

# The Best Environmental Management Practices for Waste Management and the upcoming Green Best Practice Community

Learning from frontrunners – helping organisations improve waste management performance

**Paolo Canfora** – European Commission, Joint Research Centre  
Treviso, 22/03/2018 – Public conference of the COLLECTORS project



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# **The Best Environmental Management Practices for Waste Management and the upcoming Green Best Practice Community**

## **Content of this presentation**

Who we are and what we do

Best Environmental Management Practices (BEMPs)

BEMP examples on Waste Management

The Green Best Practice Community

# The Joint Research Centre (DG JRC)

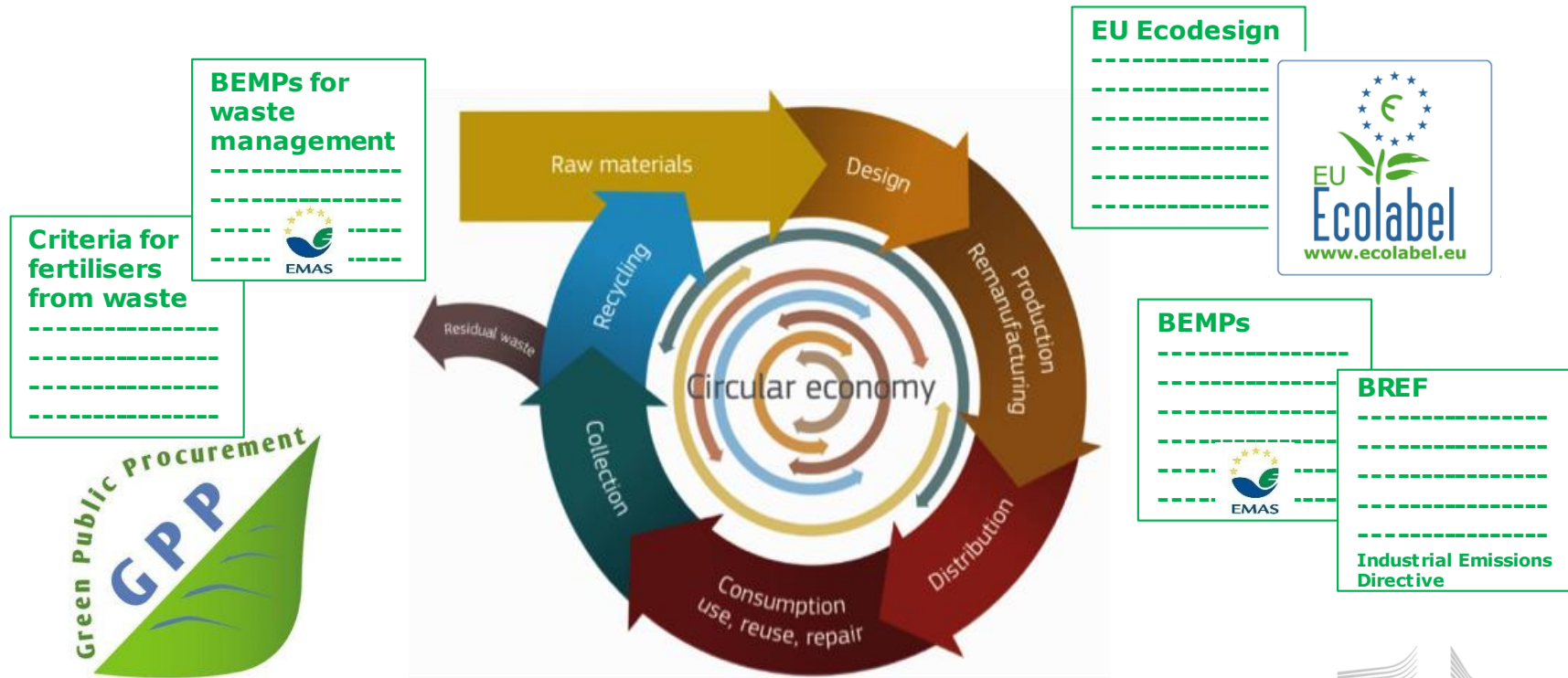
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- *Our mission is supporting EU policies with independent evidence throughout the whole policy cycle*
- *We work on nearly all science and policy areas*
- *We are policy neutral*

**3000 staff, 30+ nationalities, 6 locations**



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# The Joint Research Centre and the circular economy – some examples



# *Sectoral Reference Documents on Best Environmental Management Practice (BEMP)*

- Legal basis: **EMAS Regulation** (EC) No 1221/2009
- BEMPs support **all businesses and other organisations** to improve environmental performance, not only EMAS registered organisations



 **BEMP**

**Best practices to reduce  
enviromental impacts**

Already in Use by Best Environmental Performers



**Practical  
Guidance**



**Environmental  
Performance  
Indicators**

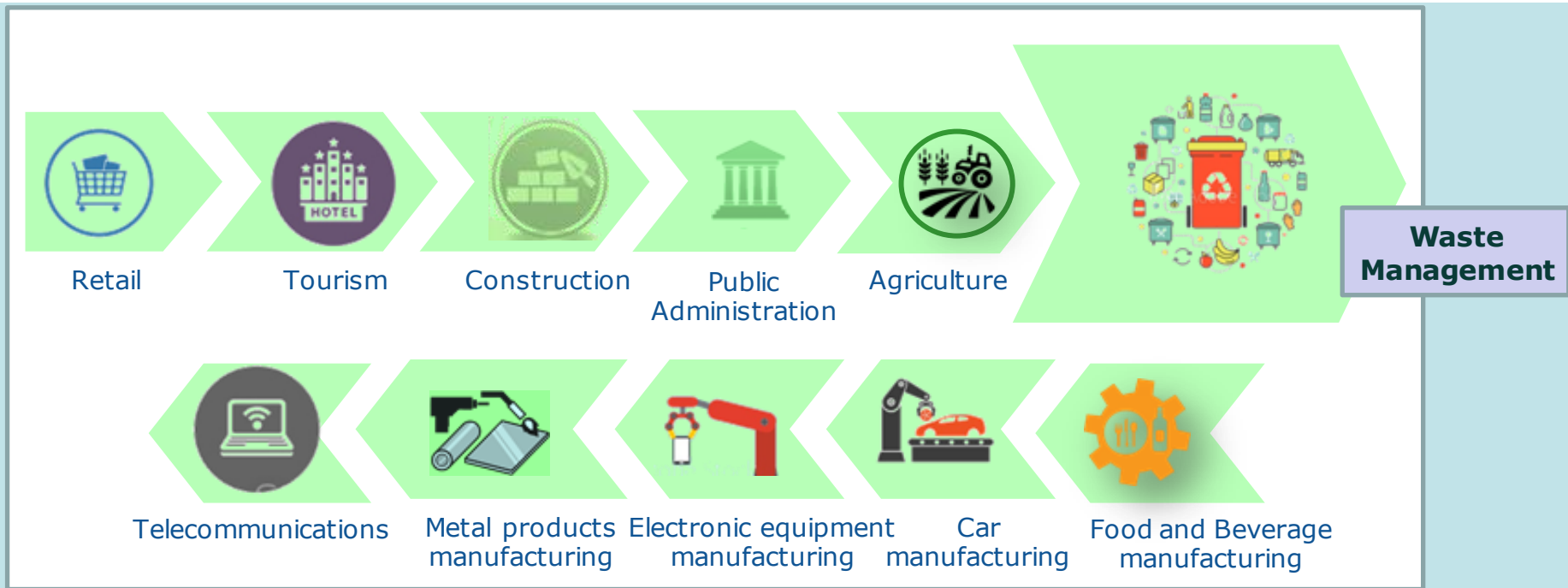


**Benchmarks  
of Excellence**



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# 11 Sectors

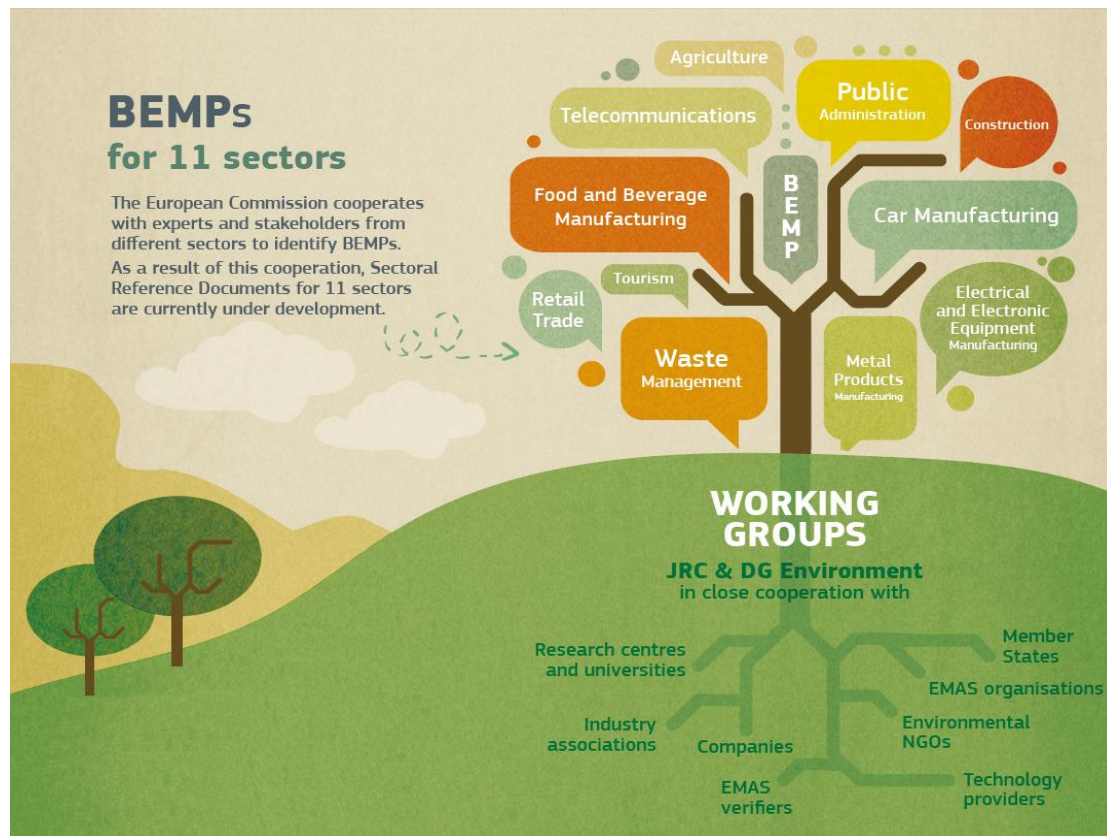




# We identify BEMPs...



# ...working together with stakeholders







# A development process based on stakeholder involvement

Three phases:

- **Desk research** (background collection of information from literature, frontrunner organisations and experts)
- **Information exchange** within the forum of a **Technical Working Group** comprising sector experts to identify and validate the best practices identified, the indicators and the benchmarks of excellence
- **Adoption process** (European Commission, member state representatives in the EMAS Committee, public consultation)

# Best Environmental Management Practices for the Waste Management sector

## The scope

Municipal solid waste

Construction and demolition waste

Healthcare waste

Waste  
management  
companies

Waste  
authorities  
(local  
authorities)

Waste  
management  
strategy



Waste  
prevention



Waste  
collection



Waste re-  
use

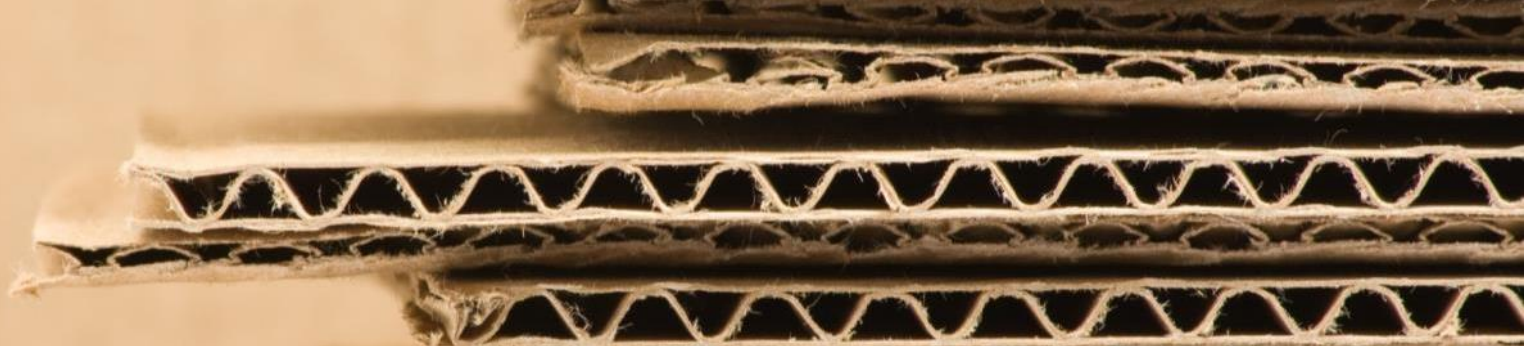


Waste  
treatment

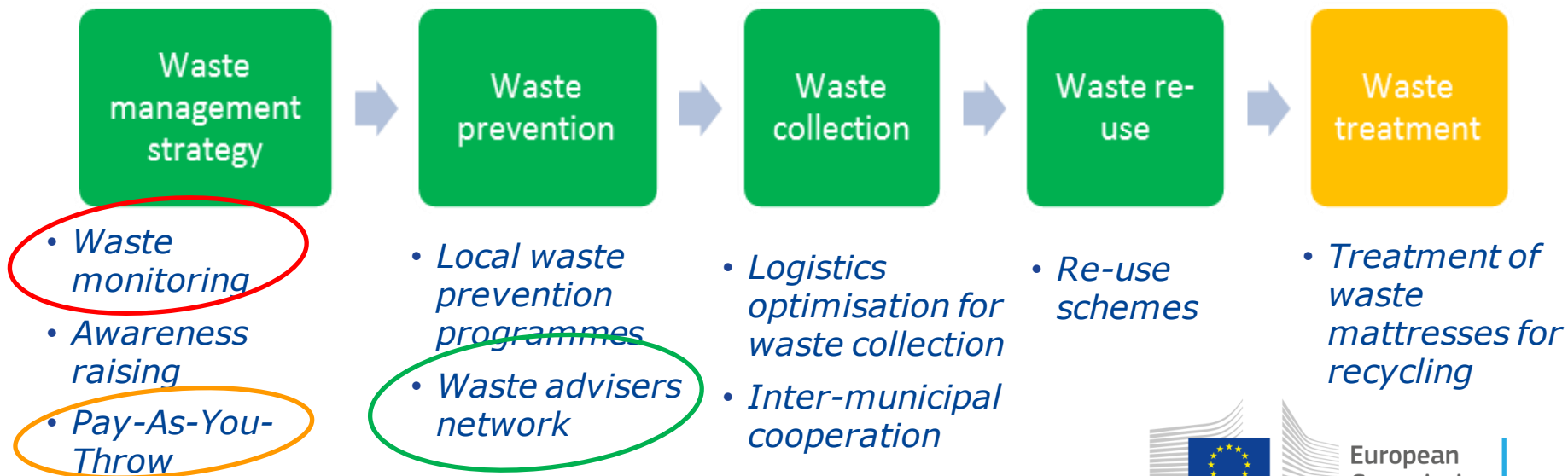


Material  
recycling, energy  
recovery, waste  
disposal





## A few examples of BEMPs for **municipal solid waste**



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# Advanced waste monitoring

- Data at **single waste stream level** and for the different waste management phases;
- Track information **along the entire value-chain** of the collected waste;
- Regular **composition analysis** of mixed waste;
- **Timely** availability of data;
- (Internal) **analysis** of data;
- **Web-based tools** for information to residents.

**Benchmark of excellence**  
**Composition analysis of mixed waste**  
is carried out at least 4 times in a year  
(during different seasons) **every 3 years**  
or after any substantial change of the  
waste management system.

*Future outlook: advanced waste monitoring + user identification at collection = web-based tool with data for each waste stream at single household level*



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# Example – Advanced waste collection monitoring

ANNO 2016

QUANTITA' RIFIUTI RACCOLTI

Val di Non (IT)

CER	Descrizione	GEN [t]	FEB [t]	MAR [t]	APR [t]	MAG [t]	GIU [t]	LUG [t]	AGO [t]	SET [t]	OTT [t]	NOV [t]	DIC [t]	TOTALE [ton.]	%	
Monthly data collection																
Frazione organica																
20013	rifiuti biodegradabili di cucine e bagni	169,120	155,880	173,440	167,200					183,000	181,440	172,620	175,400	2,161,860	12,33%	
20014	rifiuti biodegradabili da giardini e parco	54,760	28,300	137,160	266,970					262,580	155,920	283,380	113,860	2,252,270	12,84%	
Raccolte frazioni omogenee																
150101	imballaggi in carta e cartoncino	116,960	139,540	149,760	154,200					141,120	136,500	134,460	144,360	1,740,800	9,93%	
150101	carta congiunta	88,800	66,100	85,620	80,020	8,080	84,740	105,640	109,320	106,740	61,100	85,540	82,320	1,043,020	5,95%	
150102	vetro	0,000	0,000	0,000	14,200	0,000	0,000	0,000	15,120	0,000	0,000	0,000	14,960	44,280	0,25%	
200138	legno non contenente sostanze pericolose	83,630	64,820	123,830	129,110	142,030	135,190	126,920	187,650	119,510	113,490	109,690	84,970	1,420,840	8,10%	
200110	abbigliamento	6,060	0,000	7,180	6,820	7,180	7,660	0,000	0,000	9,060	13,400	7,840	4,800	70,000	0,40%	
200139	plastica	12,800	19,000	19,860	25,260	27,040	24,780	28,580	23,940	32,990	15,640	26,740	18,800	275,430	1,57%	
200140	metallo	28,110	25,430	44,910	46,990	49,520	37,740	48,490	53,230	45,760	40,810	54,680	42,450	518,120	2,95%	
170904	rifiuti misti da costruzione e demolizione	57,820	53,160	45,860	79,860	81,930	71,980	72,820	96,300	87,140	56,510	78,820	31,940	814,140	4,64%	
Imballaggi																
150102	imballaggi in plastica	58,380	53,000	65,780	72,700	88,960	70,910	70,540	86,260	72,980	67,900	73,340	69,620	850,370	4,85%	
150104	imballaggi metallici	1,200	4,080	8,240	19,440	4,100	9,000	14,340	12,580	10,220	10,640	13,340	6,620	123,800	0,71%	
150105	imballaggi in materiali composti (tetrapak)	7,400	8,580	7,380	6,800	8,800	6,820	7,060	9,100	5,580	9,520	6,460	5,420	90,980	0,52%	
150106	multimateriale	3,960	8,000	11,120	11,620	12,320	15,460	18,360	17,260	13,860	15,920	21,020	7,560	166,460	0,95%	
150107	imballaggi in vetro	0,140	103,460	92,420	76,000									1,265,920	7,22%	
RAEE																
200121*	tubi fluorescenti ed altri rifiuti contenenti Hg	0,000	0,140	0,228	0,000									2,322	0,01%	
200123*	apparecchiature fuori uso contenenti CFC	300	7,200	5,740	4,600									64,055	0,37%	
200135*	apparecchiature elettroniche			0,560	4,700									64,591	0,37%	
200136	apparecchiature elettroniche			19,700	16,000									238,171	1,36%	
Raccolte selettive																
080318	toner per stampa			0,513	0,254	0,435	0,025	0,361	0,120	0,312	0,170	0,301	0,410	3,045	0,02%	
200132	medicinali non controllati			0,897	0,473	0,339	0,108	1,101	0,386	0,508	0,220	0,366	0,608	5,216	0,03%	
200133*	batterie ed accumulatori			8,280	5,339	6,205	3,895	4,645	3,830	8,444	2,755	4,899	4,424	58,356	0,33%	
200134	batterie ed accumulatori			0,154	0,010	0,020	0,000	0,000	0,000	0,240	0,315	0,353	0,000	1,657	0,01%	
Altri rifiuti urbani non pericolosi																
200125	olio vegetale e grasso			0,170	0,870	1,580	1,230	0,630	3,040	0,000	0,520	1,415	0,500	12,065	0,07%	
200126	olio motore			0,390	1,560	2,340	1,950	0,000	0,000	5,850	0,000	0,000	0,780	16,770	0,10%	
200141	rifiuti prodotti dalla pulizia di camini e	41,520	18,480	25,480	21,840	19,880	21,400	0,000	27,880	0,000	0,000	27,520	25,460	229,460	1,31%	
200202	terra e roccia	0,000	0,000	0,000	0,000	0,000	0,000	26,660	0,000	0,000	0,000	0,000	0,000	26,660	0,15%	
160103	pneumatici fuori uso	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	12,900	16,010	0,000	0,000	28,910	0,16%	
Altri rifiuti urbani pericolosi																
160107*	liquori	0,020	0,045	0,202	0,504	0,4390	0,050	0,534	0,100	0,158	0,185	0,555	0,020	2,812	0,02%	
160504*	gas in contenitori a pressione	0,015	0,120	2,149	1,399	1,099	0,060	2,411	0,075	2,262	0,340	1,727	1,372	13,029	0,07%	
130204*	scarti di olio minerale per motori, ingranaggi	0,030	0,000	0,200	0,080	0,000	0,000	0,000	0,450	0,250	0,000	0,000	0,000	1,010	0,01%	
200127*	vernici, inchiostri, adesivi e resine	0,120	0,340	4,289	1,248	2,743	0,080	4,279	0,090	5,320	1,680	3,050	1,826	25,075	0,14%	
Raccolta indifferenziata																
200307	rifiuti ingombranti	40,990	54,140											52,640	895,140	5,10%
200301	rifiuti urbani non differenziati	225,170	209,080											233,020	3,008,840	17,16%
Totale Rifiuti Urbani differenziati														874,380	791,9930	
Totale Rifiuti Urbani indifferenziati														266,160	283,2200	
TOTALE RACCOLTA RIFIUTI URBANI														1,140,540	1,075,213	
% Raccolta Differenziata ANNO 2016														76,66%	75,06%	
Advanced waste monitoring is key for the calculation of meaningful indicators																
GEN FEB MAR APR MAG GIU LUG AGO SET OTT NOV DIC																
200303	residui della pulizia stradale	0,00	14,54											161,39		
TOTALE COMPLESSIVO con sabbie														17,696,875		
TOTALE COMPLESSIVO con sabbie																

Monthly data collection

Additionally, composition analysis of mixed waste every 3 months.

Data for 35 separately collected waste streams

Advanced waste monitoring is key for the calculation of meaningful indicators

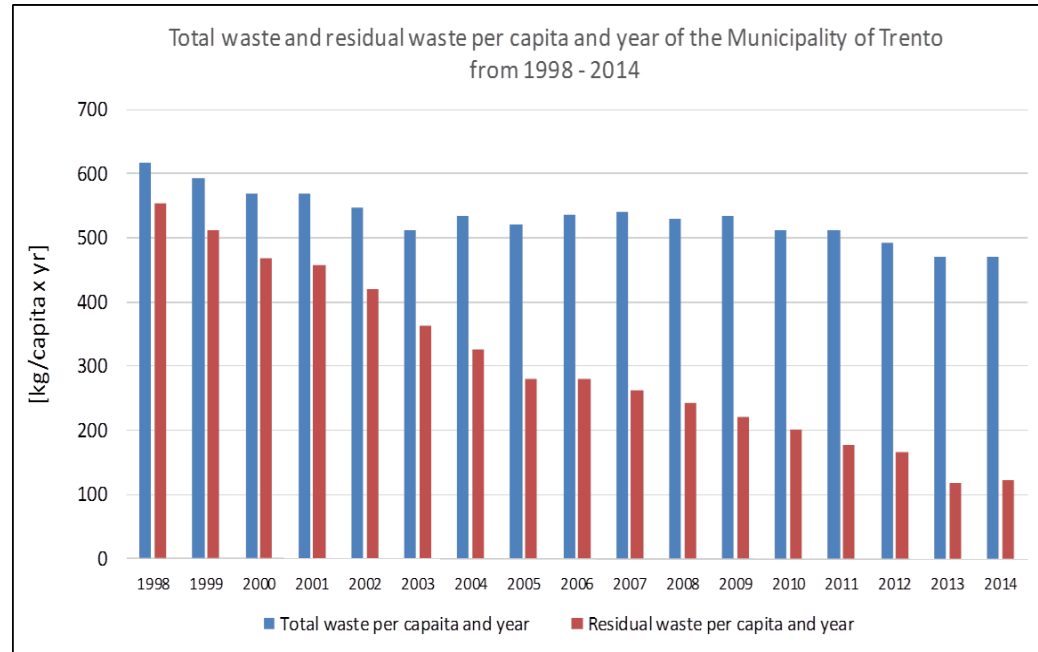




**Benchmark of excellence**  
A Pay-as-you-throw system is in place, according to which **at least 40% of the cost is charged** to the users of the waste collection system **depending on variable waste collected** factors (e.g. quantity of mixed waste collected).

## Pay-as-you-throw

- Introduce a system where citizens **pay per weight** or **per bag** of residual waste generated.
- Ensure that **infrastructure to collect and to process the recyclables** is available and efficient.
- **Organic waste** and **bulky waste** are also weighted.







# Establish a network of waste advisers

- Set up a local network of "**waste advisers**" to:
  - raise awareness on waste management;
  - offer a service to residents and entrepreneurs/small businesses;
  - gain a better understanding of what happens on the ground (drivers, reasons).
- Key features:
  - home/community **visits** (+ schools);
  - working **together** to identify possibilities to **reduce** waste generation;
  - improving source separation with practical **what goes where** sessions;
  - **focus on** waste streams that are considered more problematic (**food waste**, WEEE, bulky waste, etc.).

## **Benchmarks of excellence**

- A network of waste advisers is in place with at least **1 waste advisor per 20.000 inhabitants**.
- **Awareness campaigns** are systematically implemented for different types of target groups (e.g. pupils, general public, users of civic amenity sites) and the **annual budget** devoted to awareness raising activities is at least **5€ per resident**.



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# Establish a network of waste advisers

## Examples of frontrunners

Styria (AT)



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# Establish a network of waste advisers

## Examples of frontrunners

### Styria (AT)

*Very dense network: an adviser every 20,000 inhabitants*

*Target: children (including schools and kindergartens), private households and SMEs*



### Nürnberg (DE)

- *Waste advisers are both employees and volunteers*
- *Multi-lingual awareness raising for foreigners (English, Turkish, Russian, Arabic, Farsi, Amharic, Kurdish...)*
- *Mobile information centre*





# Common indicators for Municipal Solid Waste

## Generation

Total municipal solid waste generation  
[kg/capita/year]

## Collection

Amount of mixed waste collected  
[kg/capita/year]

Bio-waste in mixed waste [kg/capita/year]

Capture rate for glass [%]

Impurity rate for separately collected glass [%]

Capture rate for paper/cardboard [%]

## Treatment

Waste sent to energy recovery and/or disposal  
[kg/capita/year]

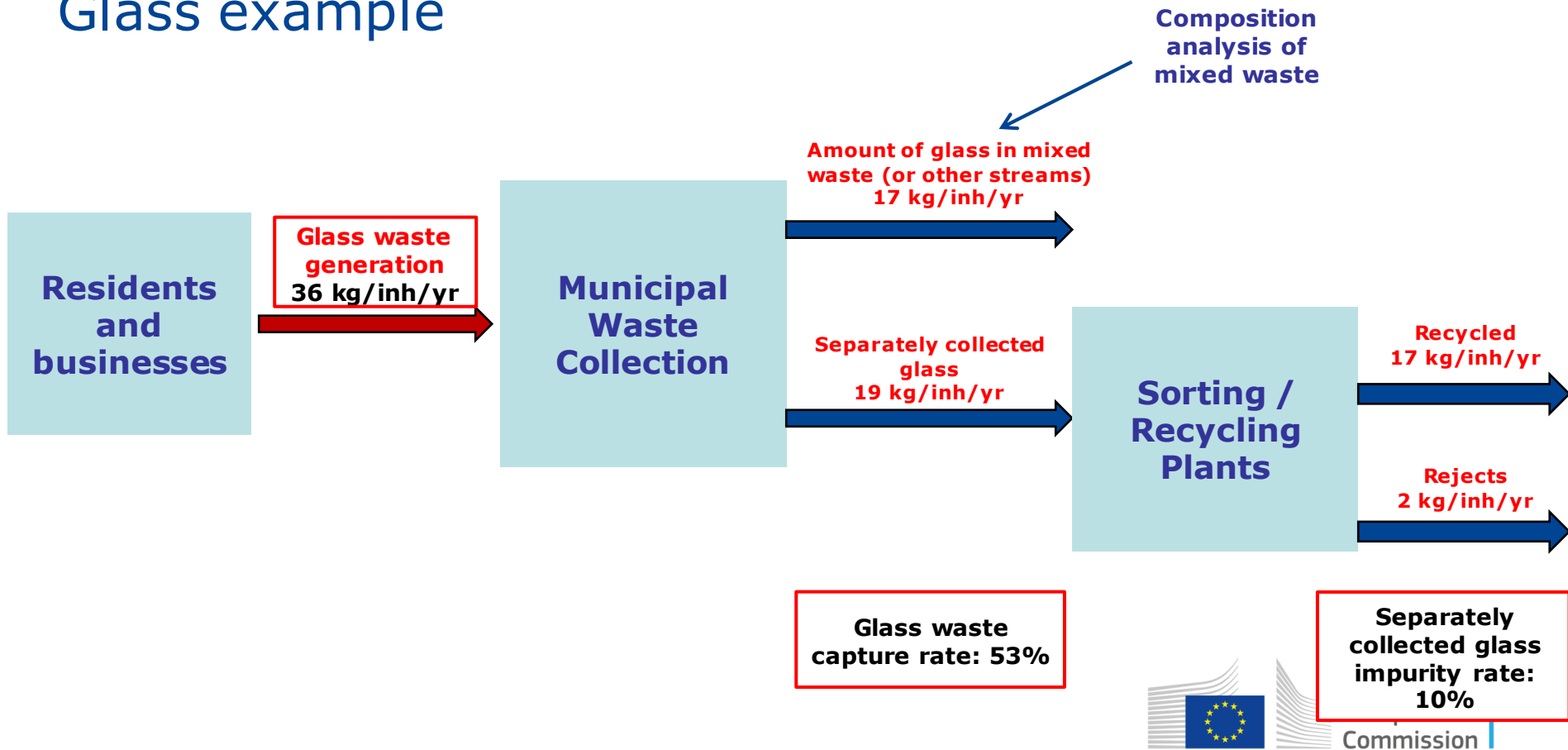
Waste sent to disposal  
[kg/capita/year]



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# Example: use of capture rates and impurity rates

## Glass example



# Common BoE for MSW



## Municipal solid waste (MSW) generation - Benchmark of excellence:

The annual generation of MSW in the territory administered or managed (collected by all different waste collection systems available in the area) is:

- lower than 75% of the national average of municipal waste generation, using the national definition of municipal waste of their own country; **or**
- lower than 360 kg/capita, if calculated only for the following waste fractions: (i) organic/biowaste (e.g. green cuttings, food, kitchen waste), (ii) co-mingled packaging, (iii) paper and cardboard, (iv) glass, (v) plastics, (vi) metals, (vii) bulky, (viii) WEEE and (ix) mixed waste.

**Frontrunners:** Ljubljana (SI), Bristol (UK), Val di Non (IT)

## MSW sent to energy recovery and/or disposal - Benchmark of excellence:

The annual amount of collected mixed MSW sent to energy recovery and/or disposal is:

- lower than 15% of the national average of municipal waste generation; **or**
- lower than 70 kg/capita.

**Frontrunners:** Treviso (IT), County of Aschaffenburg (DE), Val di Non (IT)

## MSW sent to disposal - Benchmark of excellence:

The annual amount of MSW sent to disposal is:

- lower than 2% of the national average of municipal waste generation; **or**
- lower than 10 kg/capita.

**Frontrunners:** Vienna (AT), Ljubljana (SI), County of Aschaffenburg (DE)



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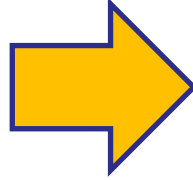


# From BEMP reports to an online tool & community

- *BEMPs for 11 sector*
- *Interest from stakeholders*

*But there are improvement opportunities:*

- Reports are not the best format for communication
- When does BEMP need update?
- Need to sustain motivation and minimise efforts for stakeholders



## ***Development of the new approach***

- *On-line tool to access information*
- *Community*

*Features:*

- More user friendly outputs
- Systematic monitoring and stakeholder involvement
- More flexible information exchange



# TAKE A GREEN STEP

## BEMPs made easy: introducing [takeagreenstep.eu](https://takeagreenstep.eu)

The one-stop online place for tips on how to make your **hotel and restaurant** more eco-friendly.

Funnelling readers to the relevant information, [takeagreenstep.eu](https://takeagreenstep.eu) includes:

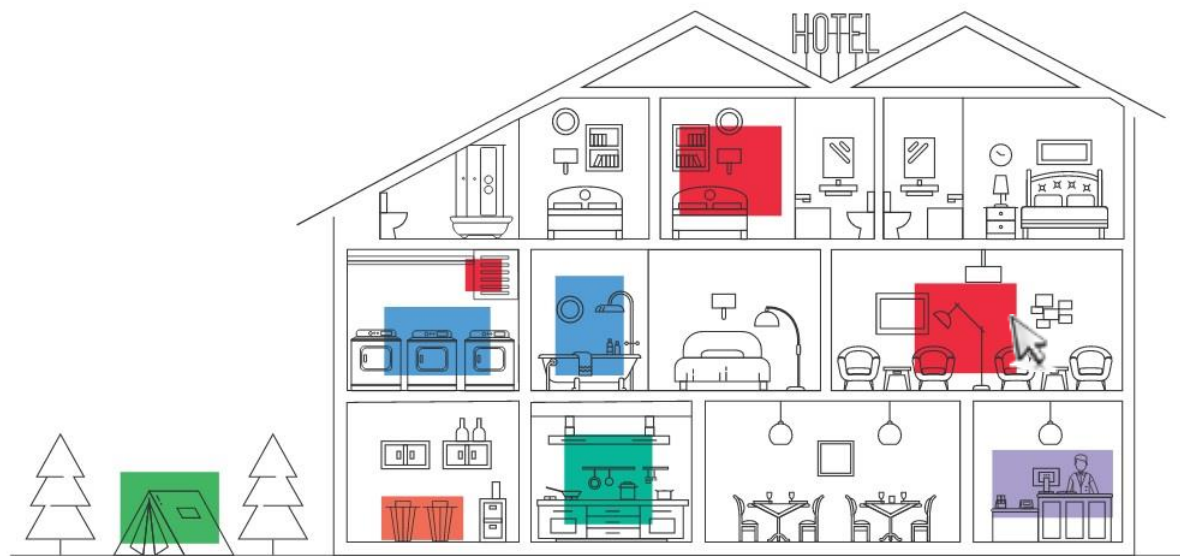
- Introductory **articles** on big and small green steps for your business
- To go further... **Case studies** showing how others have achieved it
- To get the full technical details... References to the **full Best Practices** in an easy-to-read format
- As well as **practical tools** you can use immediately such as signs for guests and checklists for staff

In 5 languages



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# TAKE A GREEN STEP





# The concept for a Green Best Practice Community

Continuous  
identification of  
BEMPs

Getting the  
message out

Broaden  
stakeholder  
engagement

Are there new best  
practices in the  
sector?

Are some BEMPs  
outdated?

*Let frontrunners and  
organisations tell us*

Meet actual needs of  
organisations

User friendly format

Partner with relevant  
multipliers

Stimulate  
contributions

Engage key  
sectoral actors

**Develop a community**



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A very first mock-up

## WELCOME

Nunc vestibulum condimentum nisi. Nam erat diam, suscipit vitae nisl eget, tempus tempus eros. Proin vel diam convallis, bibendum mi id, faucibus eros. Donec mi nisl, auctor quis aliquet a, ultricies vel metus. Ut rhoncus nulla augue, in egestas metus fringilla non. Sed sit amet felis dignissim, ornare elit vel, mattis augue. In adipiscing euismod purus id rutrum. Nulla facilisi. Nulla vitae dui lectus.

## SECTOR

### TOURISM



### WASTE MANAGEMENT



### PUBLIC ADMINISTRATION



### FOOD AND BEVERAGE



## NEWS

### HEADING

Nunc vestibulum condimentum nisi.

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### HEADING

Nunc vestibulum condimentum nisi.

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Content available in  
multiple languages

TAKE A GREEN STEP

A very first mock-up

## WELCOME

Nunc vestibulum condimentum nisi. Nam erat diam, suscipit vitae nisl eget, tempus tempus eros. Proin vel diam convallis, bibendum mi id, faucibus eros. Donec mi nisl, auctor quis aliquet a, ultricies vel metus. Ut rhoncus nulla augue, in egestas metus fringilla non. Sed sit amet felis dignissim, ornare elit vel, mattis augue. In adipiscing euismod purus id rutrum. Nulla facilisi. Nulla vitae dui lectus.

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### TOURISM



### WASTE MANAGEMENT



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### TOURISM



### WASTE MANAGEMENT



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### FOOD AND BEVERAGE



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Possibility to filter best practices according to keywords

## SECTOR

### TOURISM



### WASTE MANAGEMENT



### PUBLIC ADMINISTRATION



### FOOD AND BEVERAGE



## NEWS

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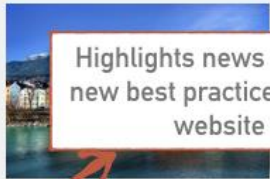
## WELCOME

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Possibility to filter best practices according to keywords

## SECTOR

TOURISM



Highlights news such as new best practices on the website

WASTE MANAGEMENT



PUBLIC ADMINISTRATION



FOOD AND BEVERAGE



## NEWS

HEADING

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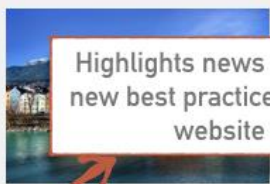
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Possibility to filter best practices according to keywords

## SECTOR

TOURISM



Highlights news such as new best practices on the website

WASTE MANAGEMENT



PUBLIC ADMINISTRATION



FOOD AND BEVERAGE



Periodical newsletter providing relevant best practices in "pills"

## NEWS

HEADING

Nunc vestibulum condimentum nisi.

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HEADING

Nunc vestibulum condimentum nisi.

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## WASTE MANAGEMENT

SUBMIT 

Municipal solid waste

Construction and demolition waste

Healthcare waste

Waste  
management  
companies

Waste  
authorities  
(local)



## ARTICLES

FIRST STEPS ON SUSTAINABLE  
MUNICIPAL WASTE MANAGEMENT  
Nunc vestibulum condimentum  
nisi.

[Read more](#)

### HEADING

Nunc vestibulum condimentum  
nisi.

[Read more](#)



TRAINING KIT



FORUM




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A very first mock-up

## WASTE MANAGEMENT

SUBMIT 

Municipal solid waste

Construction and demolition waste

Articles summarising the content of one or some best practices (e.g. tips on the first steps to improve environmental performance)

Waste management companies

Waste authorities (local)

Waste collection

Waste re-use

Waste treatment

Material recycling, energy recovery, waste disposal

## ARTICLES

FIRST STEPS ON SUSTAINABLE MUNICIPAL WASTE MANAGEMENT  
Nunc vestibulum condimentum nisi.

[Read more](#)

HEADING  
Nunc vestibulum condimentum nisi.

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TRAINING KIT



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## WASTE MANAGEMENT

SUBMIT 

Municipal solid waste

Construction and demolition waste

Waste  
management  
panies

Waste  
authorities  
(local)

Articles summarising the content of one or some best practices (e.g. tips on the first steps to improve environmental performance)

Training kit with presentations about the best practices to help practitioners to train or inform organisations

Waste  
treatment

Material  
recycling, energy  
recovery, waste  
disposal

### ARTICLES

FIRST STEPS ON SUSTAINABLE  
MUNICIPAL WASTE MANAGEMENT  
Nunc vestibulum condimentum  
nisi.

[Read more](#)

HEADING  
Nunc vestibulum condimentum  
nisi.

[Read more](#)



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FORUM




European  
Commission



A very first mock-up

## WASTE MANAGEMENT

SUBMIT 

Municipal solid waste

Construction and demolition waste

Waste  
management  
panies

Waste  
authorities  
(local)

Articles summarising the content of one or some best practices (e.g. tips on the first steps to improve environmental performance)

Training kit with presentations about the best practices to help practitioners to train or inform organisations

Waste  
treatment

Forum online where organisations can exchange experiences with JRC team and among each other

### ARTICLES

FIRST STEPS ON SUSTAINABLE MUNICIPAL WASTE MANAGEMENT  
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JOIN THE COMMUNITY

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# TAKE A GREEN STEP



## WASTE MANAGEMENT

Municipal solid waste

Construction and demolition waste

Waste management  
authorities (local)  
companies

Articles summarising the content of one or some best practices (e.g. tips on the first steps to improve environmental performance)

Training kit with presentations about the best practices to help practitioners to train or inform organisations

Helpdesk where organisations can write about their situation to be pointed to the relevant best practices and to relevant frontrunners

SUBMIT

Forum online where organisations can exchange experiences with JRC team and among each other

Waste treatment

## ARTICLES

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## TAKE A GREEN STEP

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### WASTE MANAGEMENT

SUBMIT

Municipal solid waste

Construction and

Healthcare waste

Waste  
management  
strategy

1. Cost benchmarking
2. Advanced waste monitoring
3. Pay-As-You-Throw
4. Performance-based waste management contracting
5. Awareness raising
6. Establish a network of waste advisers
7. Home and community composting

Waste  
authorities

Energy  
waste

### ARTICLES

FIRST STEPS ON SUSTAINABLE  
WASTE MANAGEMENT

Nunc vestibulum condimentum  
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## BEMP: ESTABLISH A NETWORK OF WASTE ADVISERS

Set up a local network of “waste advisers” to:

- raise awareness on waste management;
- offer a service to residents and entrepreneurs/small businesses;
- gain a better understanding of what happens on the ground (drivers, reasons).

Key features:

- home/community visits (+ schools);
- working together to identify possibilities to reduce waste generation;
- improving source separation with practical what goes where sessions;
- focus on waste streams that are considered more problematic (food waste, WEEE, bulky waste, etc.).

COMMENT

Send

## CASE STUDIES

STYRIA 

- Very dense network: an adviser every 20,000 inhabitants
- Target: children (including schools and kindergartens), private households and SMEs



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SUBMIT 

## INDICATORS

- Share of population in the waste management catchment area having contact with waste advisers over a given period of time (e.g. % population per month)
- Number of waste advisers per 100,000 inhabitants

## BENCHMARKS

- A network of waste advisers is in place with at least 1 waste advisor per 20,000 inhabitants



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## TAKE A GREEN STEP

Possibility to propose a BEMP, indicator, benchmark or case study (if your organisation is implementing a best practice and you would like to be featured in the website)

SUBMIT:

BEMP

Indicator  
Benchmark  
Case study

Information:

<insert data>

Include:

+ Indicator  
+ Benchmark  
+ Case study

Associate to:

+ BEMP  
+ Indicator  
+ Benchmark  
+ Case study

SUBMIT 

### INDICATORS

- Share of population in the waste management catchment area having contact with waste advisers over a given period of time (e.g. % population per month)
- Number of waste advisers per 100,000 inhabitants

### BENCHMARKS

- A network of waste advisers is in place with at least 1 waste advisor per 20,000 inhabitants

### BEMP: ESTABLISH

Set up a local network

- raise awareness
- offer a service to residents
- gain a better understanding

Key features:

- home/community
- working together
- improving source
- focus on waste separation, WEEE, bulky waste

COMMENT

### CASE STUDIES

#### STYRIA

- Very dense
- Target: children (including schools and kindergartens), private households and SMEs



JRC SCIENCE FOR POLICY REPORT

## Best Environmental Management Practices for the Waste Management Sector

*Learning from frontrunners*

Dri M., Canfore P., Antonopoulos I. S., Gaudillat P.

March 2018



Download the BEMPs for waste management:  
<http://susproc.jrc.ec.europa.eu/activities/emas/documents/WasteManagementBEMP.pdf>

Get in touch with us at  
[jrc-emas-srd@ec.europa.eu](mailto:jrc-emas-srd@ec.europa.eu)  
to be involved in the Green  
Best Practice Community



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# Thanks

Any questions? Interested to stay in touch?

You can reach me at



[@PaoloCanfora](#)



[paolo.canfora@ec.europa.eu](mailto:paolo.canfora@ec.europa.eu)



- <http://susproc.jrc.ec.europa.eu/bemp>
- <https://ec.europa.eu/jrc/en/research-topic/best-environmental-management-practice>



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