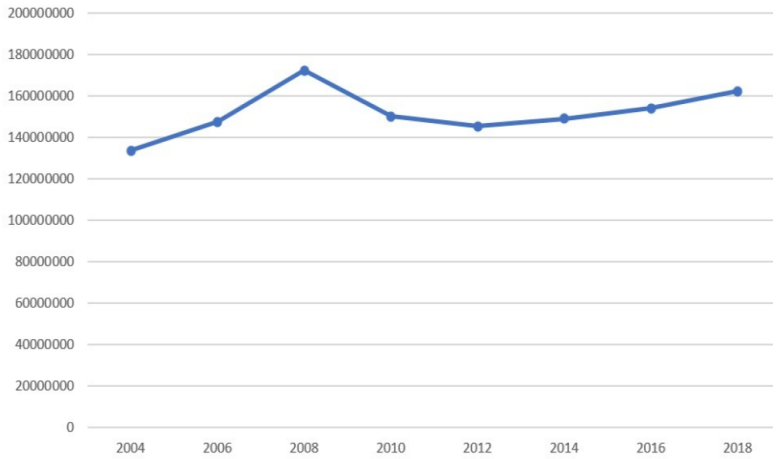


…ma essere «circolari» non è facile…



Source: Cainelli et al,: EEA (2016)

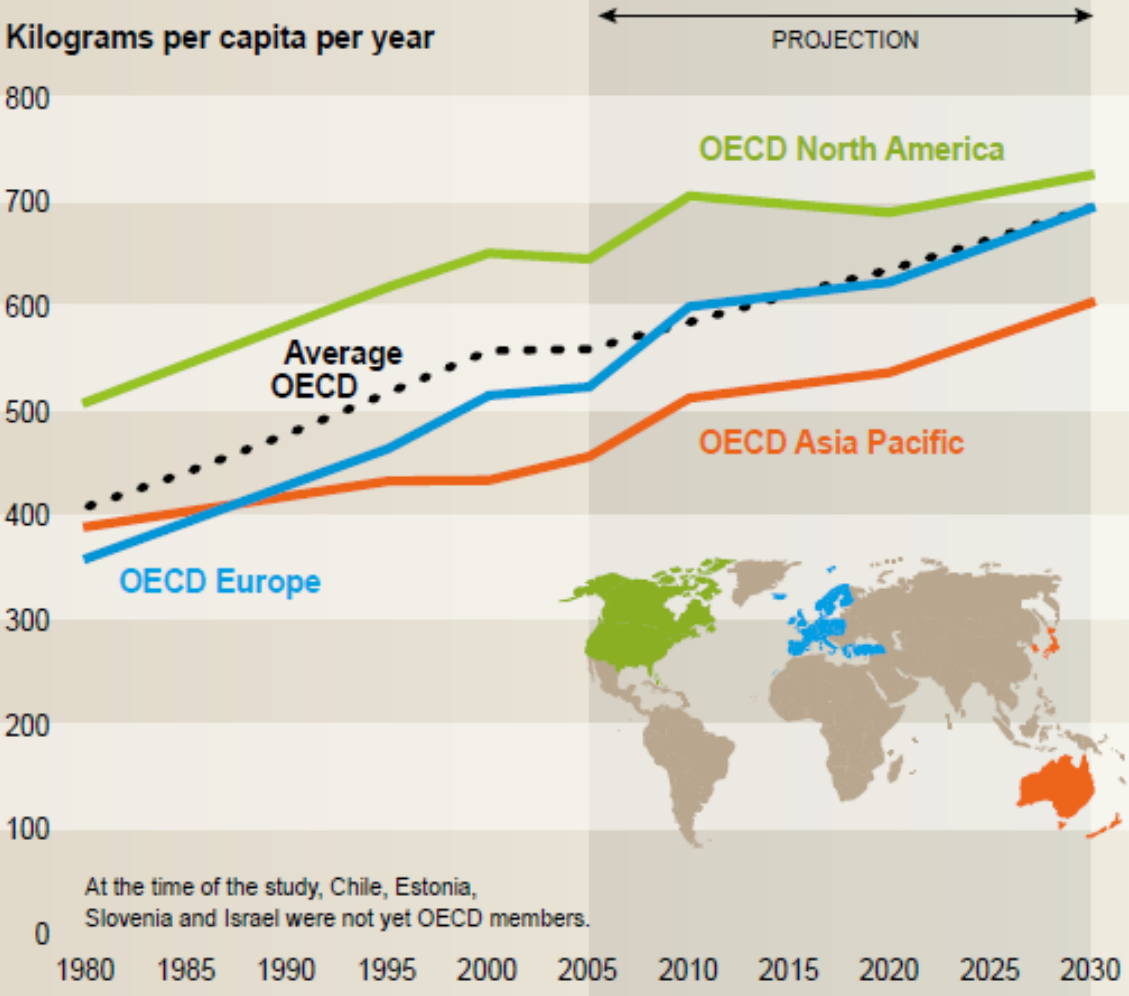
Non hazardous total waste



Source: data from ISPRA

Municipal waste generation in rich countries

Trends and projections



Source: OECD Environmental Outlook to 2030, 2008.

RIFIUTI IN UE

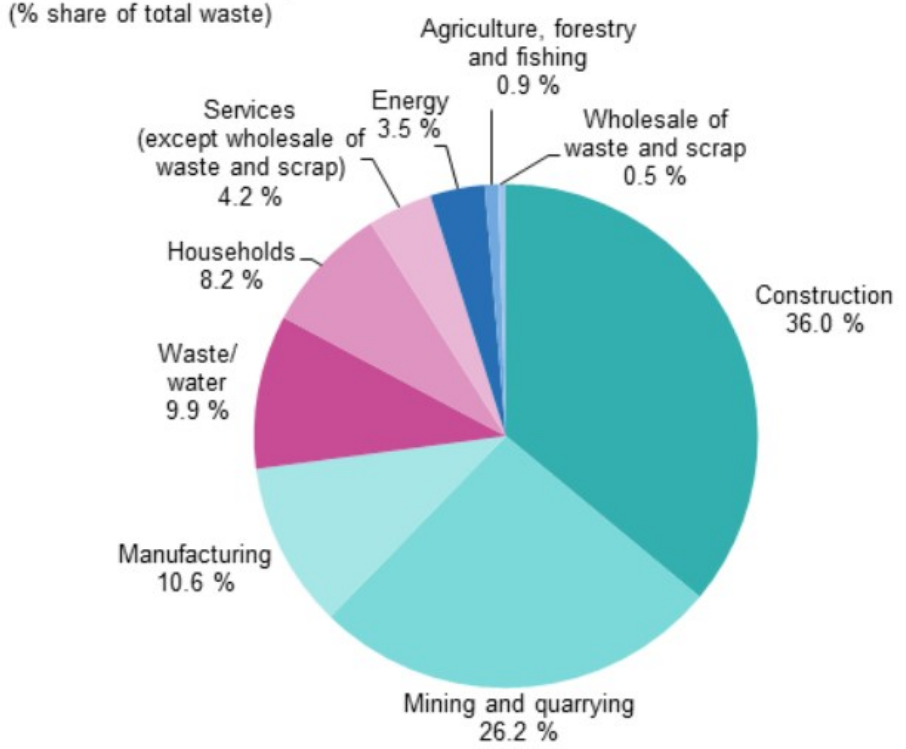


Figure 1: Waste generation by economic activities and households, EU-27, 2018

RIFIUTI IN UE

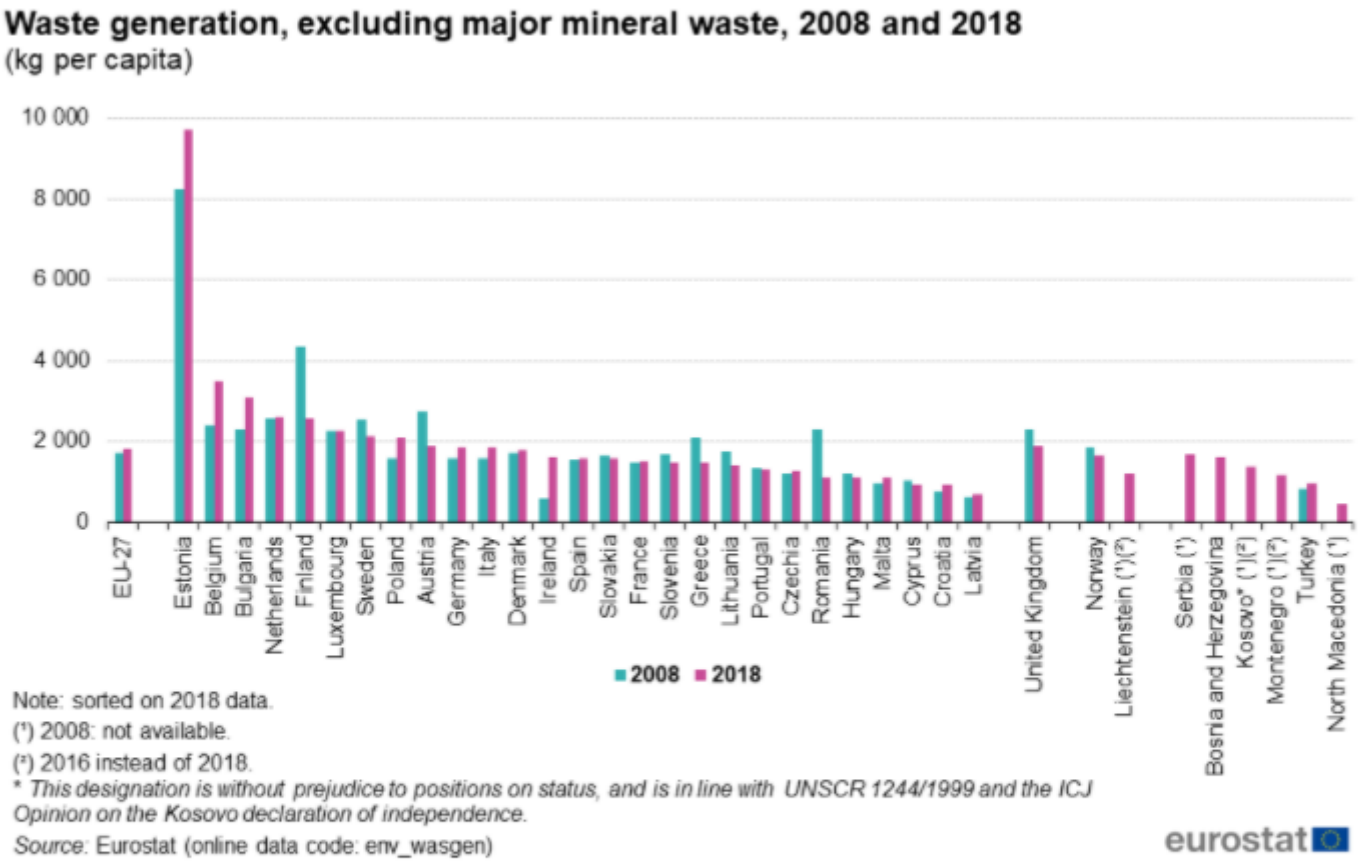


Figure 3: Waste generation, excluding major mineral waste, 2008 and 2018

(kg per capita)

RIFIUTI IN UE

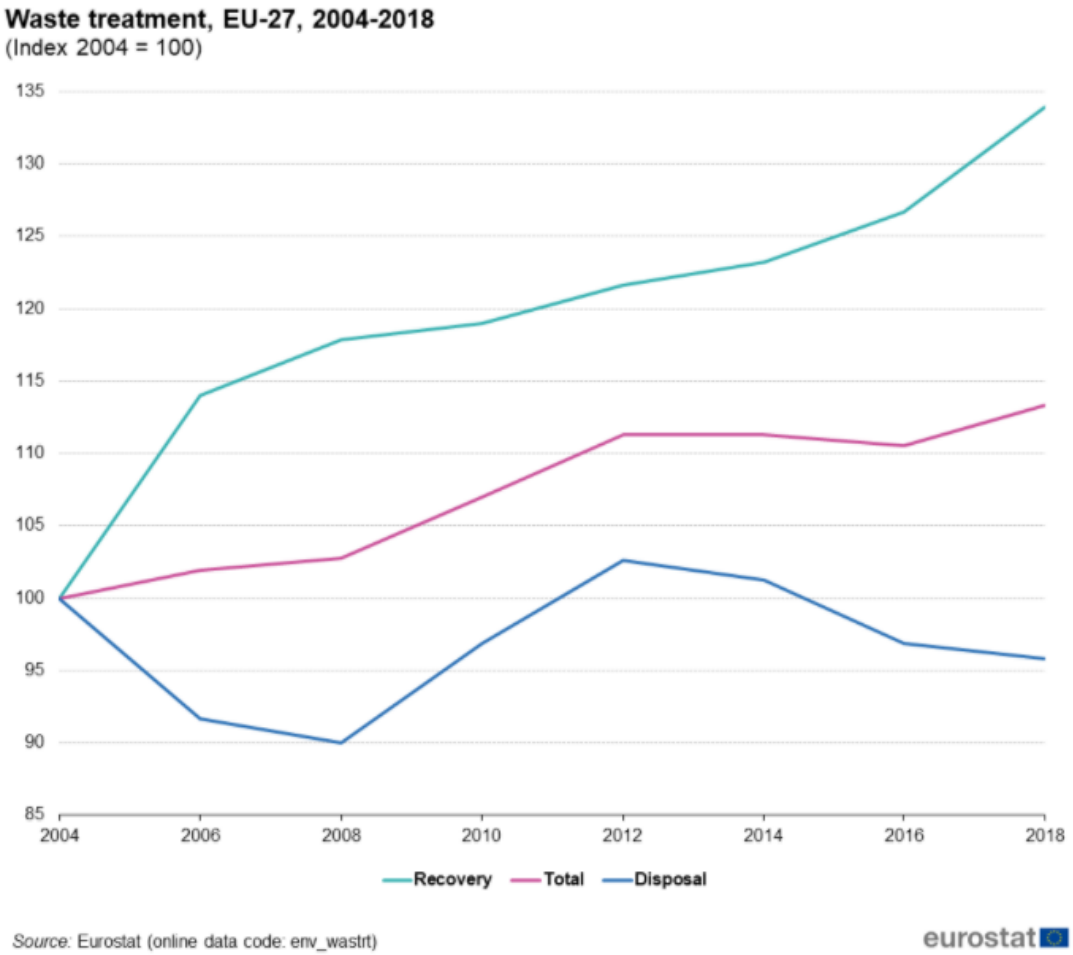


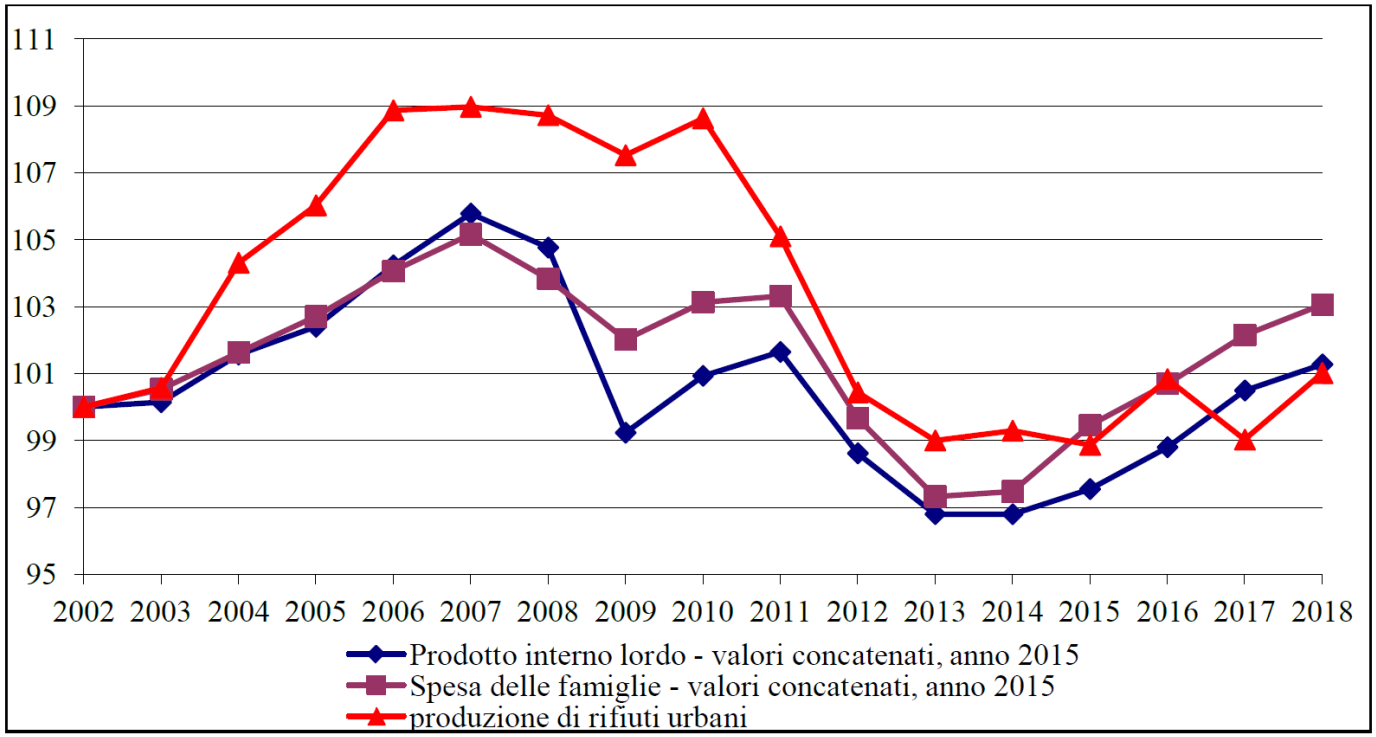
Figure 5: Waste treatment, EU-27, 2004-2018

(Index 2004 = 100)

RIFIUTI IN ITALIA

Andamento produzione rifiuti urbani (ISPRA, 2019)

Figura 1.2 – Andamento della produzione dei rifiuti urbani e degli indicatori socio economici, anni 2002 – 2018



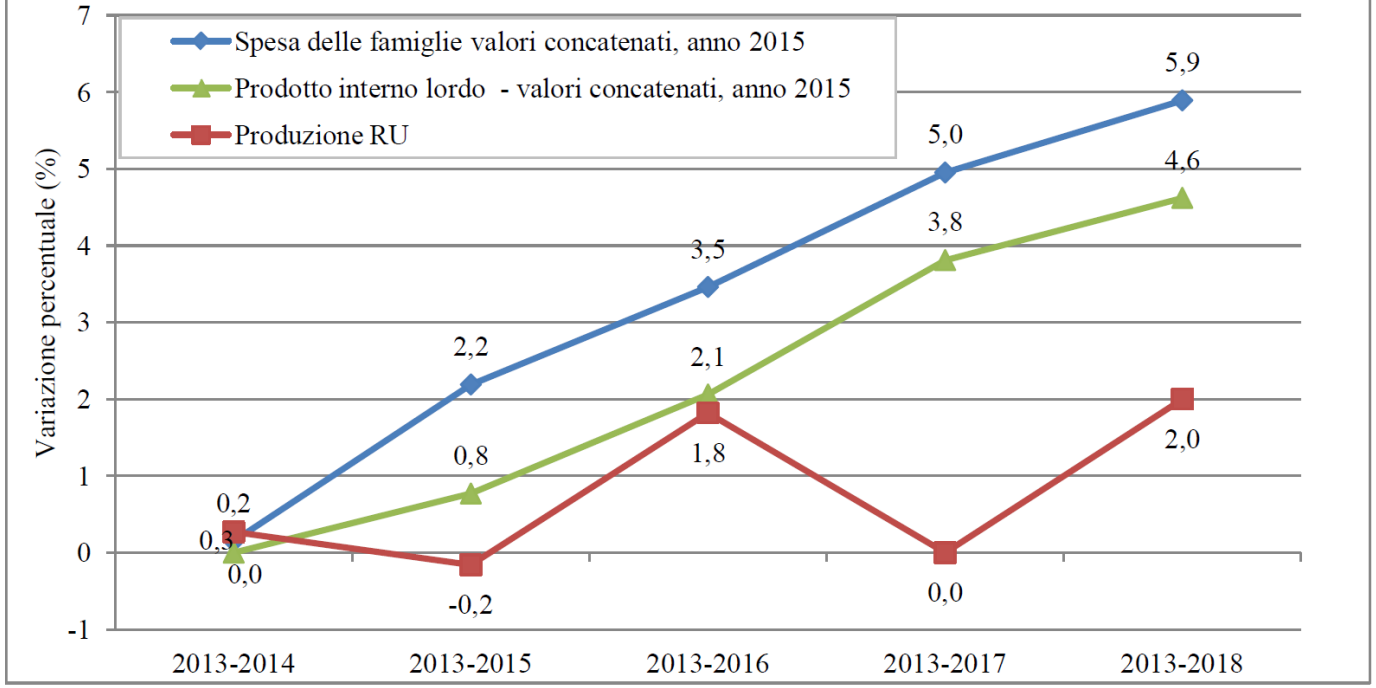
Note: sono stati assunti pari a 100 i valori delle produzione dei rifiuti urbani, del PIL e della spesa delle famiglie dell'anno 2002.

Fonte: ISPRA; dati degli indicatori socio economici: ISTAT

RIFIUTI IN ITALIA

Andamento produzione rifiuti urbani (ISPRA, 2019)

Figura 1.3 – Variazioni percentuali degli indicatori socio-economici e dei RU rispetto al 2013, anni 2104-2018

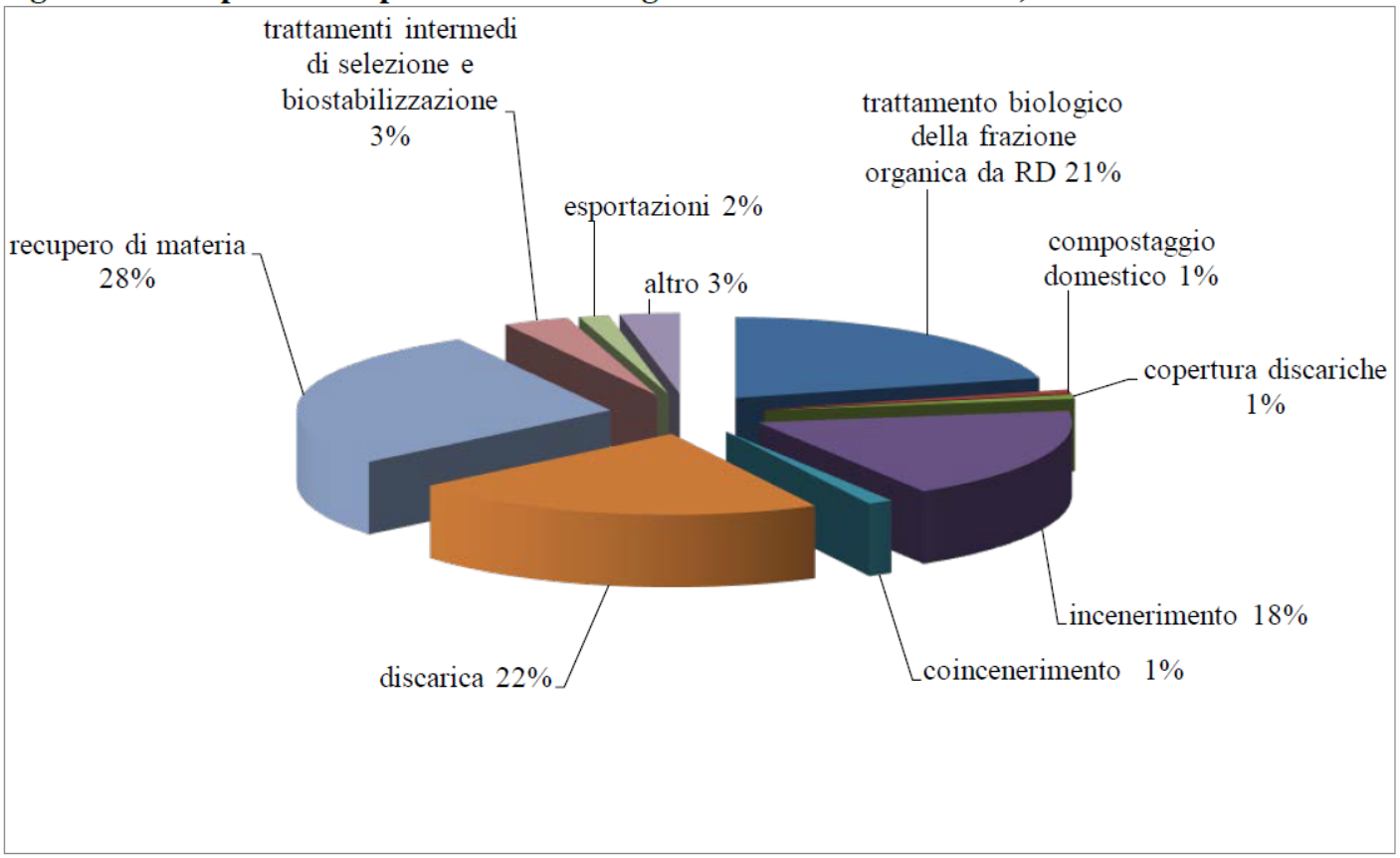


Fonte: ISPRA; dati degli indicatori socio-economici: ISTAT

RIFIUTI IN ITALIA

Andamento produzione rifiuti urbani (ISPRA, 2019)

Figura 2.1 – Ripartizione percentuale della gestione dei rifiuti urbani, anno 2018

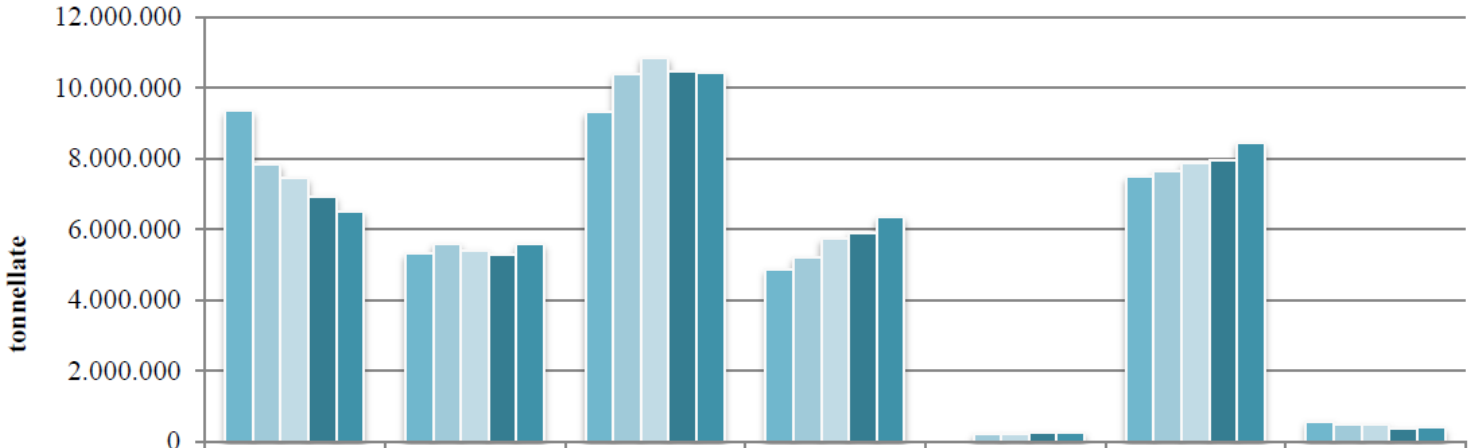


Fonte: ISPRA

RIFIUTI IN ITALIA

Andamento produzione rifiuti urbani (ISPRA, 2019)

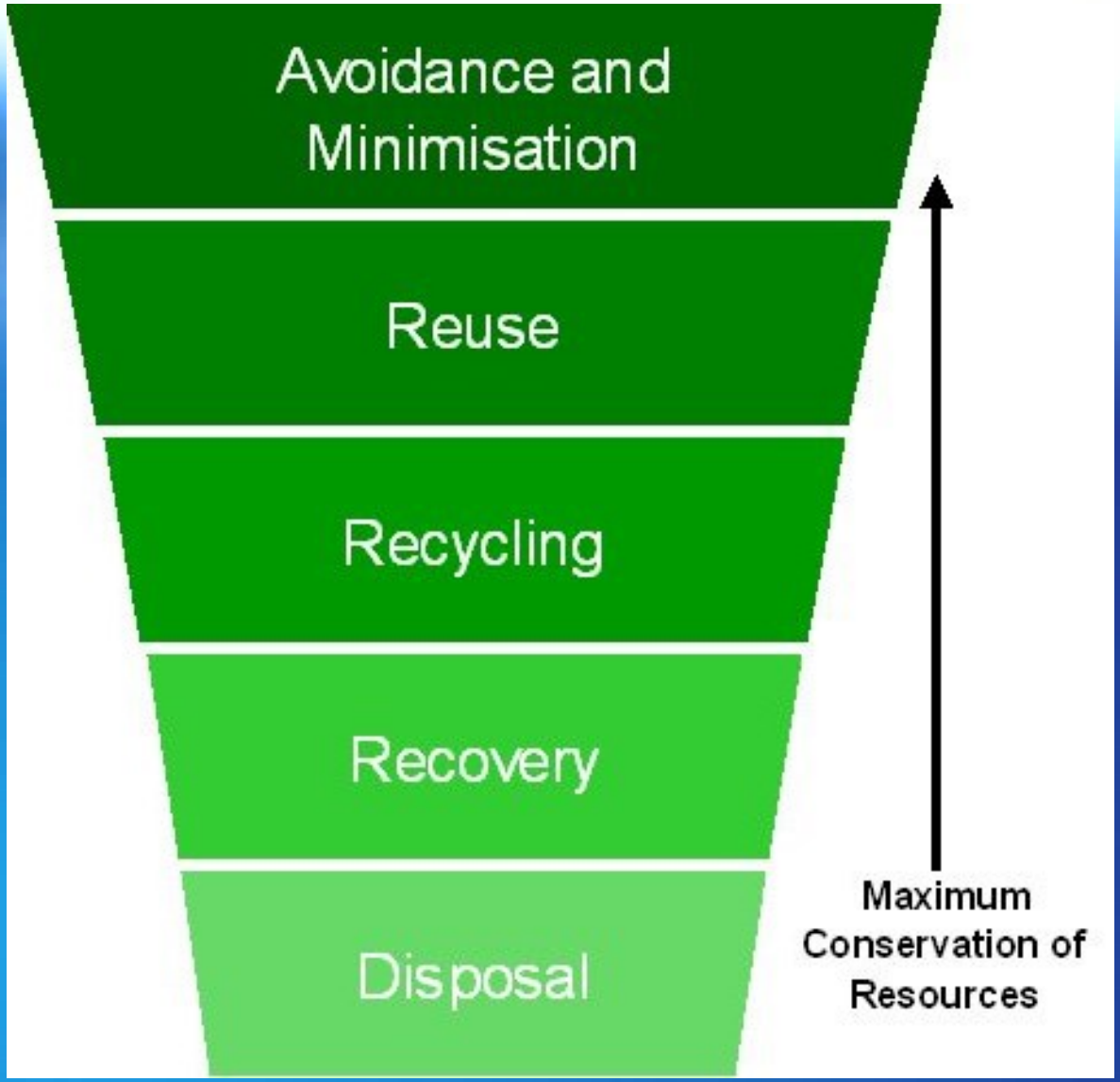
Figura 2.2 – Tipologie di gestione dei rifiuti urbani a livello nazionale, anni 2013 – 2017



	discarica	incenerimento	trattamento meccanico biologico	tratt. biologico frazione organica	compostaggio domestico	altre forme di recupero di materia	utilizzo come fonte di energia
2014	9.331.898	5.302.076	9.307.110	4.865.278	0	7.472.007	565.484
2015	7.818.796	5.582.052	10.387.860	5.203.149	214.465	7.649.395	457.850
2016	7.431.612	5.403.862	10.841.205	5.721.184	222.762	7.870.327	460.774
2017	6.926.548	5.266.779	10.462.690	5.902.574	266.942	7.951.012	367.838
2018	6.485.714	5.571.472	10.413.984	6.333.775	236.802	8.438.290	384.036

Fonte: ISPRA

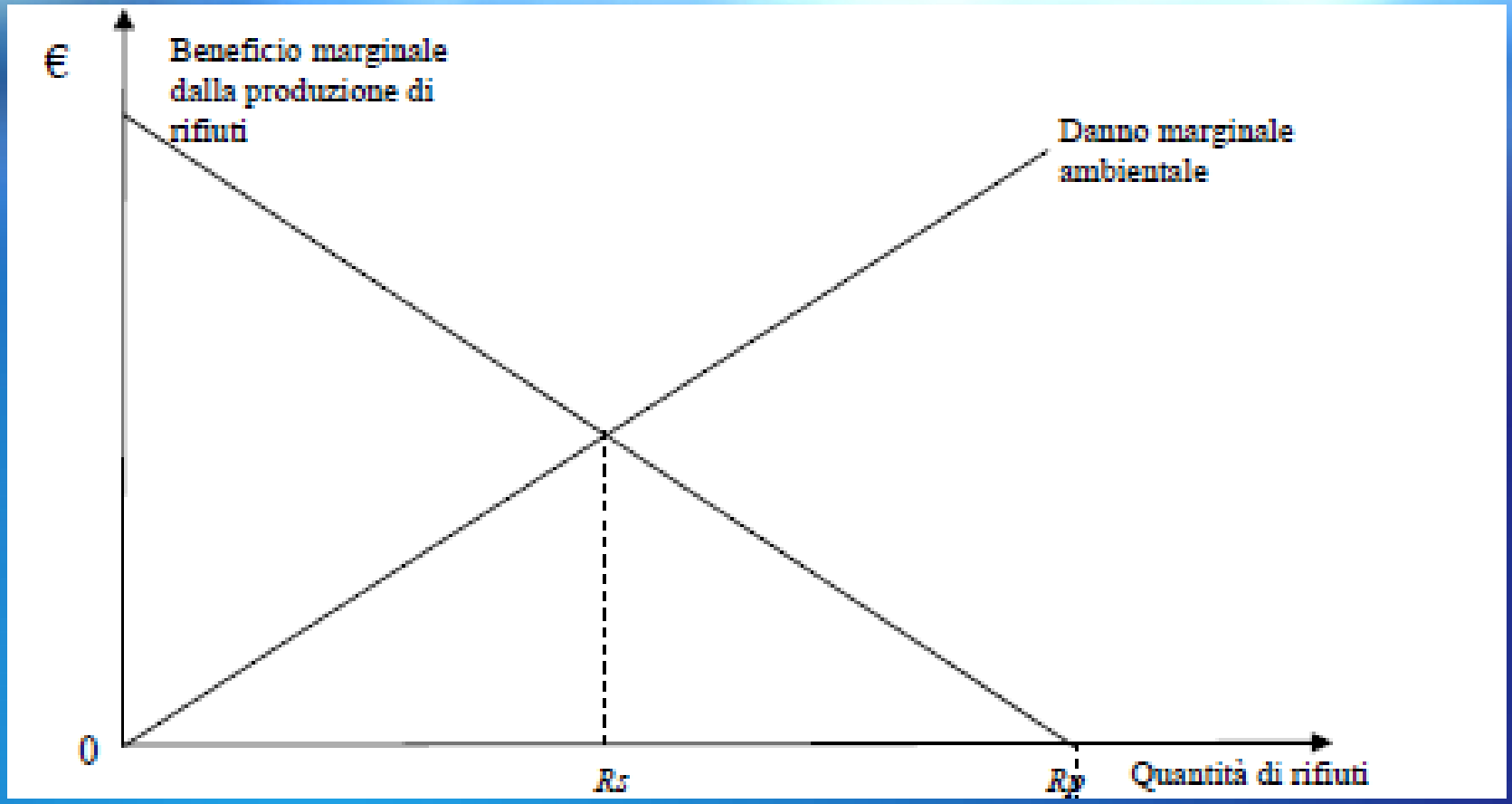
The Waste Hierarchy



Cause di inefficienza

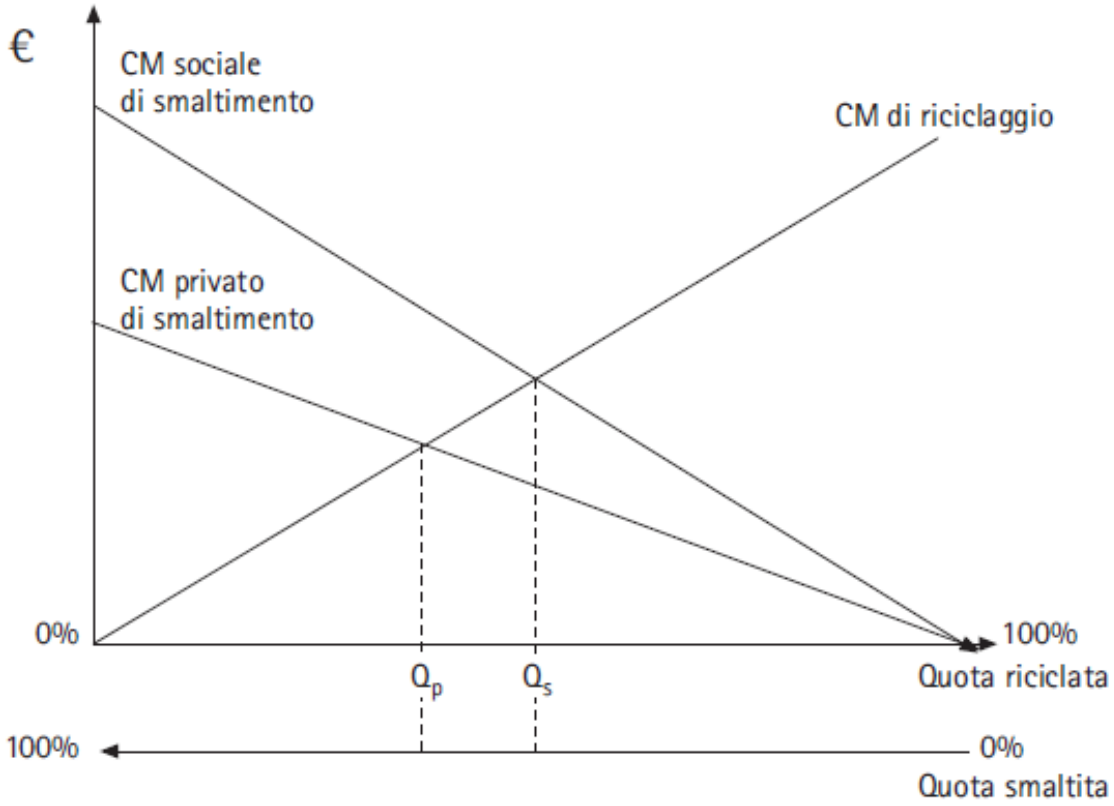
- Incentivi di scelta distorti.
- Produttori: non sostengono interamente i costi connessi allo smaltimento/generazione
- Consumatori: non sostengono interamente i costi connessi allo smaltimento/generazione e ad una non corretta RD.

Cause di inefficienza



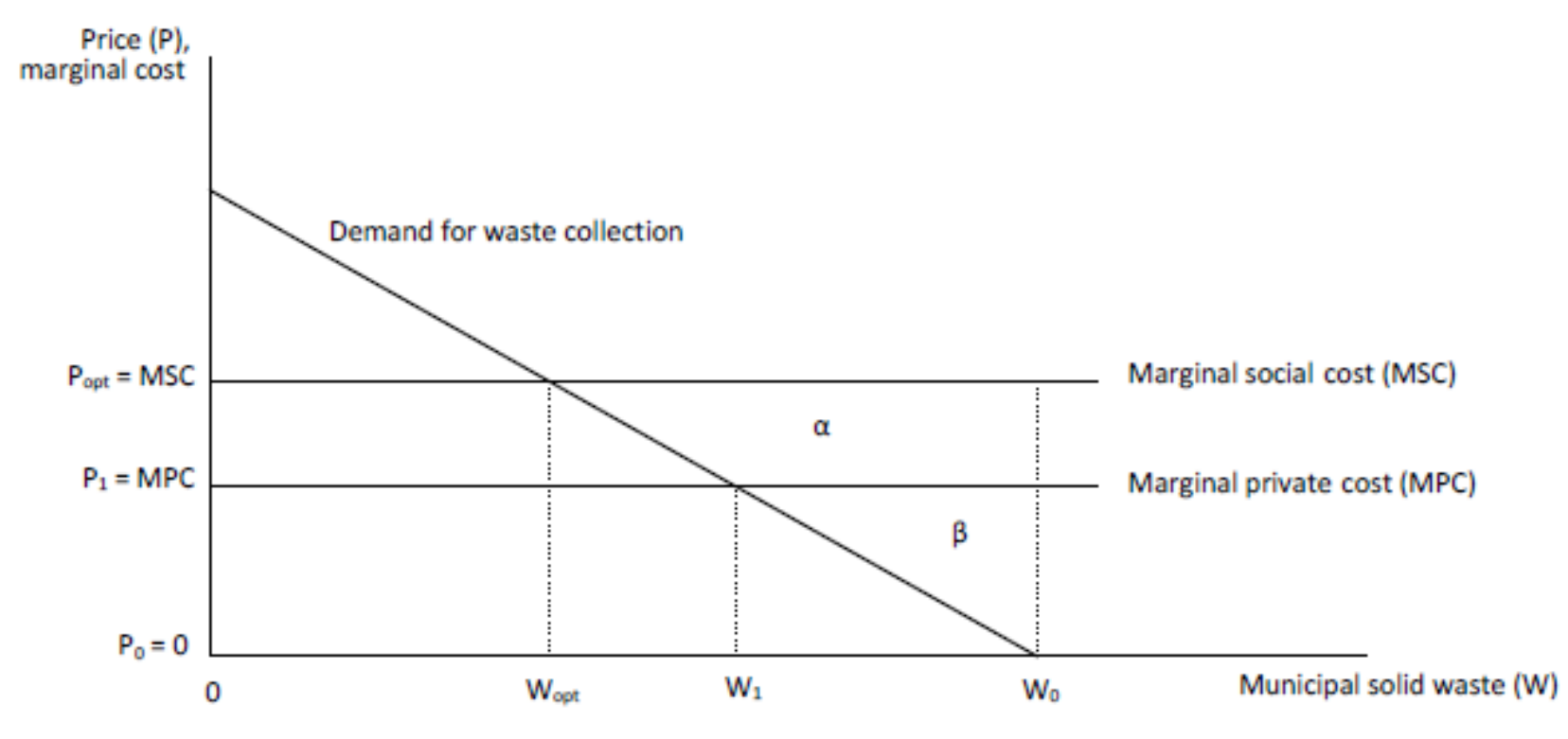
Fonte: Tietenberg (1996, 2006).

Cause di inefficienza



Fonte: Tietenberg (1996); D'Amato (2008).

Deadweight loss of underpricing waste - theory



Porter, The Economics of Waste

Deadweight loss of underpricing waste – empirical aspects

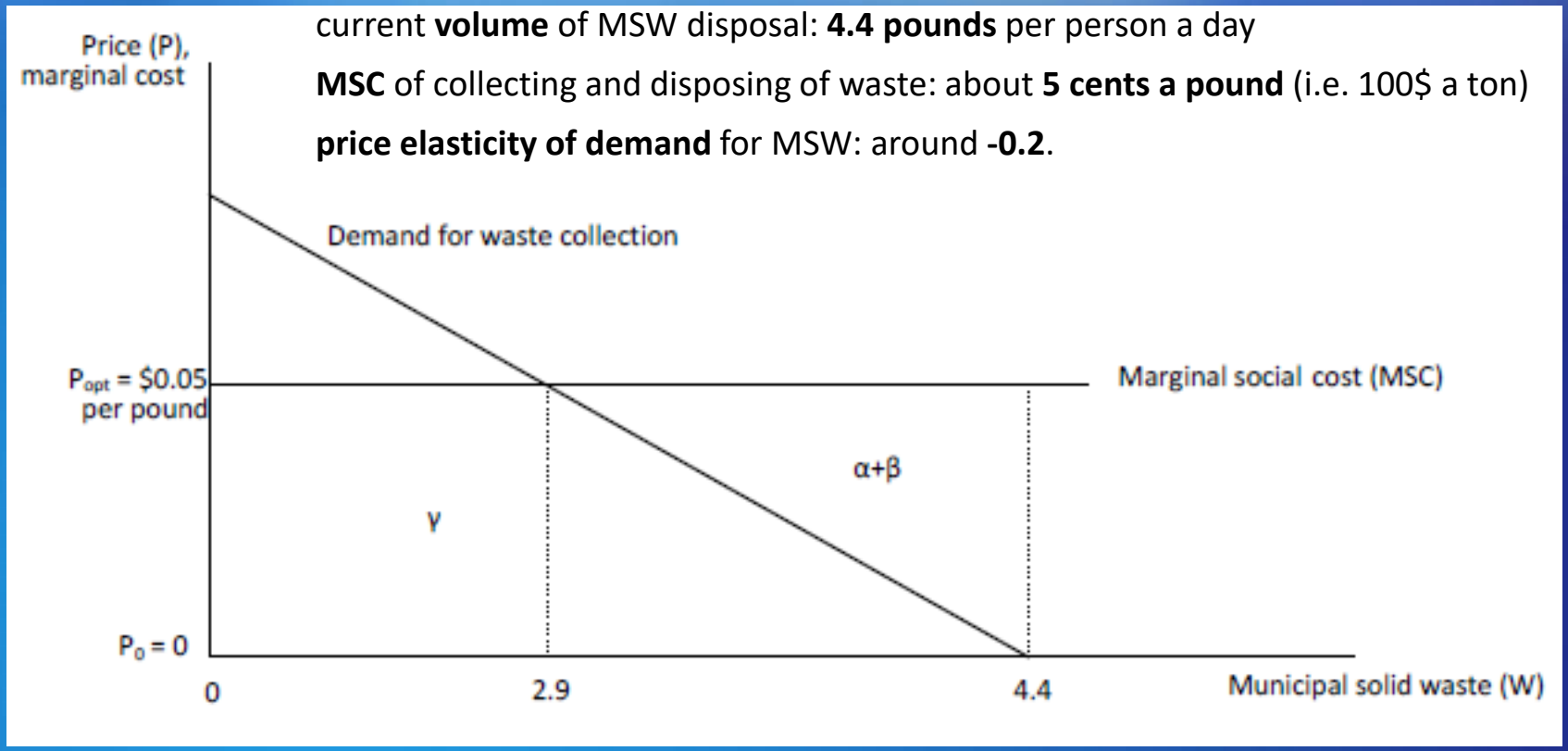
Welfare gain from optimal pricing: a little under 4 cents per person a day

($14 per average American a year – $3.5 billion a year for the whole US)

current **volume** of MSW disposal: **4.4 pounds** per person a day

MSC of collecting and disposing of waste: about **5 cents a pound** (i.e. 100$ a ton)

price elasticity of demand for MSW: around **-0.2**.

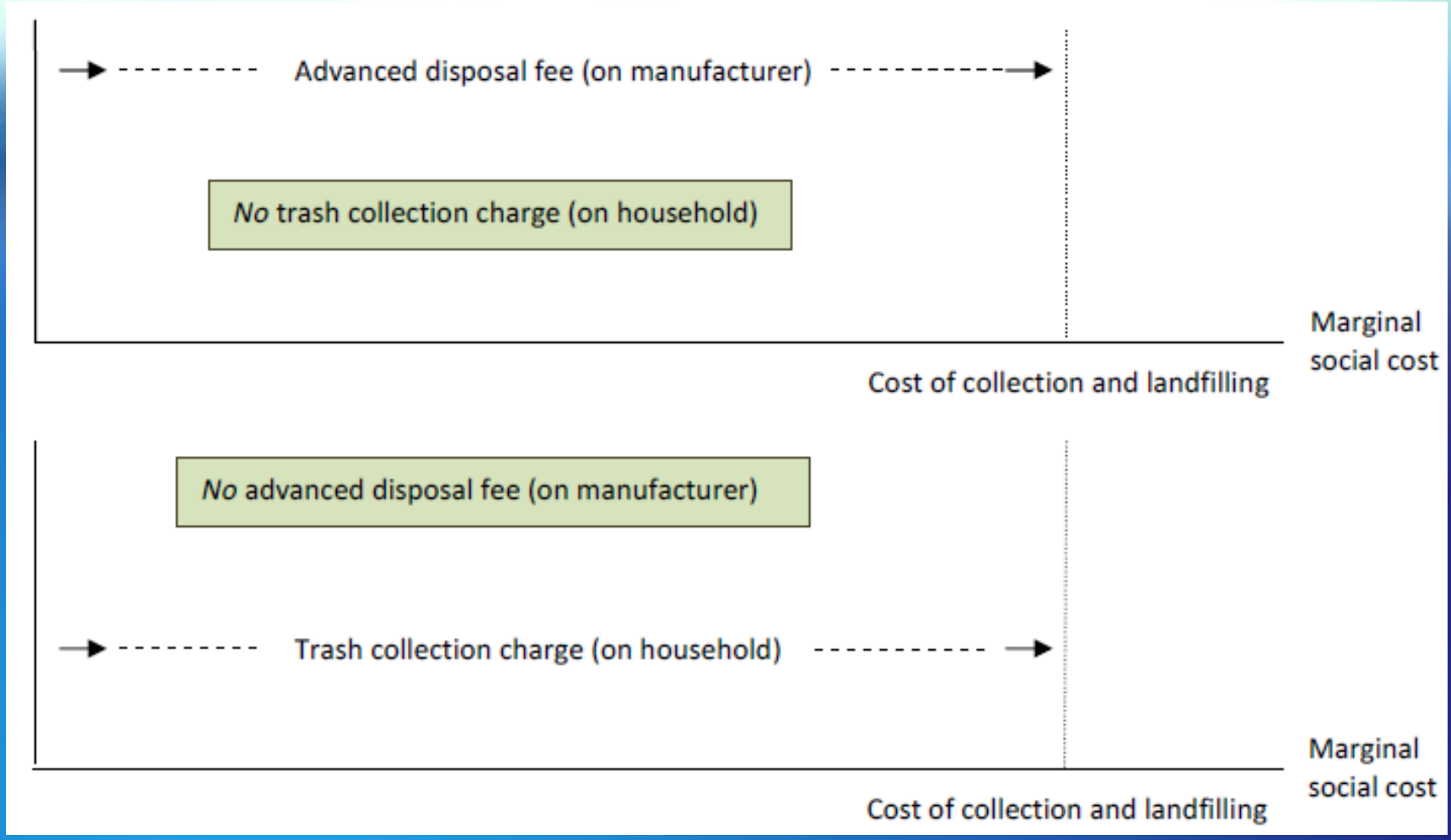


Porter, The Economics of Waste

E’ necessario l’intervento dello stato

Qual è lo strumento migliore?

Chi deve pagare?
- produttori?
- consumatori?

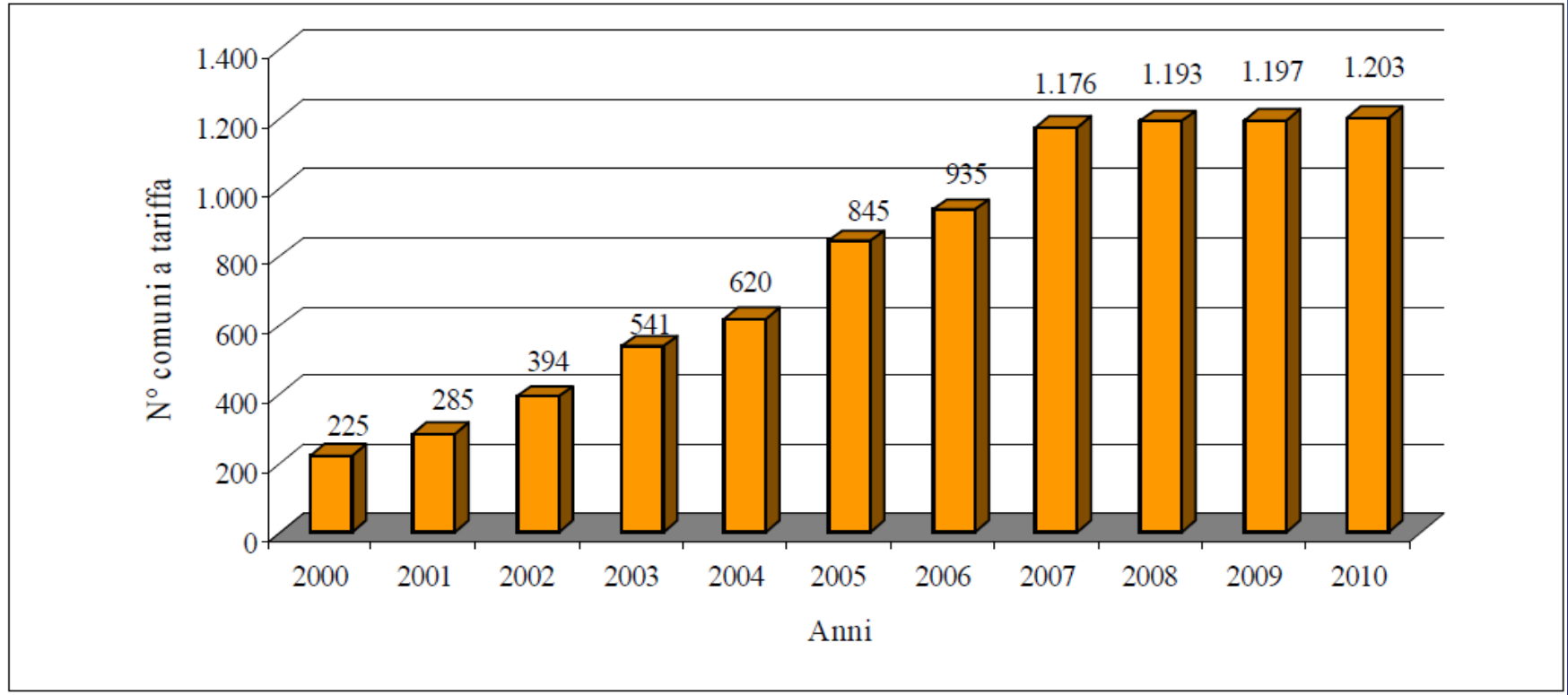


Porter, The Economics of Waste

La tariffa in Italia: un «esperimento naturale»

	2000	2001	Incre-mento %	2002	Incre-mento %	2003	Incre-mento %	2004	Incre-mento %	2005	Incre-mento %	2006	Incre-mento %	2007	Incre-mento %	2008	Incre-mento %	2009	Incre-mento %	2010	Incre-mento %
N. comuni che applicano la tariffa	225	285	26,7	394	38,2	541	37,3	620	14,6	845	36,3	935	10,7	1.176	25,8	1.193	1,4	1.197	0,3	1.203	0,5
Popolazione dei comuni a tariffa	2.254.887	2.914.038	29,2	4.373.197	50,1	9.347.097	113,7	10.434.413	11,6	13.040.212	25,0	14.322.847	9,8	16.271.928	13,6	16.953.915	4,2	17.165.047	1,2	17.342.511	1,0

Fonte: ISPRA



Fonte: ISPRA

Tabella 4.4 – Regime di prelievo applicato al 31-12-2018 dai comuni analizzati

Regime di prelievo	Numero di comuni	Popolazione	% dei comuni che applicano il regime di prelievo sul totale dei comuni analizzati	% della popolazione che applicano il regime di prelievo sul totale dei comuni analizzati
TARI NORMALIZZATA PRESUNTIVA	3.156	29.738.870	82,3	85,2
TARI TRIBUTO PUNTUALE	86	949.260	2,2	2,8
TARIFFA PUNTUALE O CORRISPETTIVA	441	3.173.165	11,5	9,2
TARIFFA PUNTUALE CORRETTA	152	967.702	4,0	2,8
TOTALE	**3.835**	**34.828.997**	**100**	**100**

Fonte: ISPRA

Sustainable Development vs Circular Economy
Geissdorfer et al, 2017

Table 3
Selected differences between sustainability and the Circular Economy.

	Sustainability	Circular Economy
Origins of the term	Environmental movements, NGOs, non-profit and intergovernmental agencies, principles in silviculture and cooperative systems	Different schools of thought like cradle-to-cradle, regulatory implementation by governments, lobbying by NGOs like the EMF, inclusion in political agendas,
Goals	[redacted]	[redacted]
Main motivation	Diffused and diverse reflexivity and adaptive ← past trajectories	Better use of resources, waste, leakage (from linear to circular)
What system is prioritised?	Triple bottom line (horizontal)	The economic system (hierarchical)
To whose benefit?	The environment, the economy, and society at large.	Economic actors are at the core, benefitting the economy and the environment. Society benefits from environmental improvements and certain add-ons and assumptions, like more manual labour or fairer taxation
How did they institutionalise (wide diffusion)?	Providing vague framing that can be adapted to different contexts and aspirations.	Emphasising economic and environmental benefits
Agency (Who influences? Who should influence?)	Diffused (priorities should be defined by all stakeholders)	Governments, companies, NGOs
Timeframe of changes	Open-ended, sustain current status "indefinitely"	Theoretical limits to optimisation and practical ones to implementation could set input and leakage thresholds for the successful conclusion of the
Perceptions of responsibilities	[redacted]	[redacted]
Commitments, goals, and interests behind the use of the term	Interest alignment between stakeholders, e.g. less waste is good for the environment, organisational profits, and consumer prices	Economic/financial advantages for companies, and less resource consumption and pollution for the environment

Sustainable Development vs Circular Economy
Geissdorfer et al, 2017

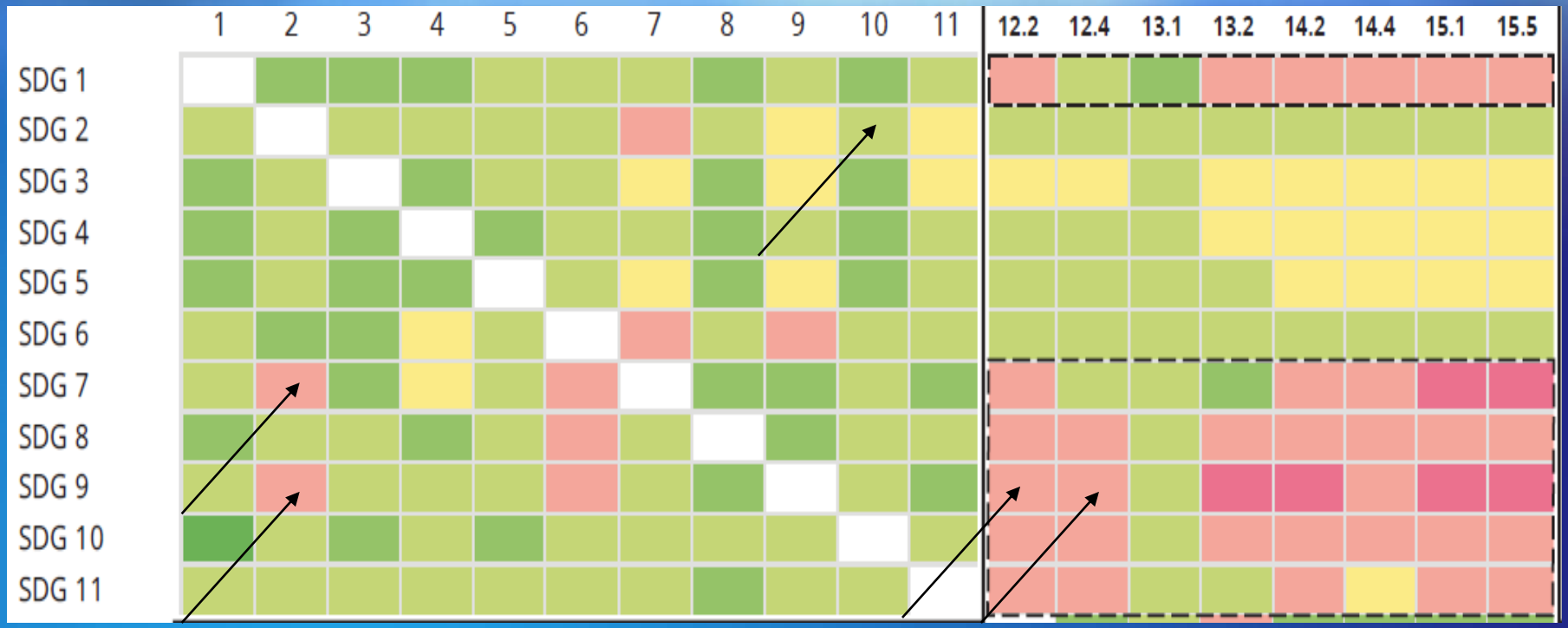
Table 4
Relationship types between the Circular Economy and sustainability.

General direction	Type of relationship	Short description Circularity/closed loop systems are seen as …	Examples in literature
Conditional	Conditional relation	One of the conditions for a sustainable system	Läpple, 2007 Rashid et al., 2013
	Strong conditional relation	The main solution for a transformation to a sustainable system	Bakker et al., 2014 EMF, 2013b UNEP, 2006 Nakajima, 2000
Beneficial	Beneficial relationship	Beneficial in terms of sustainability, without referring to condition-ality or alternative approaches	European Commission, 2014
	Subset relation (structured and unstructured)	One among several solutions for fostering a sustainable system	Allwood et al., 2012 Bocken et al., 2014 Evans et al., 2009 Garetti and Taisch, 2012 Seliger, 2007 Weissbrod and Bocken, 2017
	Degree relation	Yielding a degree of sustainability with other concepts being more and/or less sustainable	OECD, 2009
Trade-off	Cost-benefit/trade-off relation	Having costs and benefits in regard to sustainability, which can also lead to negative outcomes	Allwood, 2014 Andersen, 2007 Murray et al., 2015

Legami tra Economia circolare ed SDGs

Target 12.2: By 2030, achieve the sustainable management and efficient use of natural resources

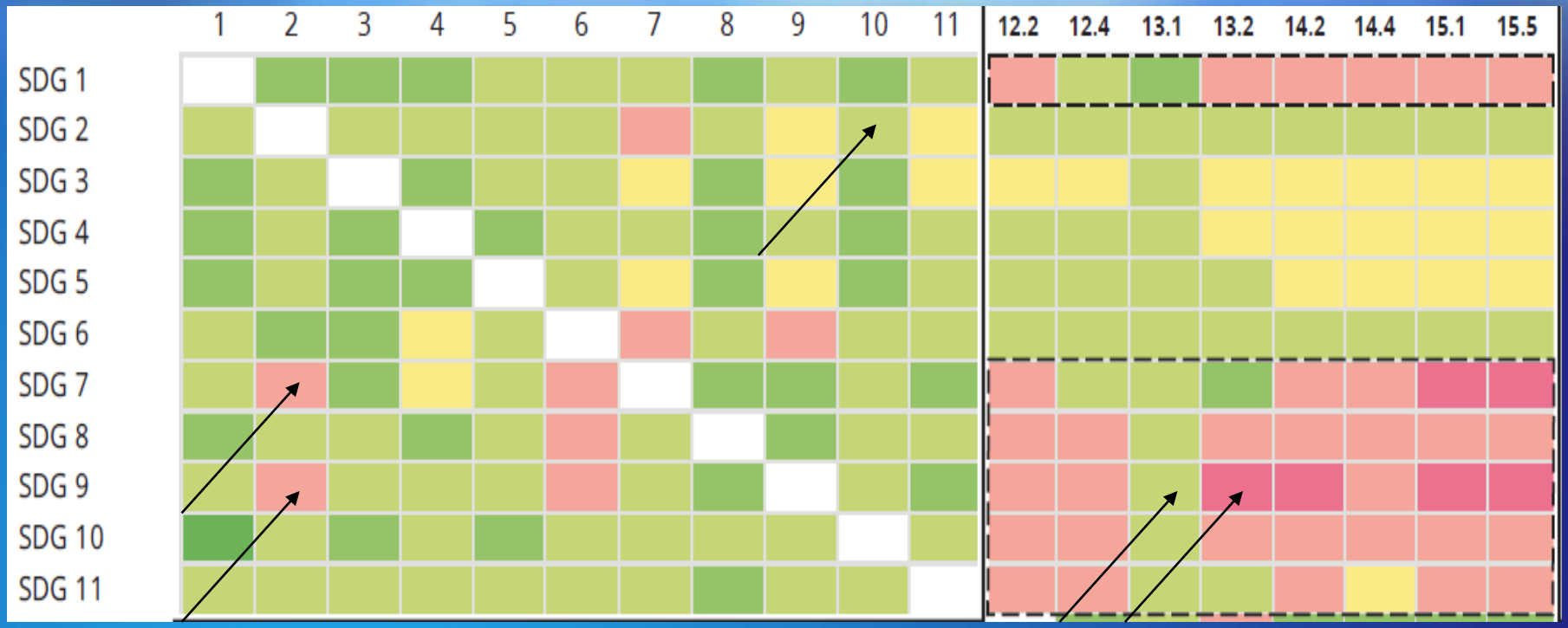
Target 12.4: By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle



Fonte: EEA (2020): SOER

Legami tra Economia circolare ed SDGs

- **Target 13.1:** Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries
- **Target 13.2:** Integrate climate change measures into national policies, strategies and planning



Fonte: EEA (2020): SOER

EEA SOER 2020: evoluzione dell'approccio alle politiche ambientali nel tempo

TABLE 2.1 **The changing understanding of environmental challenges and the evolution of approaches to policy and assessment**

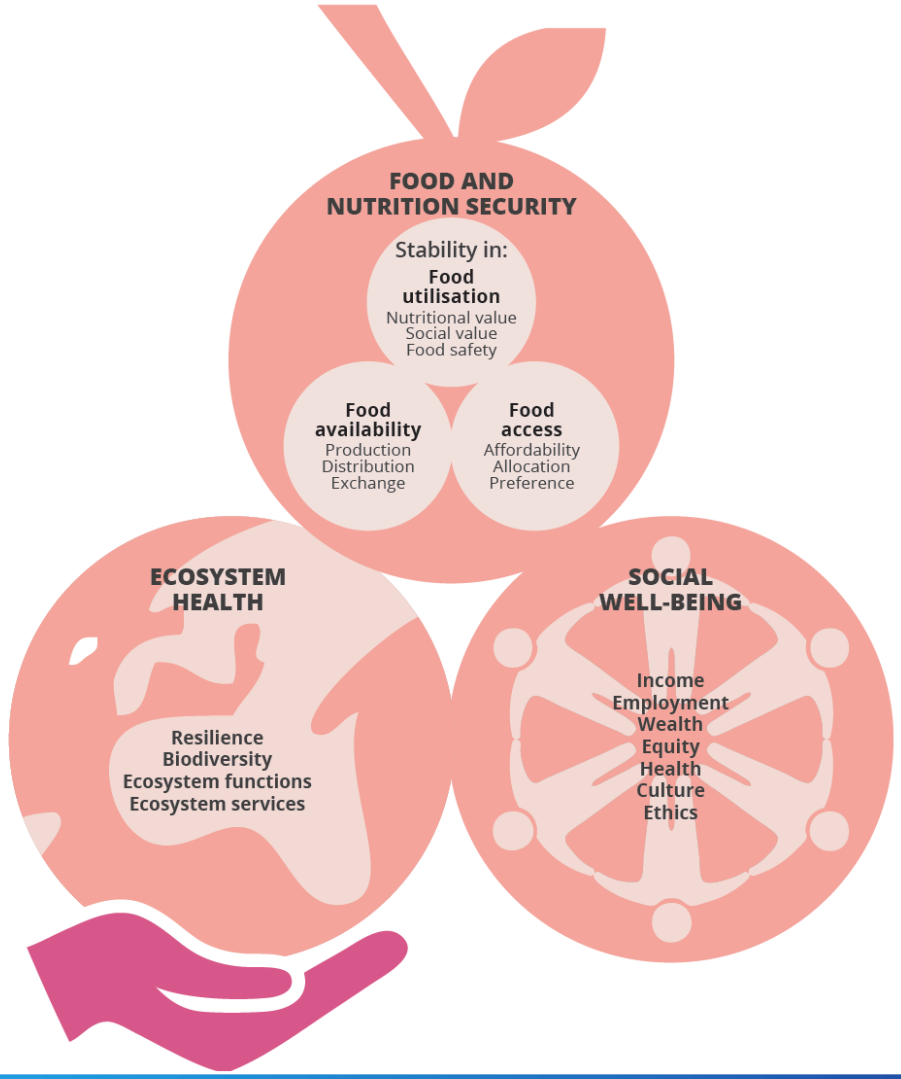
Characterisation of key challenges	Key features	In policy since	Policy approaches (examples)	Assessment approaches and tools (examples)
Specific	Linear cause-effect, point source, local	1970s	Targeted policies and single-use instruments	Data sets, indicators
Diffuse	Cumulative causes	1990s	Policy integration, market-based instruments, raising public awareness	Data sets, indicators, environmental accounts, outlooks
Systemic	Systemic causes	2010s	Policy coherence, systemic focus (e.g. mobility system), long-term and multidimensional goals (e.g. SDGs)	Indicators, accounts, practice-based knowledge, systems assessment, stakeholder participation, foresight

Policy objectives and targets	Sources	Target year	Agreement
Resource use and efficiency			
Improve resource efficiency	7th EAP (EU, 2013); Roadmap to a resource efficient Europe (EC, 2011a)	2020	Non-binding commitments
Strive towards an absolute decoupling of economic growth and environmental degradation	7th EAP (EU, 2013)	2020	Non-binding commitments
Create more with less, delivering greater value with less input, using resources in a sustainable way and minimising their impacts on the environment	7th EAP (EU, 2013)	2050	Non-binding commitments
Achieve the sustainable management and efficient use of natural resources	SDG 12.2 (global, national) (UN, 2015); 7th EAP (EU, 2013)	2030	Non-binding commitments
Waste generation and management			
50 %/55 %/60 %/65 % of municipal waste is prepared for reuse or recycled (differing calculation method for the 50 % target)	Waste Framework Directive (EU, 2008, 2018b)	2020/2025/2030/2035	Legally binding
Reduce landfill of biodegradable municipal waste to 75 %/50 %/35 % of the same waste generated in 1995	Landfill Directive (EU, 1999)	2006/2009/2013	Legally binding
Reduce landfill to a maximum of 10 % of municipal waste generated	Landfill Directive (EU, 1999, 2018a)	2035	Legally binding
Specific targets for collection, recycling and/or recovery of packaging waste, construction and demolition waste, WEEE, end-of-life vehicles, batteries, single-use plastics (incl. market restrictions and requirements for recycled content)	Waste Framework Directive (EU, 2008, 2018b), Packaging Waste Directive (EU, 1994, 2018c), WEEE Directive, ELV Directive (EU, 2000), Batteries Directive (EU, 2006); Single-use Plastics Directive (EU, 2019b))	2008-2035	Legally binding
All plastics packaging should be recyclable	EU plastics strategy (EC, 2018a)	2030	Non-binding commitments
Waste generation to decline absolutely and per capita, and reduction and sound management of hazardous waste	7th EAP (EU, 2013)	2020	Non-binding commitments
Energy recovery to be limited to non-recyclable waste	7th EAP (EU, 2013)	2020	Non-binding commitments
Halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses	SDG 12.3 (UN, 2015)	2030	Non-binding commitments

Fonte: EEA (2020): SOER

Politica Economica e Cibo

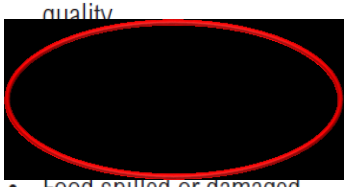
FIGURE 16.1 **Food system desired outcomes**



Fonte: EEA (2020): SOER

Rifiuti da cibo

PRODUCTION	HANDLING & STORAGE	PROCESSING & PACKAGING	DISTRIBUTION & MARKET	CONSUMPTION
During or immediately after harvesting on the farm	*After leaving the farm for handling, storage, and transport*	*During industrial or domestic processing and/or packaging*	*During distribution to markets, including at wholesale and retail markets*	*In the home or business of the consumer, including restaurants and caterers*
• Fruits discarded due to bruising during picking • Fish discarded during fishing operations	• Livestock death during transport to slaughter or not accepted for slaughter • Fish that are spilled or degraded after landing	• Milk spilled during pasteurization and processing • Food sorted out as not suitable for processing • Livestock trimming during slaughtering and industrial processing • Fish spilled or damaged during canning or smoking	• Food sorted out due to quality • Food spilled or damaged in market	• Food sorted out due to



Fonte: FAO

Rifiuti da cibo

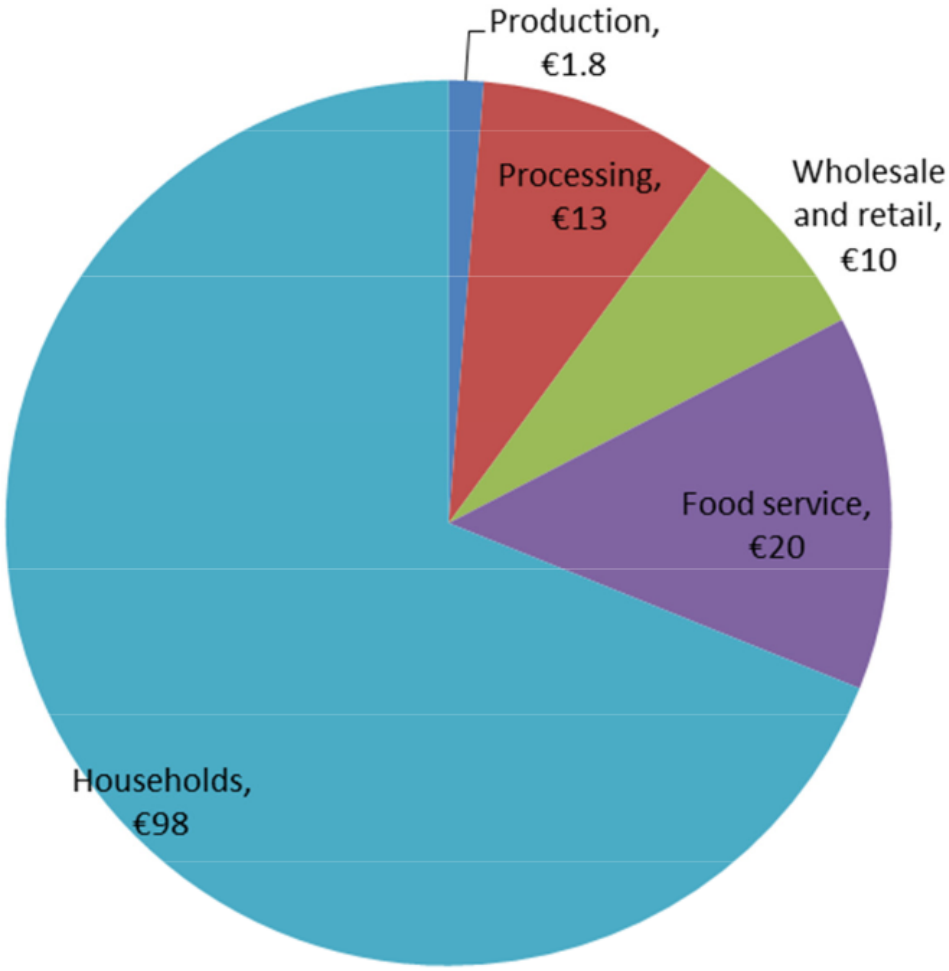
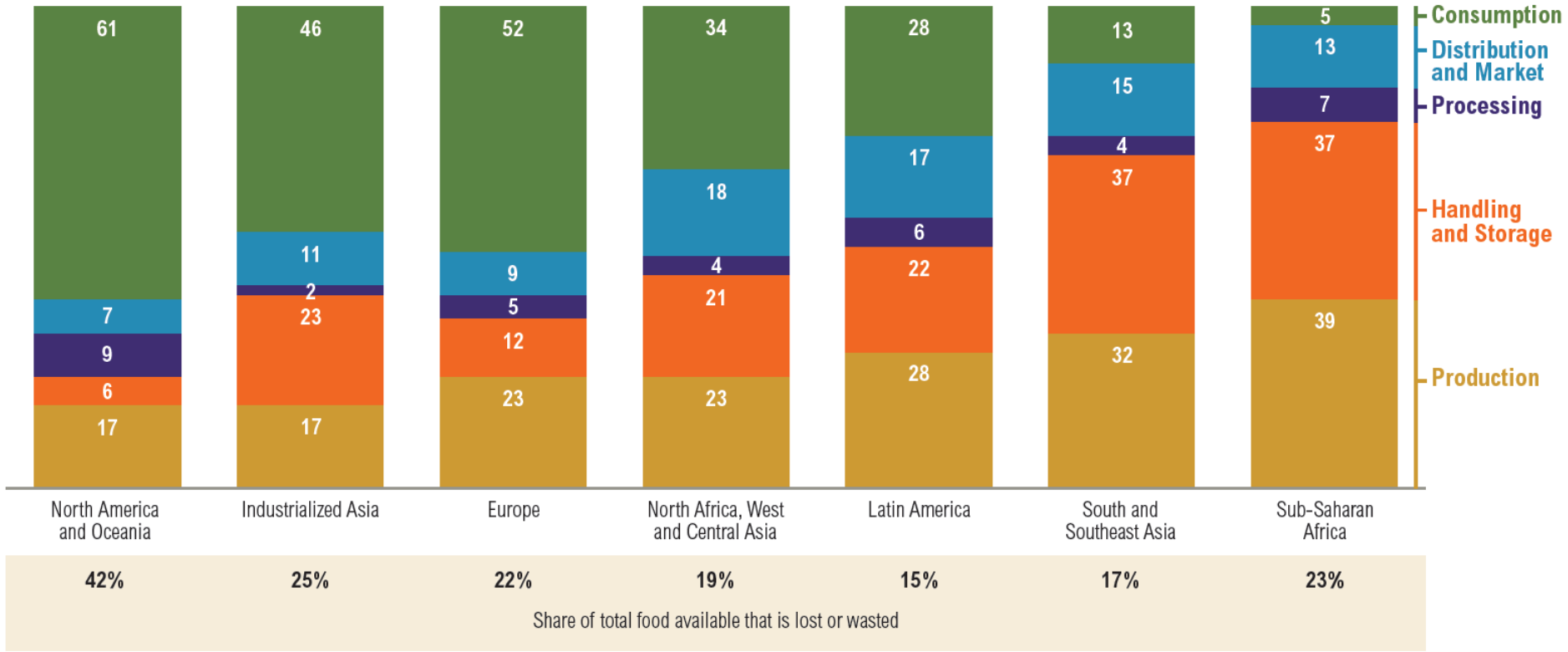


Figure 5. Costs associated with food waste by sector (values in billions of euros)

Fonte: Fusions (2016 – data refer to 2012)

Rifiuti da cibo



Fonte: FAO

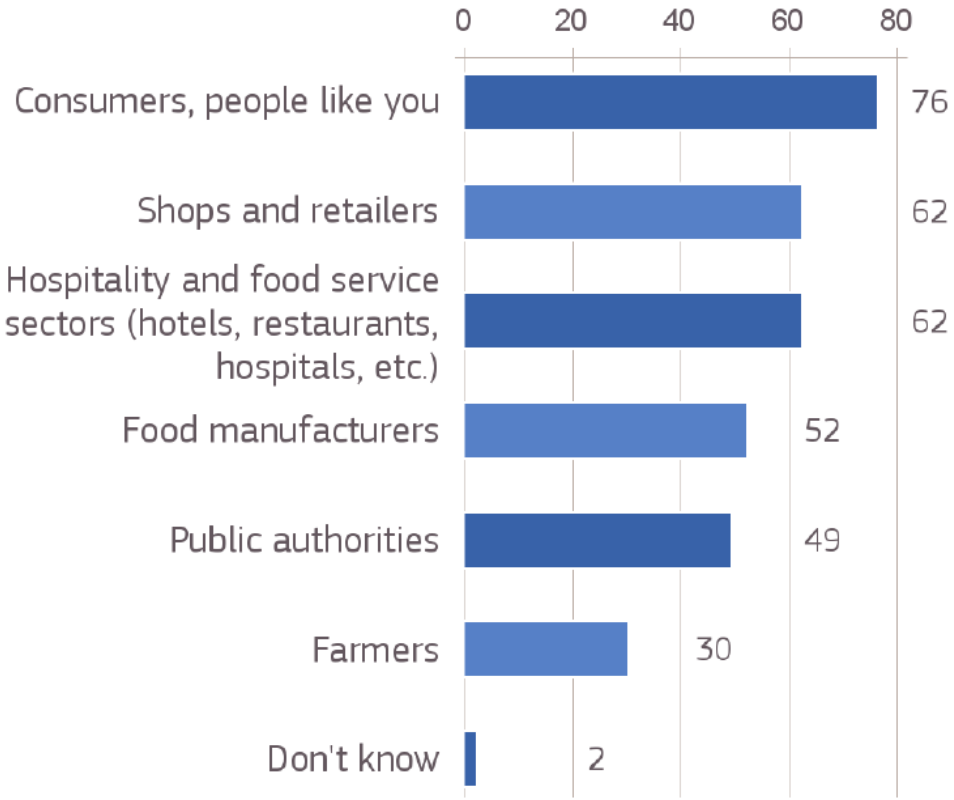
EU actions against food waste

- Impegno della C.E. a:
  - Elaborare una metodologia commune per misurare i rifiuti da cibo
  - Creare una nuova piattaforma che coinvolga sia gli Stati Membri che gli attori, incluse le NGO, coinvolte nella food chain
  - Chiarire la legislazione EU legata a rifiuti, cibo, oltre a facilitare le donazioni di cibo
  - Esaminare i possibili miglioramenti della food chain, con particolare attenzione ad etichettatura e date di scadenza.
- http://ec.europa.eu/food/safety/food_waste/stop/index_en.htm

Eurobarometer (1)

Q1 In Europe, about 100 million tonnes of food are wasted annually. Which of the following actors do you think have a role to play in preventing food waste? (MULTIPLE ANSWERS POSSIBLE)

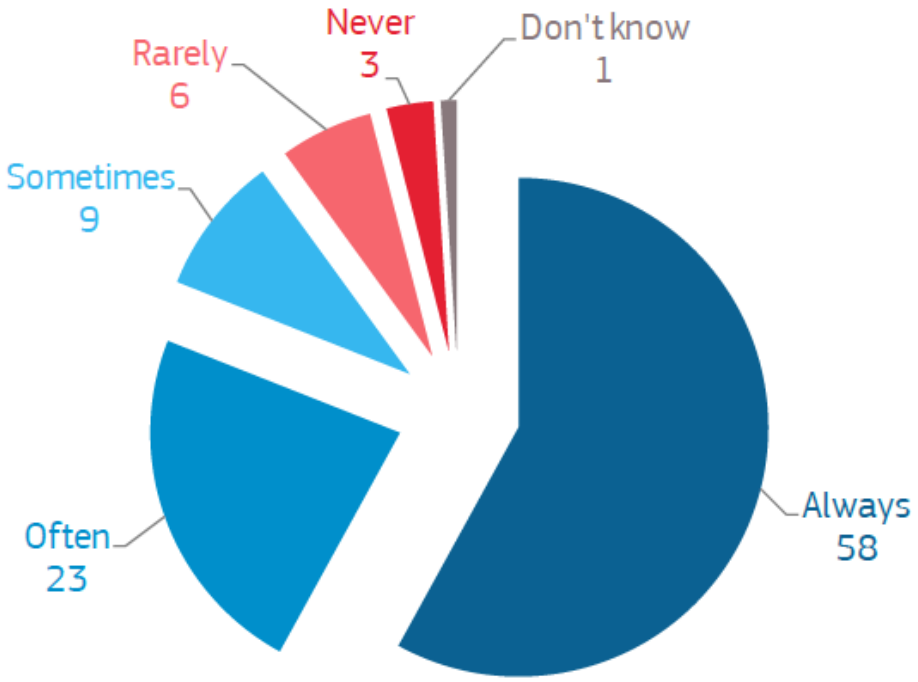
(% - EU)



Eurobarometer (2)

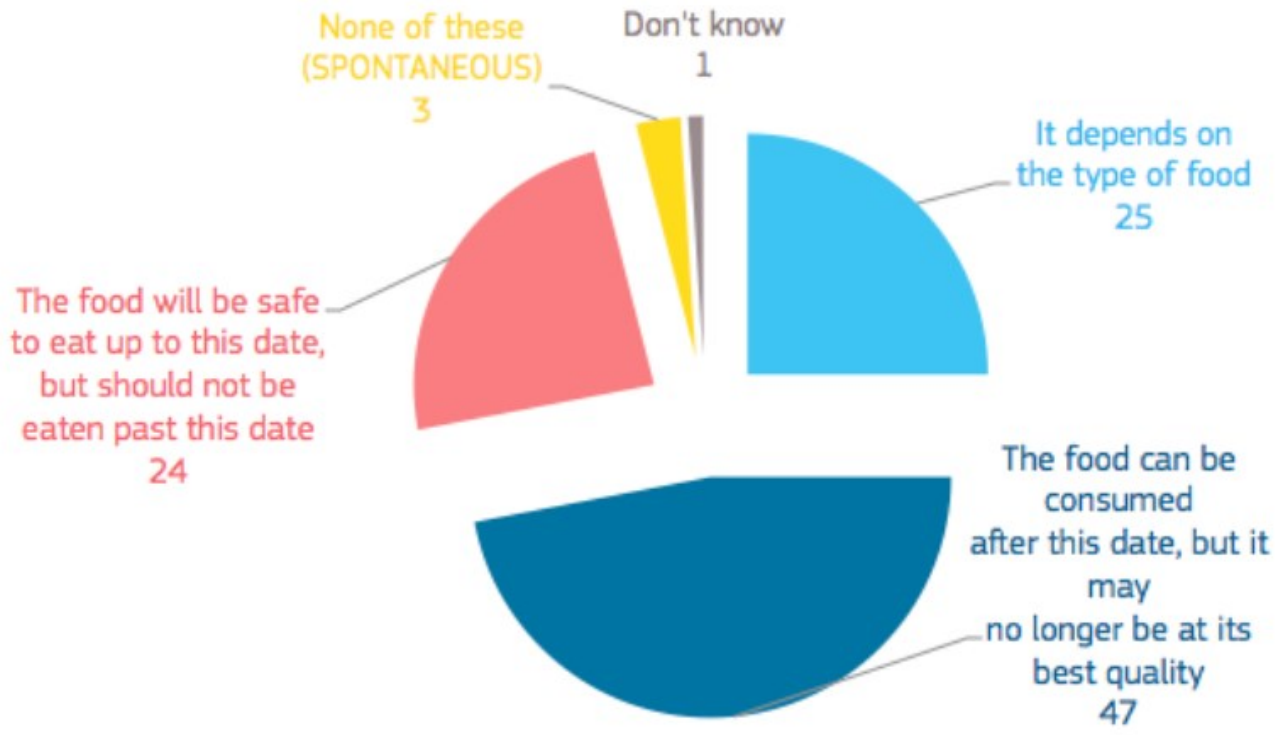
Q3 How often, if at all, do you look at "use by" or "best before" dates on food labels when shopping and preparing meals?

(% - EU)

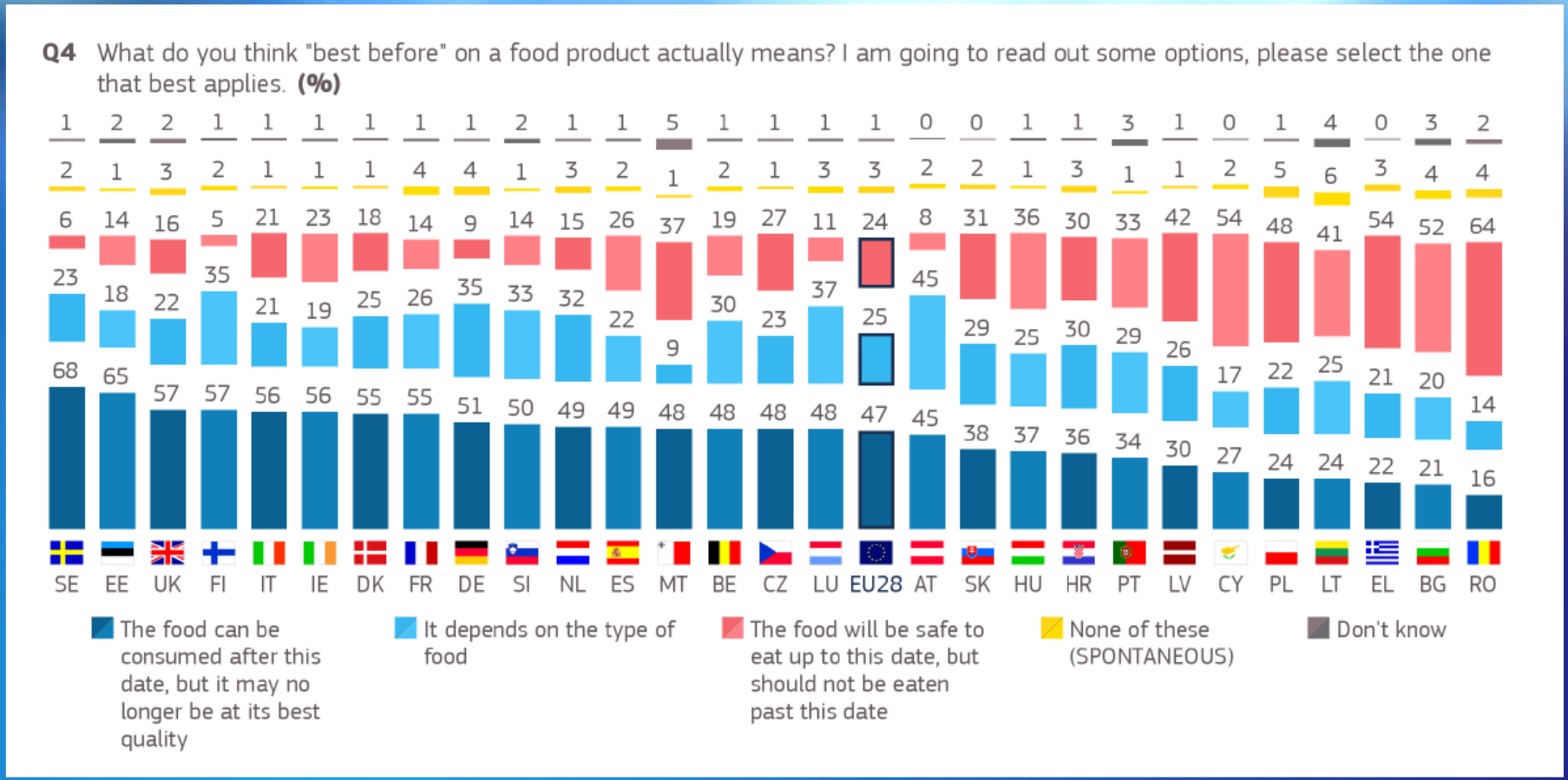


Eurobarometer (3)

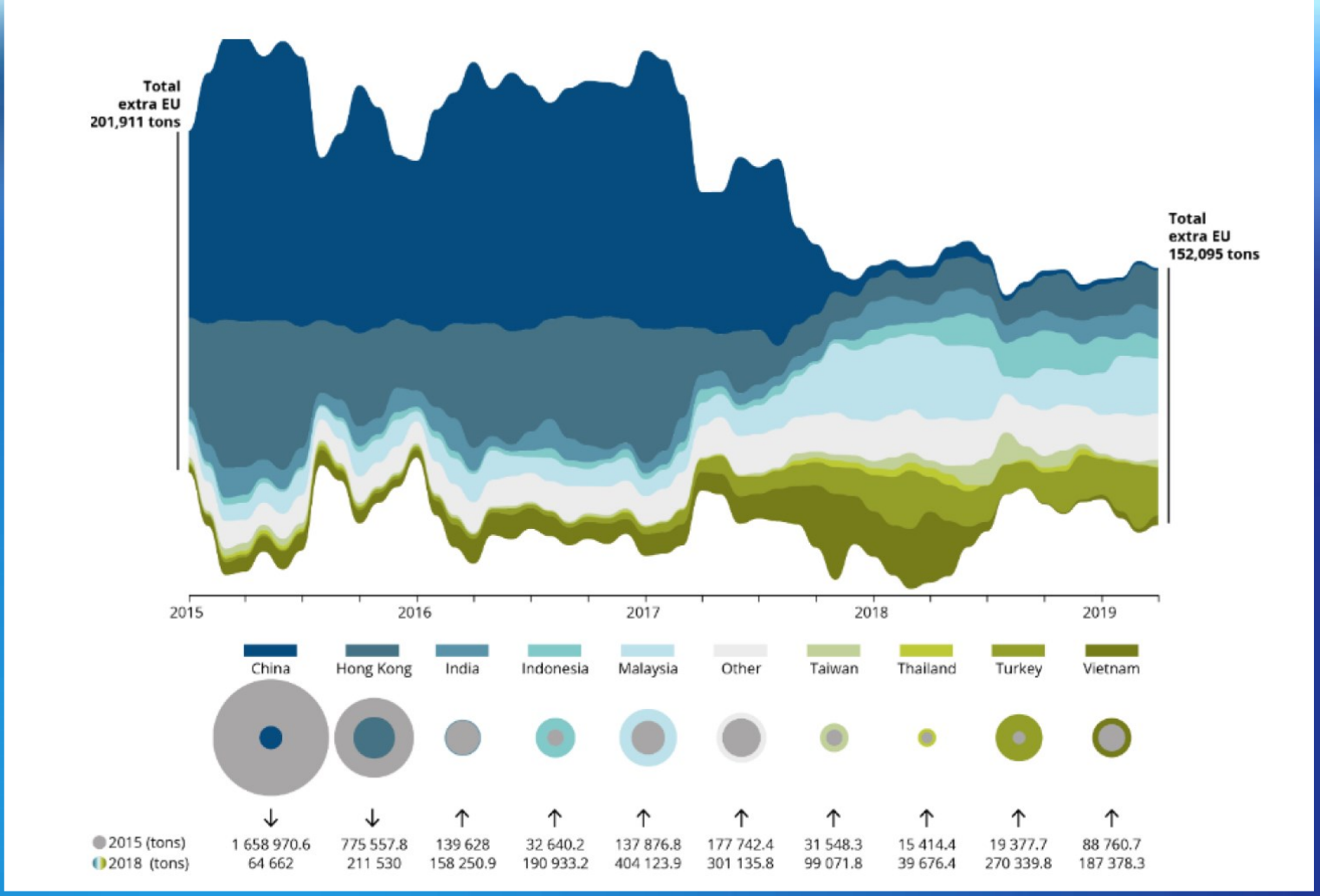
Q4 What do you think "best before" on a food product actually means?
I am going to read out some options, please select the one that best applies.
(% - EU)



Eurobarometer (4)



Commercio internazionale (ETC/WMGE, 2019)



Attitudine dei cittadini (C.E. 2018)