Waste: Local Actions with Global Effects

RIO 22 June 2012

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Analysis and data processing developed with the support of

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WasteWaterEnergy Engineering

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Potential markets

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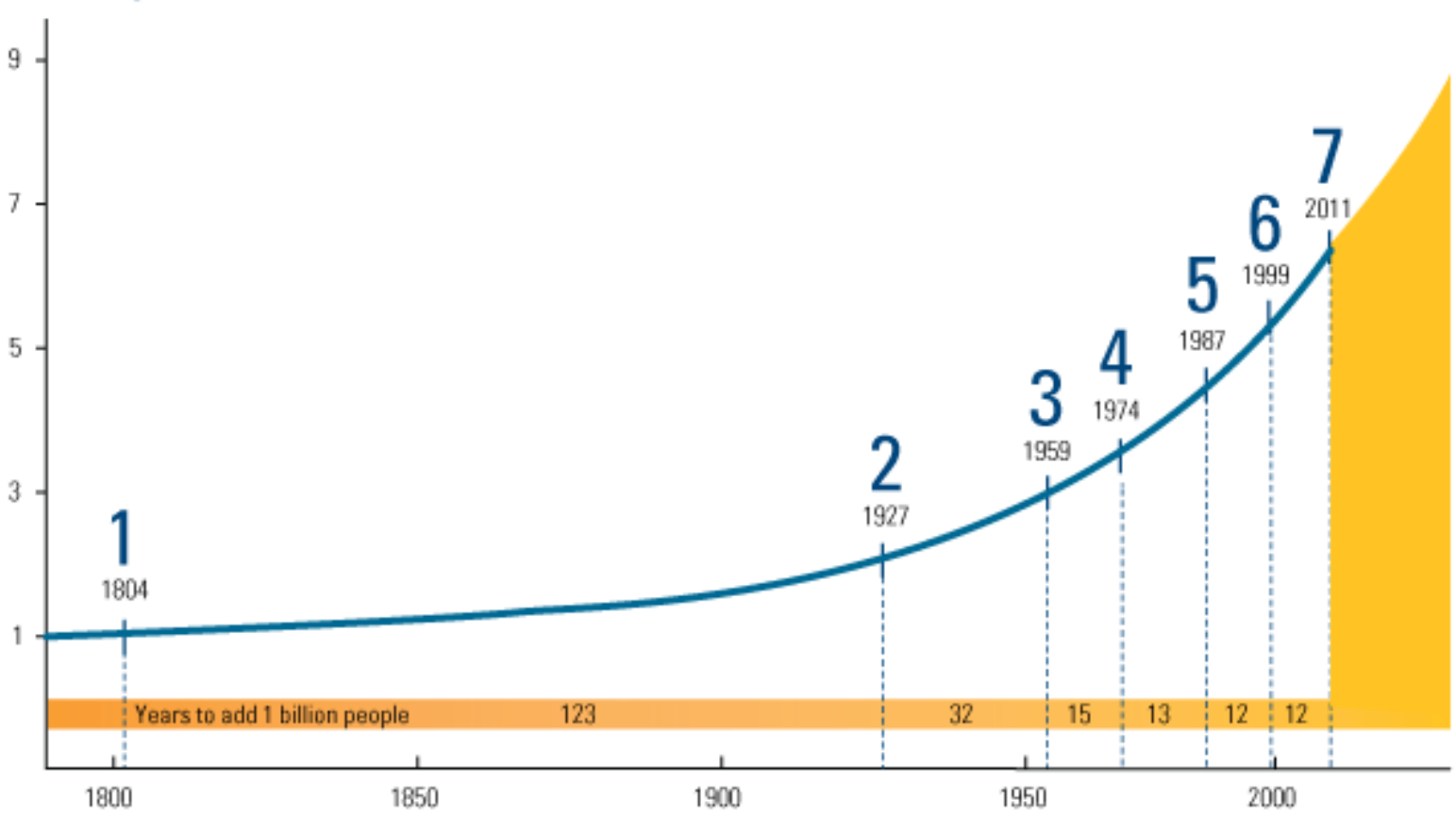
Austria, best practices to avoid landfill

Other best practice

Population Trend

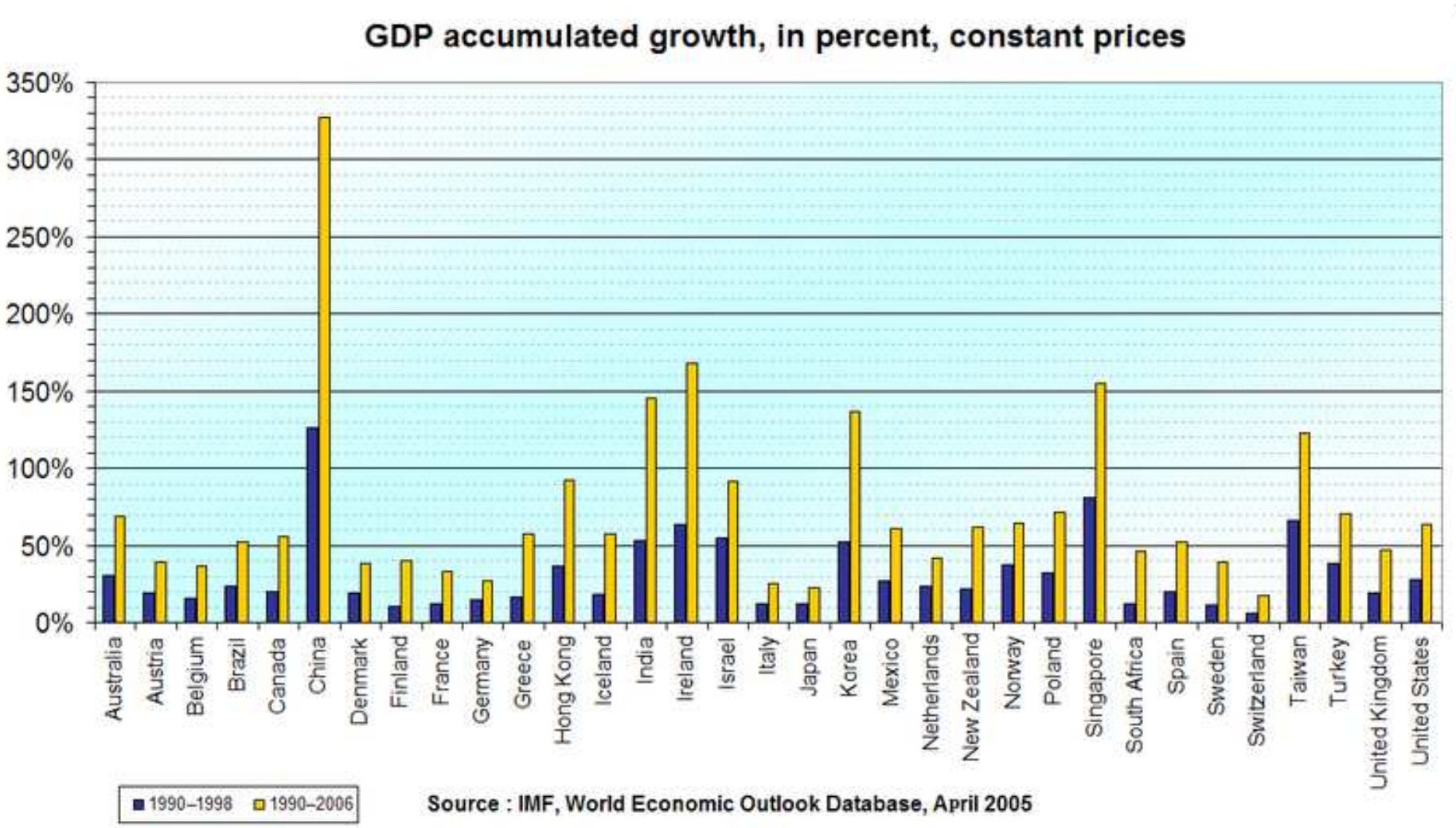
- **Growth up to 10 billion by 2050**



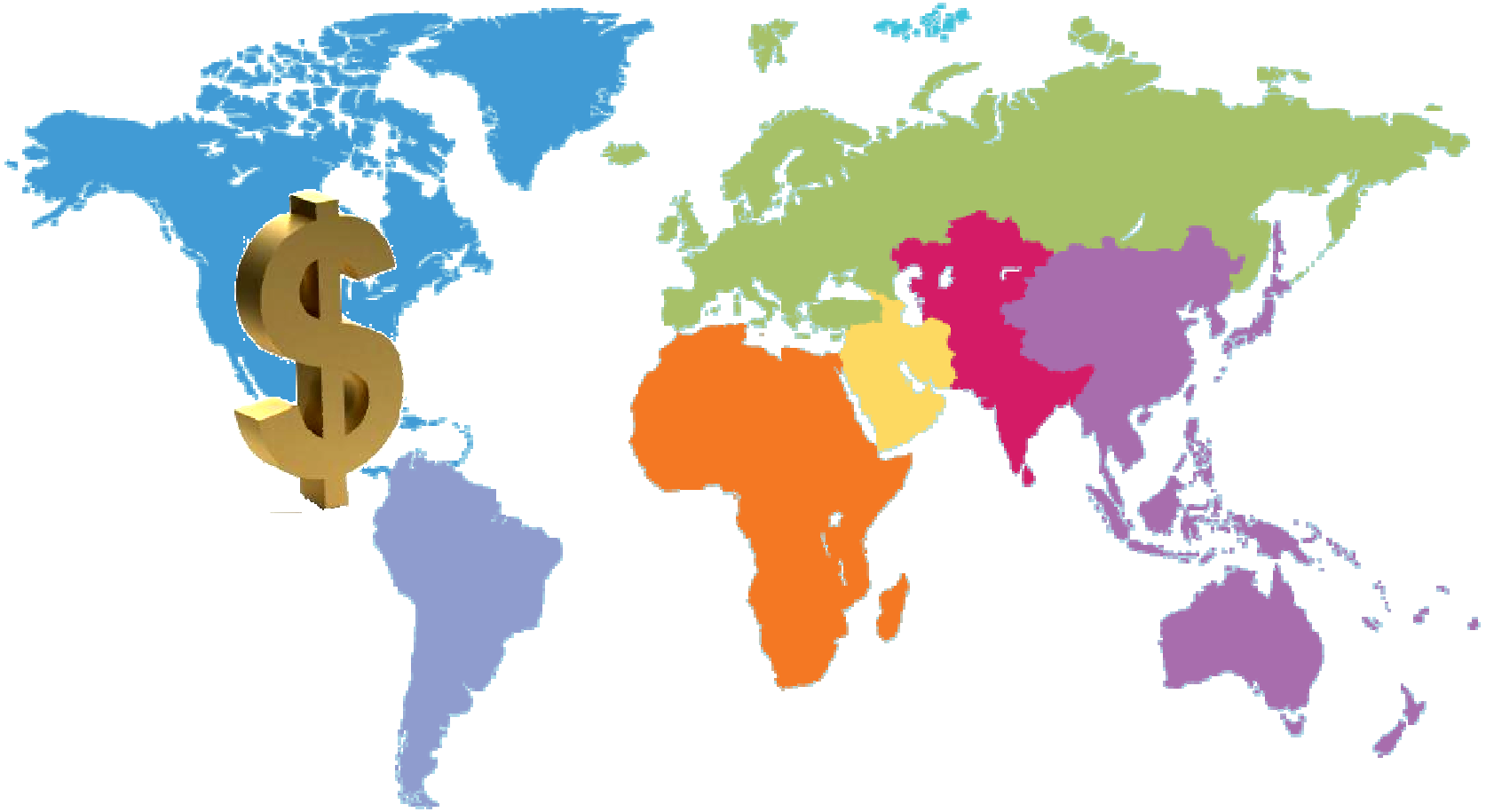
Source: UNFPA, the United Nations Population Fund.

Population Trend - Details

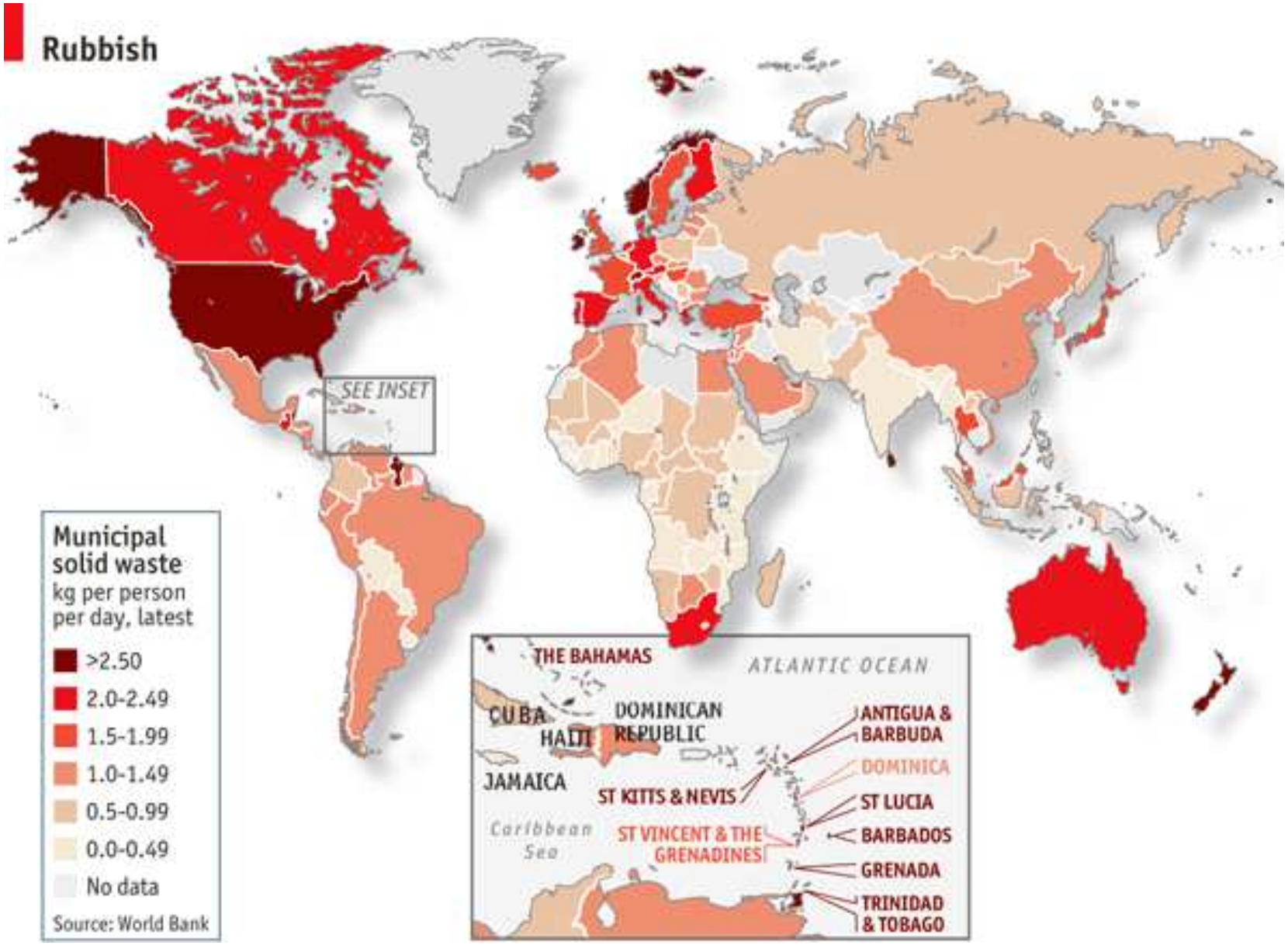
- **World's Emerging Middle Class Consumption is Growing**



The “new” Economic Path



A global comparison of MSW – Municipal Solid Waste



http://www.economist.com/blogs/graphicdetail/2012/06/daily-chart-3

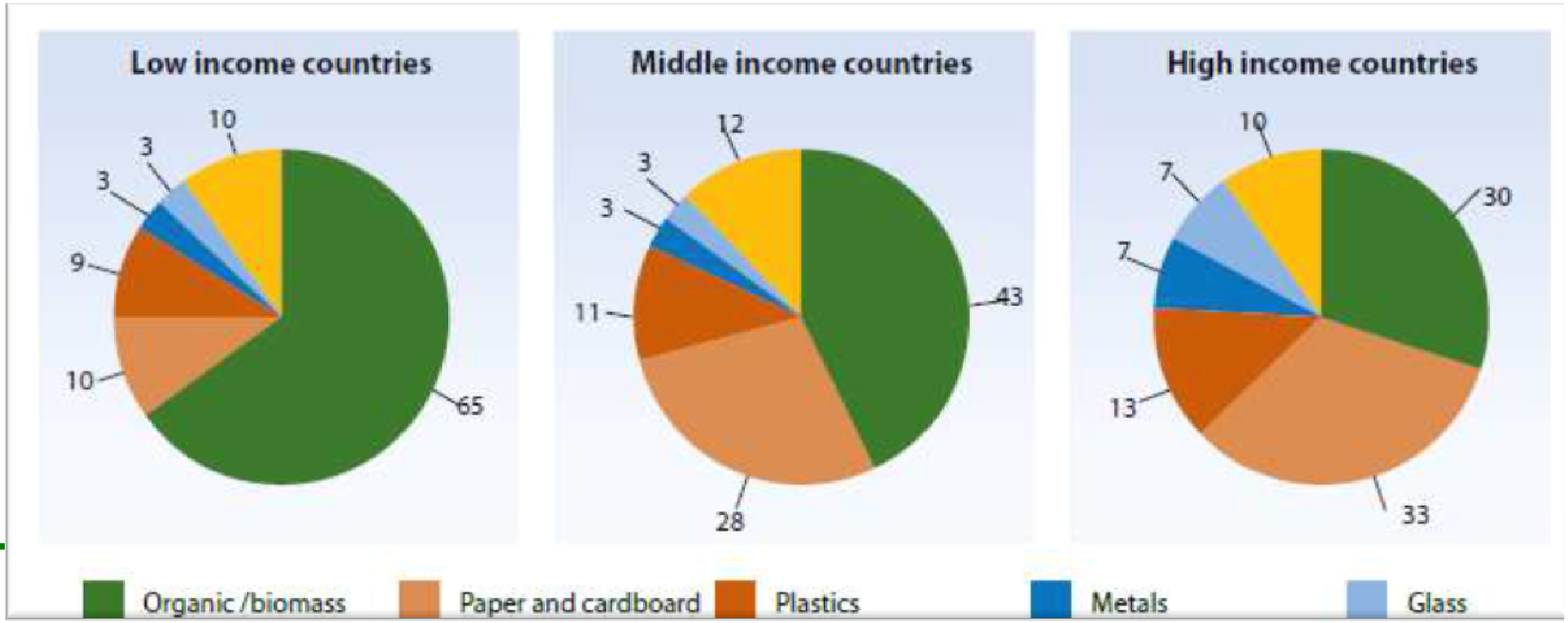
WORLD – Municipal Waste Generation Data [2006 t]

Estimated world waste production and collection for 2006

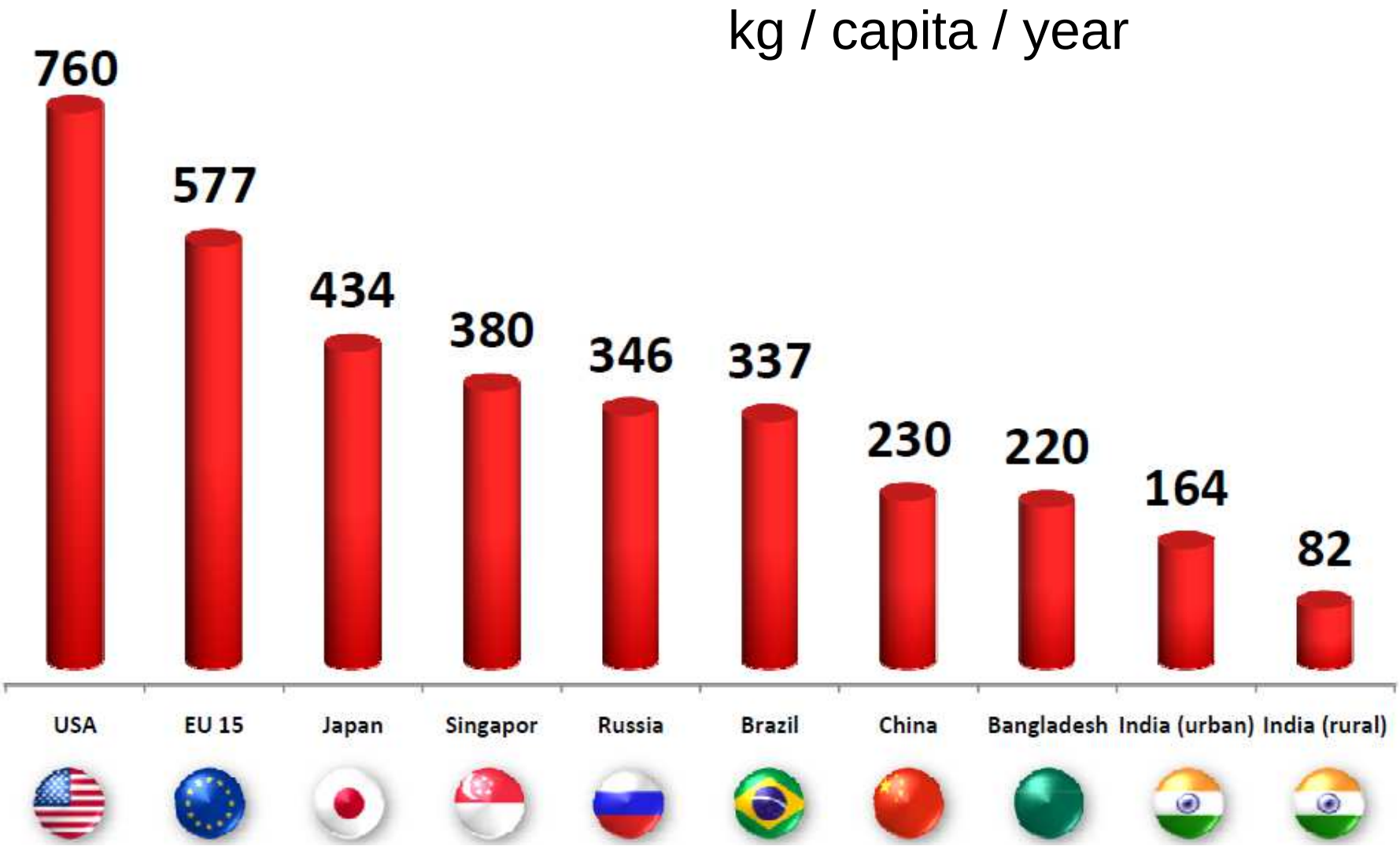
Tonnes	Quantities produced (tonnes)	Quantities collected (tonnes)
World total municipal waste	1.7 to 1.9 billion	1.24 billion
Manufacturing industry non-hazardous waste	1.2 to 1.67 billion	1.2 billion
Manufacturing industry hazardous waste for a selection of countries	490 million	300 million
Total	**3.4 to 4 billion**	**2.74 billion**

Source: CyclOpe.
Note: The quantities of non-hazardous and hazardous construction and demolition waste produced in a selection of countries amounts to 1 billion tonnes. The quantities of waste produced by the mining, electricity and water industry (non-hazardous) in a selection of countries amount to 6.4 billion tonnes.

MSW Composition in Relation to the Relative Wealth of the Countries



Municipal Waste production



Waste management in the developing countries

- Current MSWM policy in developing countries seeks to maximize collection and disposal of those wastes in landfills. Most low income cities lack recycling programs, and many have enacted anti-scavenging ordinances. **MSWM policy in developing country cities should encourage, or at least tolerate, informal recycling and waste collection activities.** The current approach of picking up wastes and disposing of them indiscriminately at landfills hardly constitutes a rational use of resources, particularly of non-renewable resources.

- Conventional solutions to MSWM in low income countries often rely in high-tech, high-cost, bureaucratic, and centralized alternatives. **Conventional solutions usually do not consider the profound differences between High and Low Income conditions, resulting in less than optimum outcomes**.

- **The experience on the use of advanced technology in developing countries, however, has been largely negative.**

- **The adoption of a decentralized and integrated MSWM system in low income cities would create jobs, reduce poverty, extend the collection and improve final disposal of wastes, minimize public investment on personnel, equipment and facilities, reduce pollution and risks to human health and the environment.**

World – Climate change, emissions of CH4 e CO2: (1) Approach

For many wastes, the material in MSW represent what **is left over after a long series of steps**:

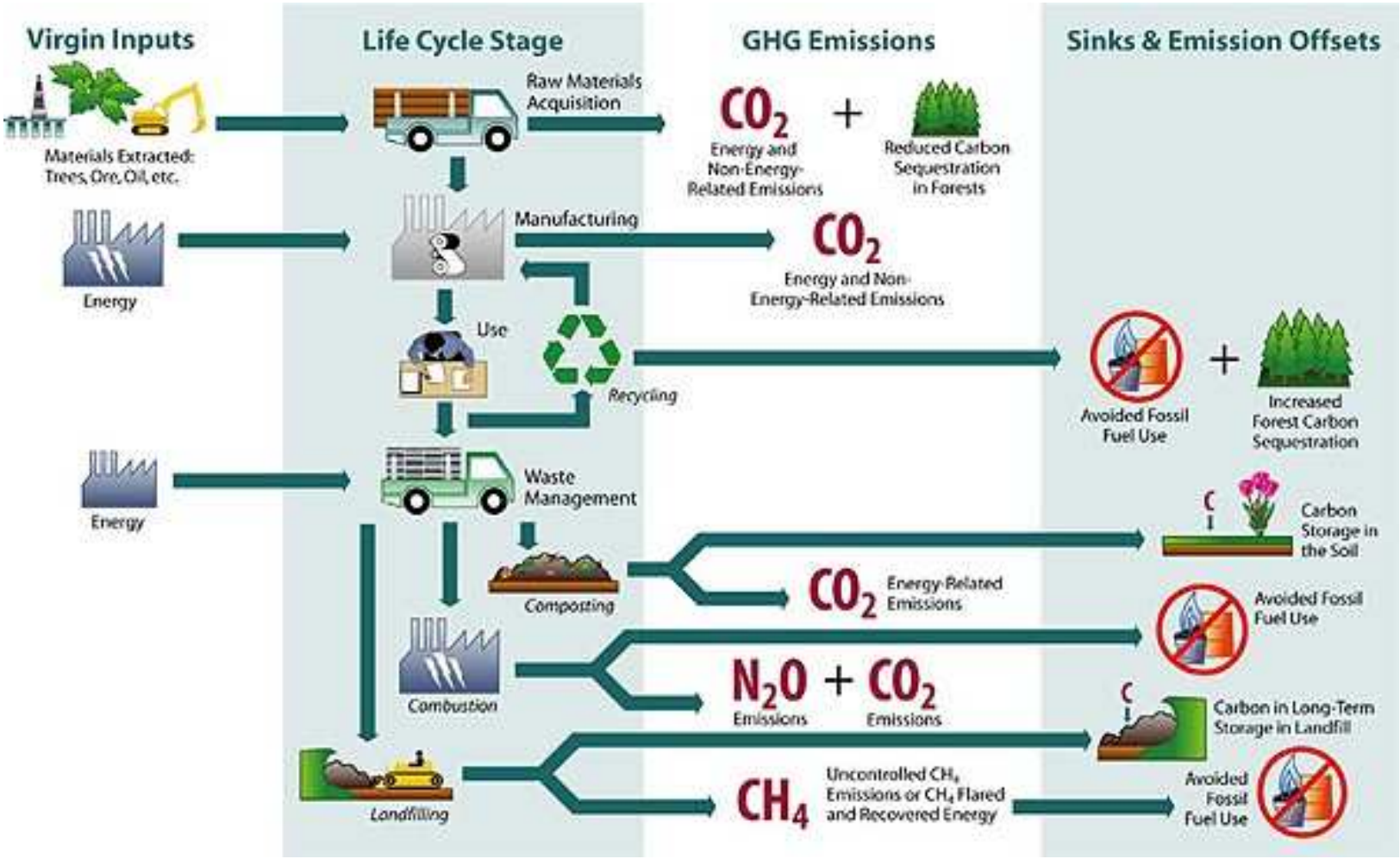
1.Extraction and processing of raw materials;

2.Manufacture of products

3.Transport of materials and products to markets

4.Use by consumers

5.Waste management



Source UNEP - Waste and Climate Change Global Trends and Strategy Framework

World – Climate change, emissions of CH4 e CO2: (2) Big Data

GHG emissions from waste as calculated by US EPA (2006) and Monni et al (2006) ($MtCO_2$-e, rounded) (Data sourced from Bogner *et al* 2007).

Source	1990	1995	2000	2005	2010	2015	2020	2030	2050
US EPA (2006)	760	770	730	750	760	790	820		
Monni *et al* (2006)	340	400	450	520	640	800	1000	1500	2900

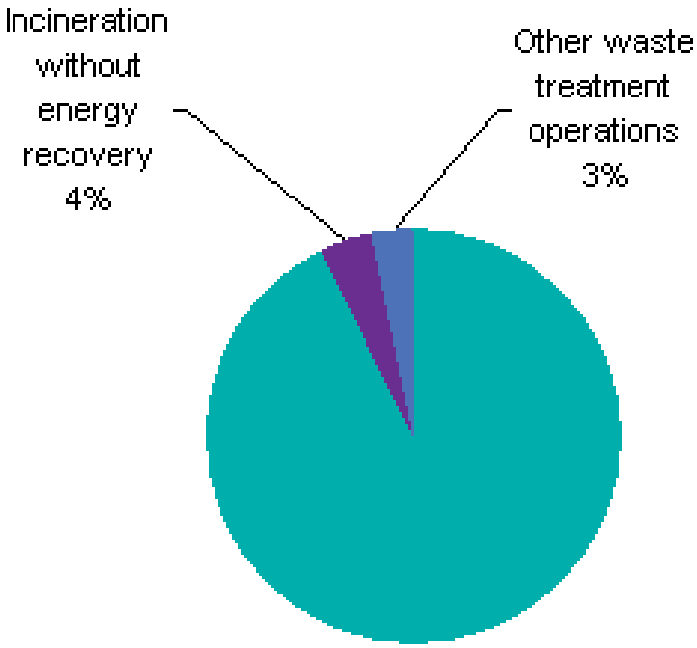
Source UNEP - Waste and Climate Change Global Trends and Strategy Framework

World – Climate change, emissions of CH4 e CO2: (3) Composition

- **GHG from post-consumer waste and wastewater are a small contributor (about 3%) to total global anthropogenic GHG emissions.**

- **The CH4 from landfills and wastewater collectively accounted for about 90% of waste sector emissions**, or about 18% of global anthropogenic methane emissions (which were about 14% of the global total in 2004).

Estimated share of GHG emissions from disposal treatment operations in Europe

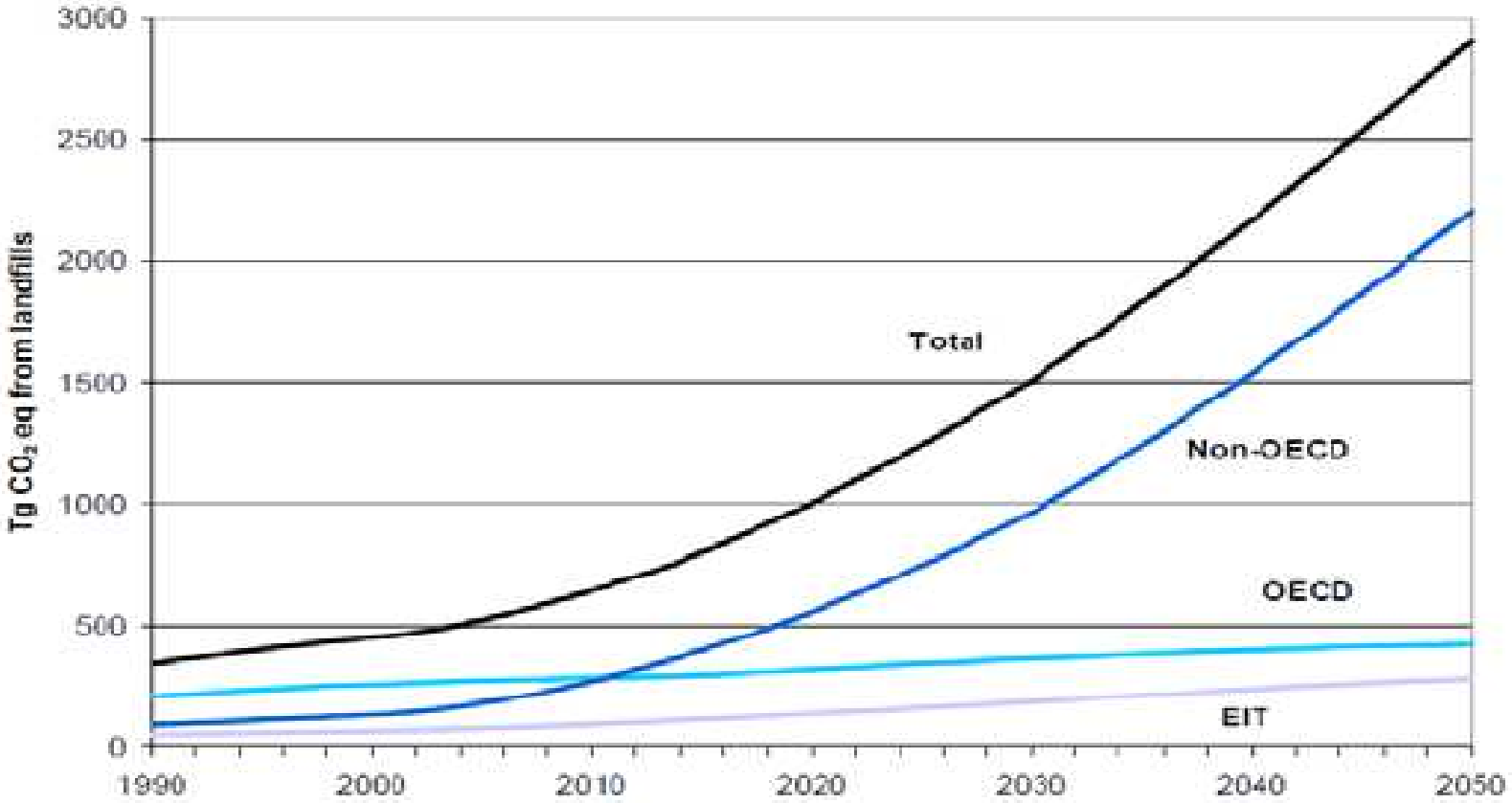


Source: Annual European Union greenhouse gas inventory 1990–2008 and inventory report 2010, Submission to the UNFCCC Secretariat, 15. April 2010

(1) Source Mitigation of global greenhouse gas emissions from waste: conclusions and strategies from the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report.In waste manangement & research February 2008

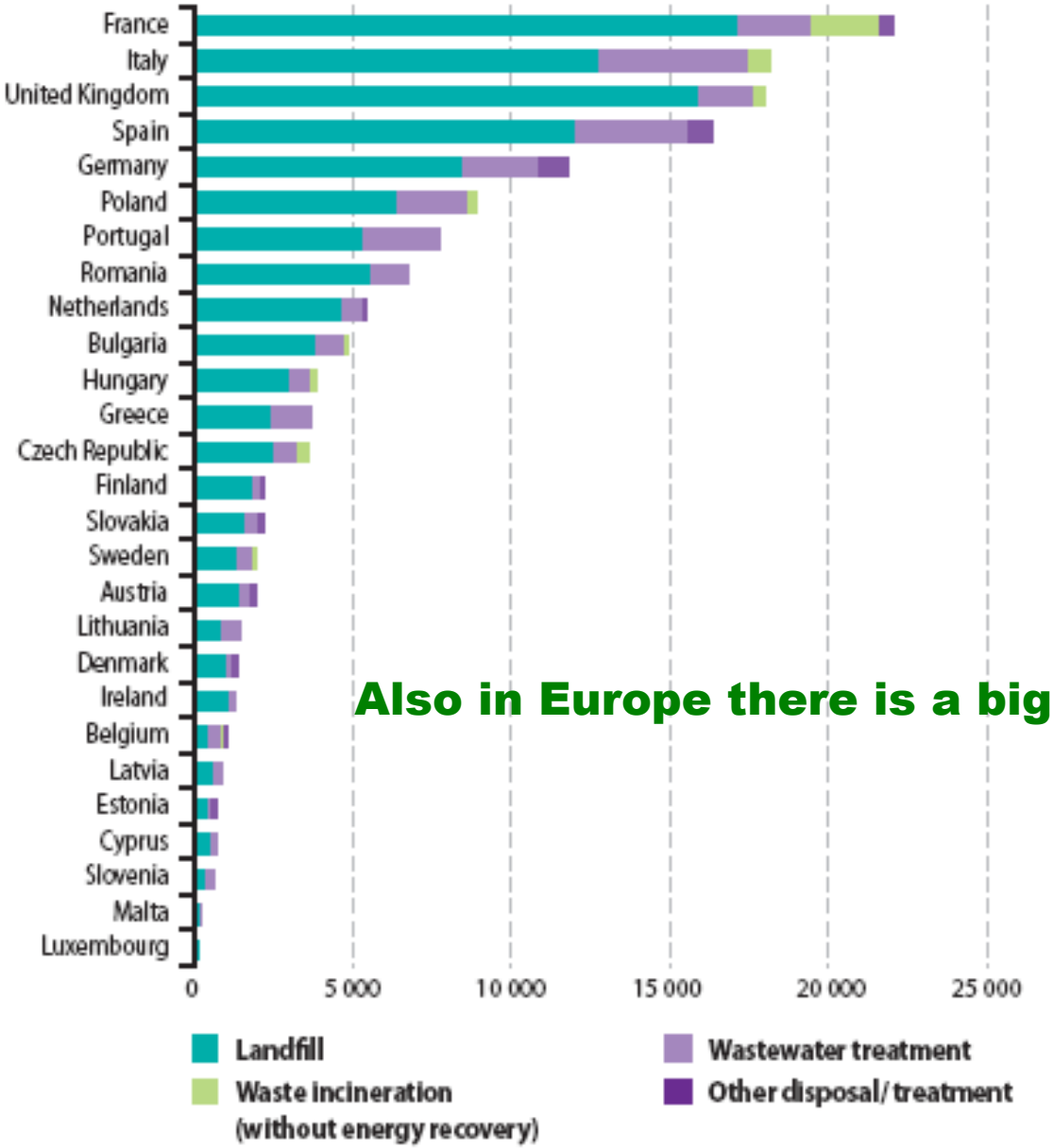
World – Climate change, emissions of CH4 e CO2: (4) Focus on Landfill

In this scenario, non-OECD countries will have a relative share of 64% of global landfill methane emissions by 2030 due to increasing waste disposal.



Source UNEP - Waste and Climate Change Global Trends and Strategy Framework

Municipal waste: generation and treatment data in Europe



Source: European Environment Agency

Greenhouse gas emissions from waste treatment, by treatment type, 2009

(thousand tonnes of CO2 equivalent)

Also in Europe there is a big potential for recovery !!

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World – Climate change, emissions of CH4 e CO2: (6) Recycling vs Landfill

CO2-e savings for materials recycled in N Europe, Australia, and USA (ISWA 2009; RMIT 2009; US EPA 2006).

Material	Kg CO_2-e saved per tonne of material recycled – Northern Europe	Kg CO_2-e saved per tonne of material recycled – Australia	Kg CO_2-e saved per tonne of material recycled – USA
Paper	600 - 2,500	670 – 740	838 – 937
Aluminium	10,000	17,720	4,079
Steel	2,000	400 – 440	540
Glass	500	560 – 620	88
Plastic	0 -1,000	0 – 1,180	0 – 507

Source UNEP - Waste and Climate Change Global Trends and Strategy Framework

Benefits of Paper Recycling …..an example with EPA Approach !...

Recycling one ton of paper would:

Save enough energy to power the average American home for six months.

Save 7,000 gallons of water.

Save 3.3 cubic yards of landfill space.

Reduce greenhouse gas emissions by one metric ton of carbon equivalent (MTCE).

The environmental benefits: Reduces greenhouse gas emissions that can contribute to climate change by avoiding methane emissions and reducing energy required for a number of paper products.

Extends the fiber supply and contributes to carbon sequestration.

Saves considerable landfill space.

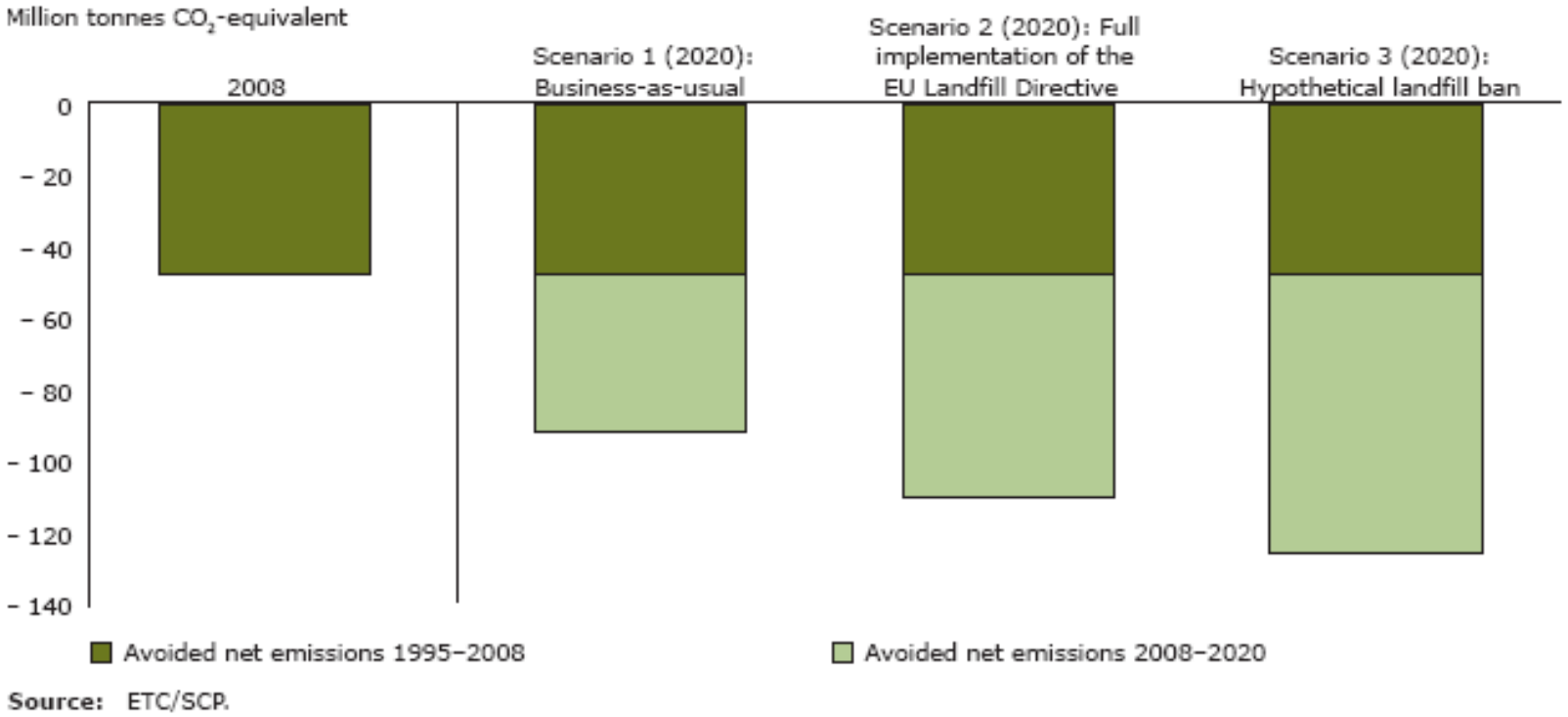
Reduces energy and water consumption.

Decreases the need for disposal (i.e., landfill or incineration which decreases the amount of CO2 produced).

On the other hand, when trees are harvested for papermaking, carbon is released, generally in the form of carbon dioxide. When the rate of carbon absorption exceeds the rate of release, carbon is said to be "sequestered." This carbon sequestration reduces greenhouse gas concentrations by removing carbon dioxide from the atmosphere.

Net emission reductions from MSW management in the EU (excluding Cyprus) plus Norway and Switzerland in 2008 and 2020 compared to 1995

Waste opportunities Past and future climate benefits from better municipal waste management in Europe
EEA ReportNo 3/2011



Source: ETC/SCP.

Which Local Actions with Global Effects ?
(Part B)

To Establish an Ecological Civilization Oriented toward the Future

Cities should respect nature, consider the urban ecological environment as an asset, integrate environmental issues into urban planning and administration, and accelerate the transition to sustainable development. They should promote the use of renewable energy sources and build low-carbon eco-cities. They should strongly advocate for conservation of resources and promote environment-friendly manufacturing. Cities and their citizens should join together to create sustainable lifestyles and an ecological civilization in which people and environment co-exist in harmony.

Shanghai Declaration on Better Cities, Better Life

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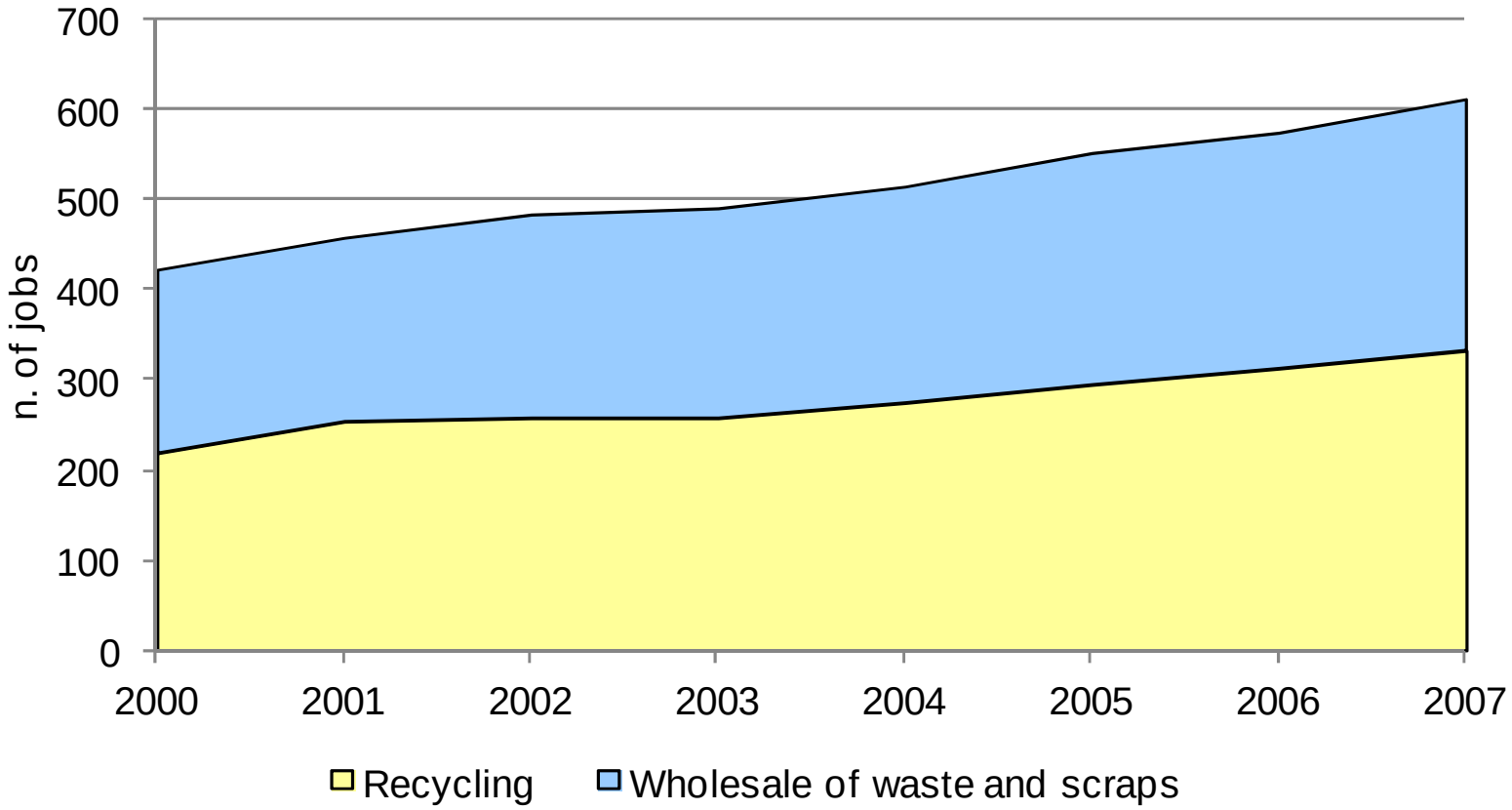
Recycling Potential

Type of waste	Recycled products	Recycling potential
Biomass	Composts	Future of compost depends on its environmental and agronomic quality and the dynamism of its market.
Paper and cardboard	Recovered paper (recyded paper)	Increasing demand in Asia, particularly in PRC.
Plastics	Recovered plastics	Increasingly stringent regulations and growing demand for recovered plastics in Asia, favoring development and internationalization of this market. Cost of collection system and volatile prices are limiting factors.
Ferrous Metals	Steel	In 2004, world production of scrap metal rose to 450Mt and consumption reached 405.5Mt. Can be recovered from MSW, construction waste, etc.
E-wastes	Recoverable materials	Estimated that 10million computers contain 135,000 metric tons of recoverable materials, such as base metals, silicon, glass, plastic, and precious metals.

Source: ADB and IGES (2008),[16] with modifications.

Persons employed in recycling activities in the EU, Norway and Switzerland per million inhabitants, 2000–2007



The actual figures show an increase in jobs related to the recycling activities

Source: European Environment Agency based on Eurostat data - 2011

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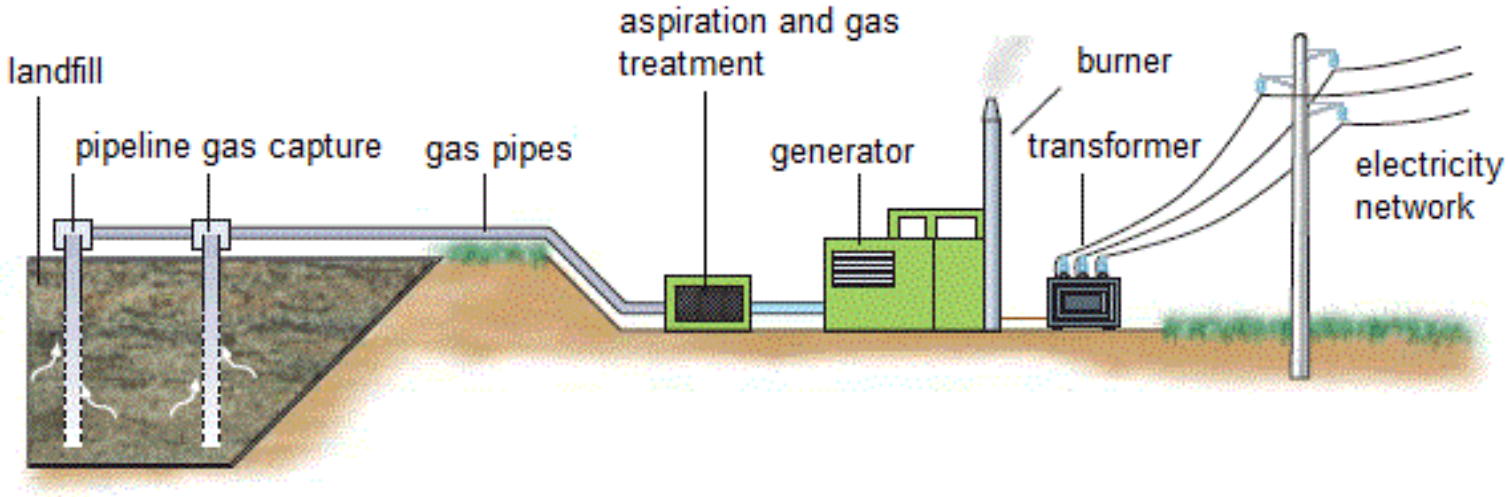
Number of jobs per 1000 tons of waste in a landfill = 1

Number of jobs per 1000 tons of waste in an incinerator = 2

Number of jobs per 1000 tons of waste recycled = 10

Landfill gas collection

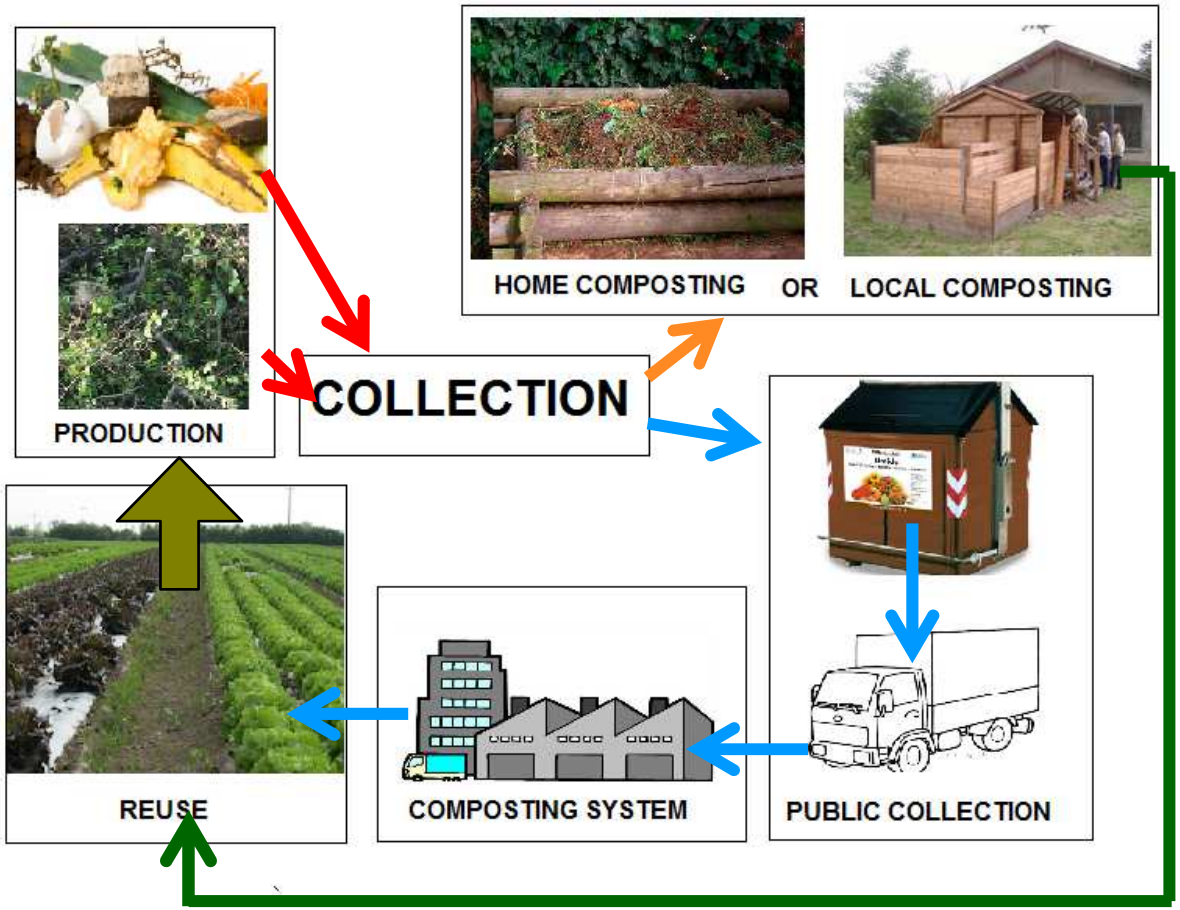
- reduce emissions of landfill gas
- allows the production of energy with reduced emissions of pollutants
- energy produced in this way can replace other more polluting energy sources like coal



How to reduce emissions from landfills

Composting

- Compost helps to reduce waste to landfill
- Composting recover precious nutrients allows the production of fertilizer at low cost and low environmental impact
- Compost is useful for combating desertification
- compost production contributes to organic agricultural development benefiting small farmers and rural ecosystems and the Waste to Energy (WtE) market was already estimated at US$19.9 billion in 2008 and projected to grow by 30 per cent by 2014.

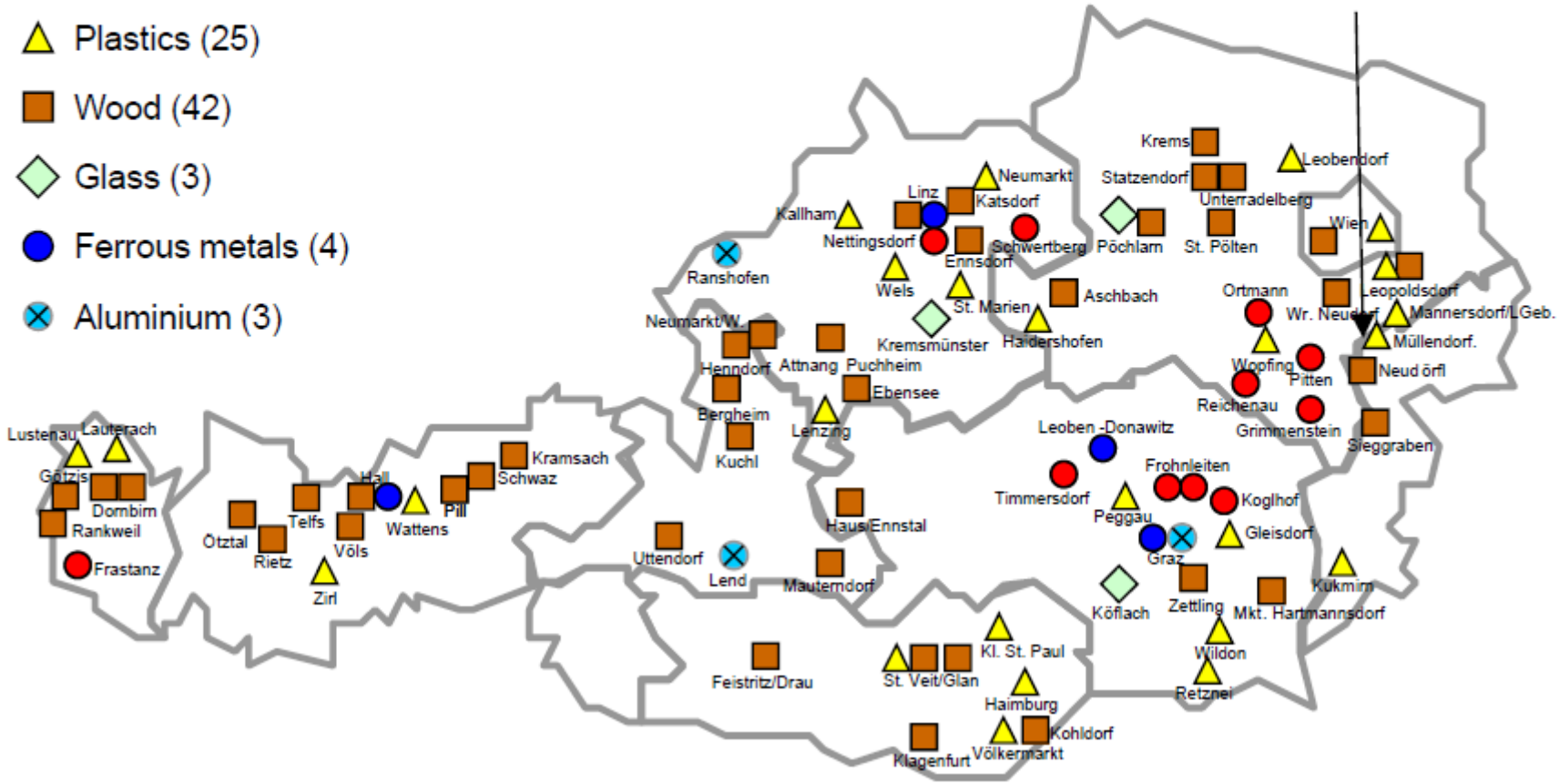


Austria, a model for sustainable waste management

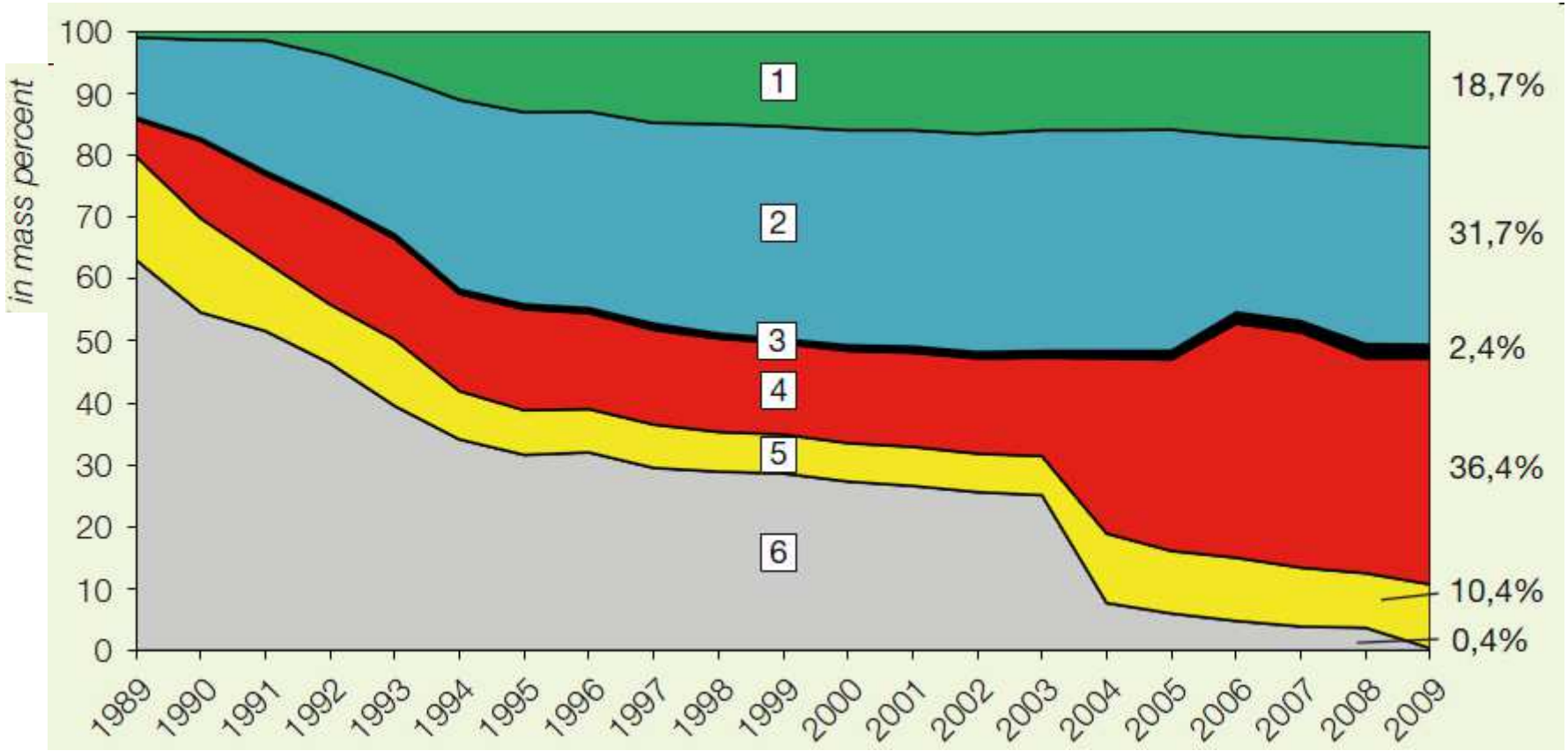
Recovery Companies in Austria 2007

- Paper (11)
- Plastics (25)
- Wood (42)
- Glass (3)
- Ferrous metals (4)
- Aluminium (3)

Müllendorf: new bottle to bottle recycling plant

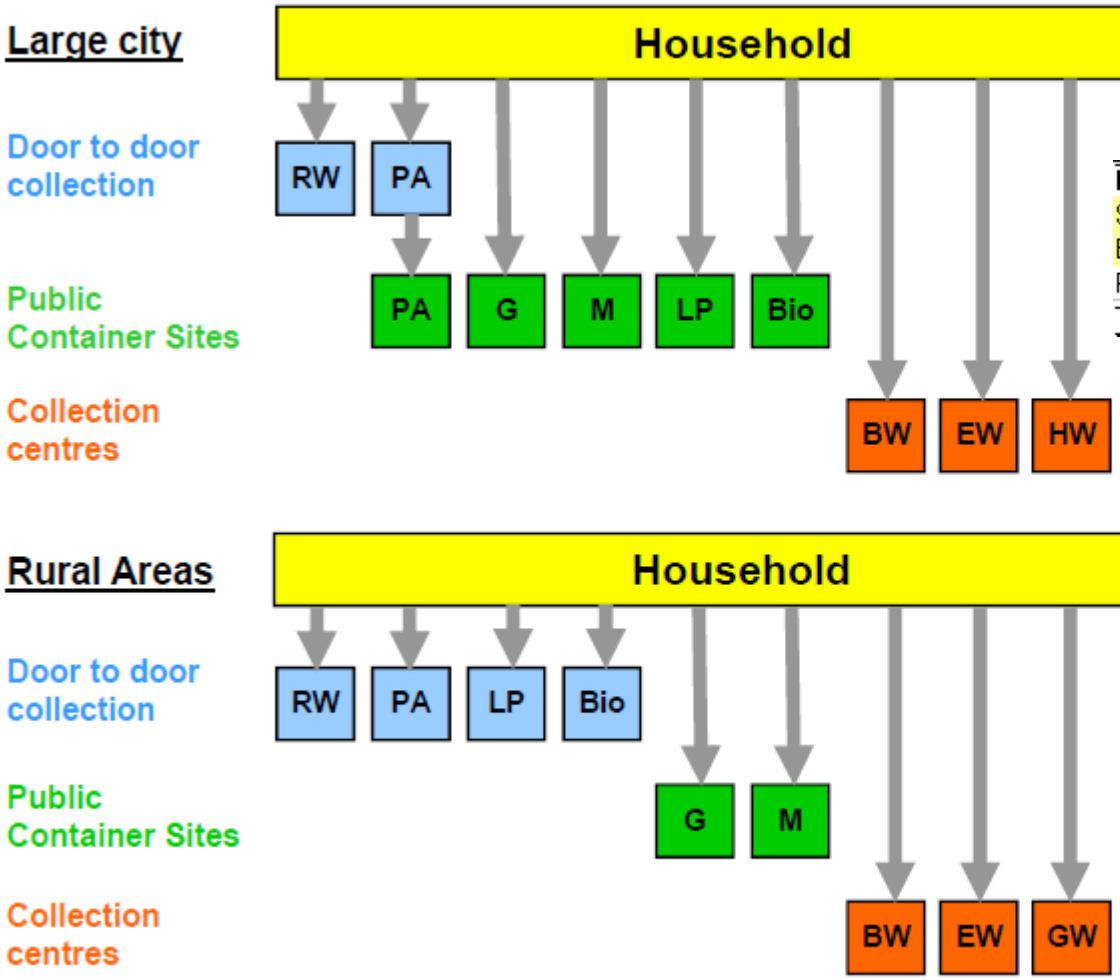


Recovery and disposal of waste from households in Austria – 1989 - 2009



(1) Recovery of organic matter, (2) Recovery of dry waste materials, (3) Treatment of hazardous household waste and WEEE, (4) Thermal treatment, (5) – Mechanical-Biological Treatment plant, (6) Landfilling

Municipal Collection System in Austria - Examples

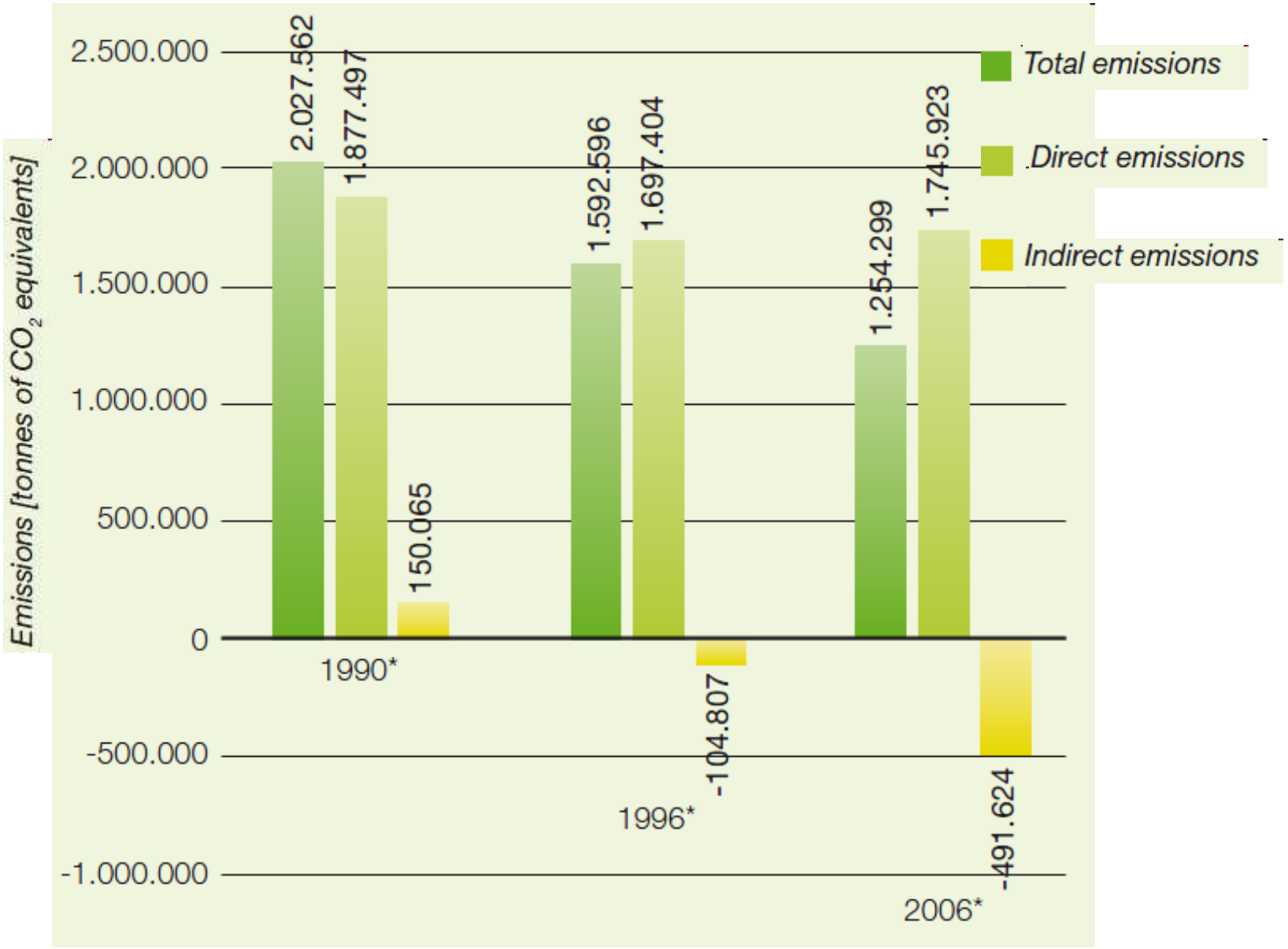


KEY DATA 2009	Tonn per year	%
Separate Collection	2.234.000	57%
Bulky waste	826.000	21%
Residual Waste	835.000	21%
Total Municipal Waste	**3.895.000**	**100%**

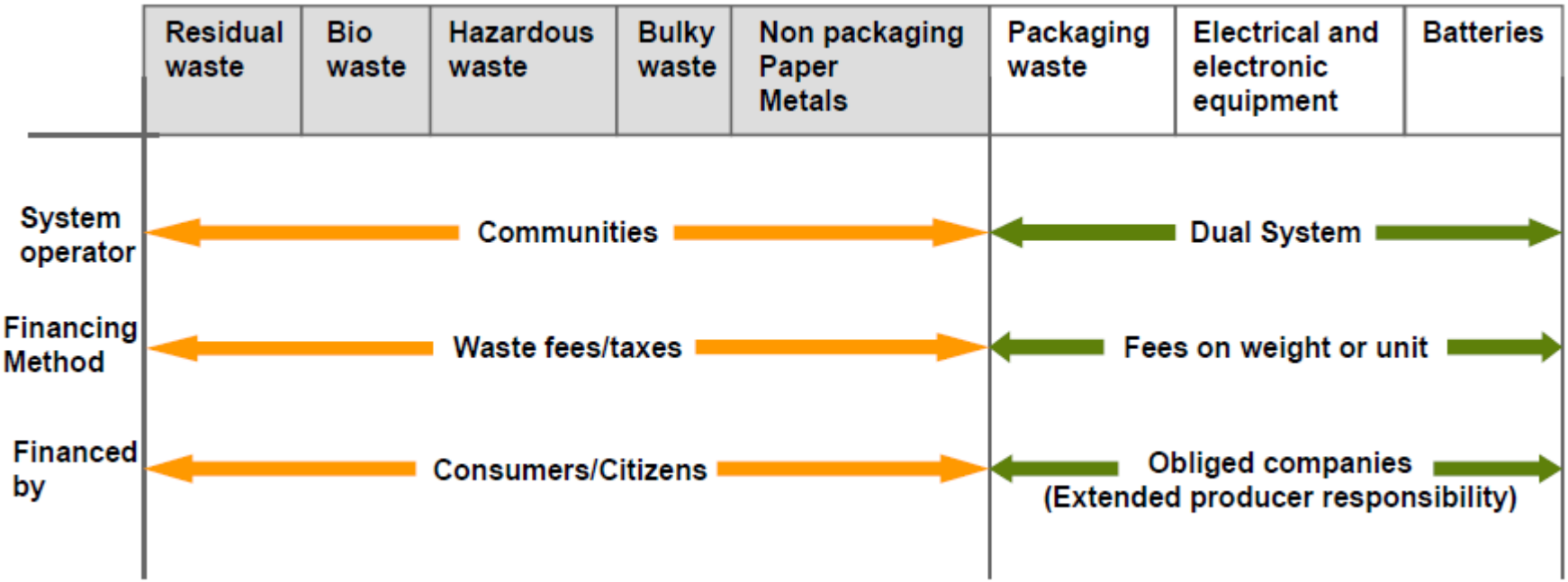
RW	Residual Waste
PA	Paper, cardboard
G	Glass packaging
M	Metal packaging
LP	Light weight packaging
BIO	Biogenic waste
BW	Bulky waste
EW	Electronic Waste
GW	Green waste
HW	Hazardous waste

Source: Peter Lechner (2004), Kommunale Abfallentsorgung. Facultas Verlag, Vienna

WASTE IN AUSTRIA: CO2 eq. EMISSIONS FROM 1990 TO 2006



Different Waste Types are financed by different means



Funding it all

$$$$$$

Overall, according to OECD's database, Official Development Assistance (ODA) increased by 25% between 2006 and 2010, reaching almost $164 billion in 2010.

Yet for waste management projects only between 0,16 – 0,32% of the total ODA, ranging between 257 – 415 million $/year for the same years.

Let's push for $5bn now and $10bn in 2020 !

The World Bank says the waste emergency is as serious as Climate Change.

Our case is solid !

Economic benefits	Environmental benefits	Social benefits
o Revenues for marketable secondary materials o Reduced costs for treatment and disposal of residual waste o Opportunity for tourism o Availability of less costly substitute materials (i.e. secondary material) for production o Value added remains in the region of consumption	o Climate benefits – through reduced GHG emissions o Saved environmental costs (water quality, biodiversity and ecosystem services) o Less volume of waste going to disposal sites o Conserves natural resources (raw material) and fossil fuels (energy)	o Employment o Job Creation o Reduced litter o Reduced human toxicity o Public Participation

CONCLUSIONS

Jobs, Urban hygiene, less emissions, new resources recovered, new energy produced

JOIN US IN OUR CAMPAIGN FOR A CLEAN ENVIRONMENT

JOIN US AS AN ENVIRONMENTAL ACTIVIST

JOIN US TO PROMOTE SUSTAINABLE WASTE MANAGEMENT

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