

RicicloEcoefficiente

Bruxelles
1^o marzo
march 1st 2010

**Il contributo dell'industria
per una società europea del riciclo**
**The contribution of industry
to a European recycling society**

**"Eco-efficient recycling, economic, environmental
and energetic performance and perspective"**

**Report on the italian system
of recovery and recycling**

Duccio Bianchi

AMBIENTEITALIA
ISTITUTO DI RICERCHE

**Study was performed by Research Institute Ambiente Italia and
published by Edizioni Ambiente**

Milano - Via C. Poerio 39
20129, Milano
tel. 02 277441
fax 02 27744222
info@ambienteitalia.it

Roma - Via Vicenza 5/a
00185, Roma
tel. 06 44340129
fax 06 440872
rome@ambienteitalia.it

Pisa - Via Giuntini 25
56023, Navacchio (PI)
tel. 050 754230
fax 050 754231
pisa@ambienteitalia.it

Treviso - Via degli Alpini 6
31030, Carbonara (TV)
tel. 0422 445208
fax 0422 445222
veneto@ambienteitalia.it

www.ambienteitalia.it

AMBIENTEITALIA
ISTITUTO DI RICERCHE

Storia e identità aziendale

Ambiente Italia srl è una società di ricerca e consulenza che opera nel campo della pianificazione, analisi e progettazione dell'ambiente e del territorio.

Nasce nel 1995 riunendo l'esperienza dell'Istituto di Ricerche Ambiente Italia (1990) e della Cooperativa Ecologia (1978)

Identità aziendale: coniuga l'approccio scientifico e ad una convinta matrice culturale ambientalista ("ambientalismo scientifico").

**Il riciclo
eoefficiente**

*Performance e scenari economici,
ambientali ed energetici*

a cura di Duccio Bianchi,
Istituto di ricerca,
Ambiente Italia
con la collaborazione
di Edizioni Ambiente degli Atenei

**TREND
E RICERCHE**

Il rapporto è realizzato nell'ambito
del Forum Club e promosso da:
ENI, Eni Environment, ENEC, Eni
Sistemi, Eni, ENI, ENI, ENI

Report supported by



sponsored by:



CIAI - CONSORZIO IMBALLAGGI ALLUMINIO
Via Pompeo Litta 5, 20122 Milano



COBAT - CONSORZIO OBBLIGATORIO BATTERIE ESAUSTE
Via Toscana 1, 00187 Roma



COMIECO - CONSORZIO NAZIONALE RECUPERO E RICICLO
DEGLI IMBALLAGGI A BASE CELLULOSICA
Via Pompeo Litta 5, 20122 Milano



COOU - CONSORZIO OBBLIGATORIO DEGLI OLI USATI
Via Virgilio Maroso 50, 00186 Roma



CONSORZIO NAZIONALE PER IL RICICLO ED IL RECUPERO
DEGLI IMBALLAGGI IN ACCIAIO
Via Pirelli 27, 20124 Milano



COREPLA - CONSORZIO NAZIONALE PER LA RACCOLTA,
IL RICICLAGGIO E IL RECUPERO DEI RIFIUTI DI IMBALLAGGI
IN PLASTICA
Via del vecchio politecnico 3, 20121 Milano



FISE UNIRE - UNIONE NAZIONALE IMPRESE RECUPERO
Viale Majno 3, 20122 Milano



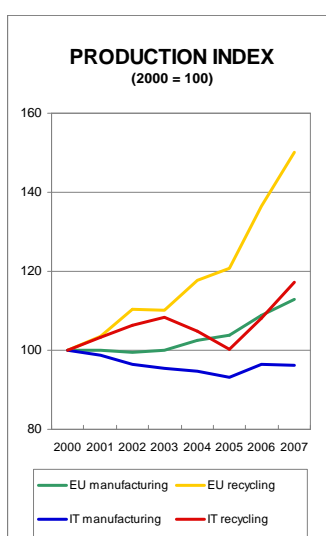
FEDERAMBIENTE - FEDERAZIONE ITALIANA SERVIZI PUBBLICI
IGIENE AMBIENTALE
Via Cavour 179/a, 00184 Roma



MP AMBIENTE S.p.A.
Viale Certosa 247, 20151 Milano

AMBIENTEITALIA
ISTITUTO DI RICERCHE

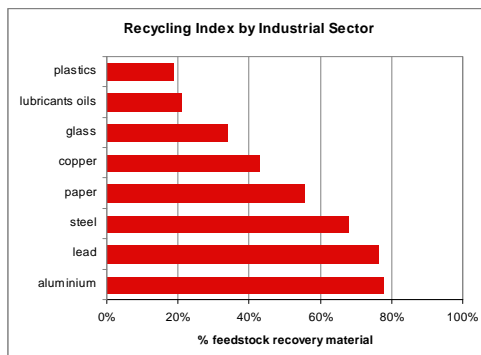
State of the Recycling Industry



- ⌘ The recycling industry has become an economic sector characterized by high innovation content, outperforming most of the manufacturing industry both in terms of investment per employee and in terms of value-added per employee
- ⌘ Between 2000 – 2007 the recycling sector has experienced greater growth rates than the overall industrial system

AMBIENTEITALIA
ISTITUTO DI RICERCHE

Recovered Materials and Manufacturing Inputs



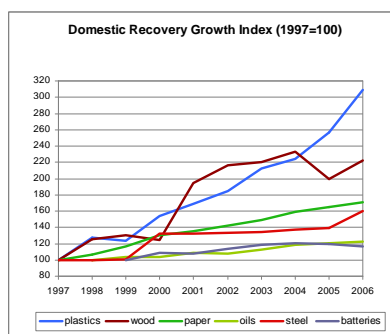
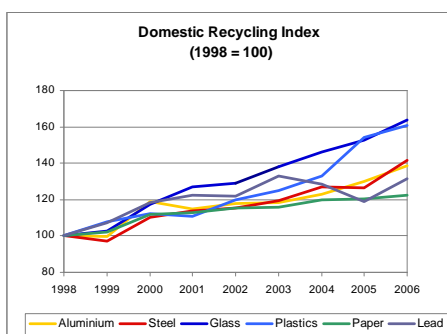
⌘ The availability of recovered materials is crucial to a variety of industrial sectors

⌘ The iron and steel industry, the aluminium industry, and the metal industries at large are highly dependent.

⌘ So are, albeit to a lesser extent, the pulp and paper sector, the glass industry, the wood and furniture sector, the wool textile industry and the plastics sector.

AMBIENTEITALIA
ISTITUTO DI RICERCHE

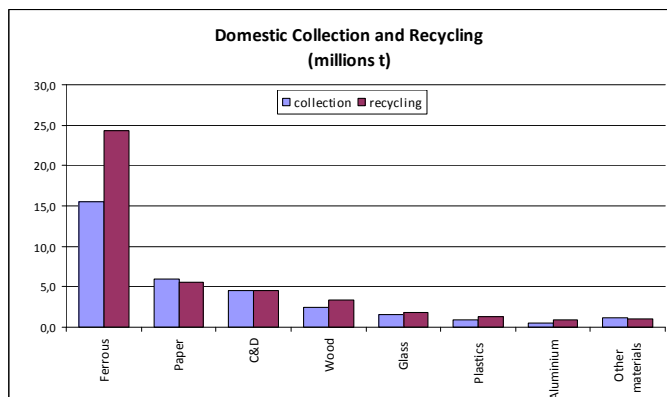
Recovery and recycling growth



In Italy, over the last ten years, recovered material volumes and recycling rates (i.e. the percentage of recycled material utilization) have increased for all major commodity materials.

AMBIENTEITALIA
ISTITUTO DI RICERCHE

Recovered and recycled materials



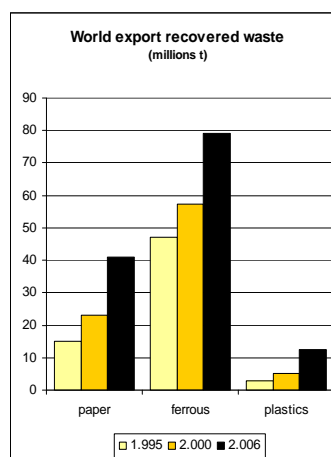
Over 52 million tons of production and consumption wastes were recovered (2005), more than 40 millions tons were processed industrially. Italy imports near 6 millions tons of recovered waste.

AMBIENTEITALIA
ISTITUTO DI RICERCHE

Globalization of Recycling markets

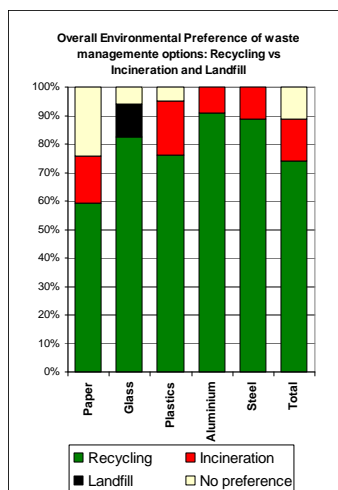
The growth in the global trade of recovered material has two main economic drivers:

- ☒ manufacturing capacity is moving from Europe and North America to countries with lower manufacturing costs but more limited raw resources
- ☒ inverse relationship between trade flows of manufactured goods (and the material they are packaged in) and the trade flows of recovered materials.



AMBIENTEITALIA
ISTITUTO DI RICERCHE

Recycling and Closed Loop Economy – Environmental benefits



The growing recycling is an indicator of eco-efficiency production and of transition to a “circular deconomy”

All the studies agree on the benefits deriving from material recycling and recovery as compared to raw material production. Wide consensus about the benefits of recycling and recovery relative to other waste treatment options

A study of WRAP examining the over 200 LCA scenarios of materials showed that recycling proved to perform better in 83% of cases (96% better performance over landfill disposal, 75% better performance over incineration)

The evolution towards a less carbon intensive energy production system will render, on the grounds of energy use, recycling all the more advantageous.

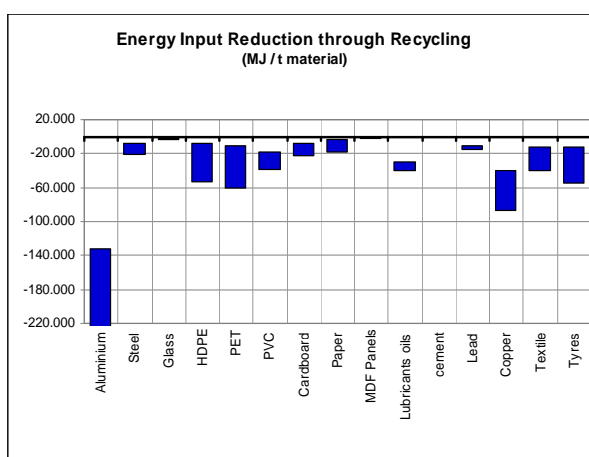
AMBIENTEITALIA
ISTITUTO DI RICERCHE

Specific Energy Input Reduction through Recycling (per t of material)

Our study selected a range of coefficients for energy savings through recycling, from recent studies based on LCA methodology.

Products based on secondary materials are compared with products based on raw materials.

Data are variable, reflecting different assumptions or technology and geographical contest, but consistent



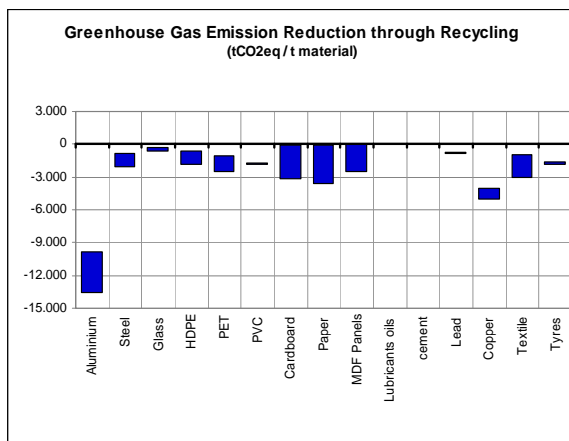
AMBIENTEITALIA
ISTITUTO DI RICERCHE

Specific Greenhouse Gas Emissions Reduction through Recycling (per t of material)

Our study selected a range of coefficients for CO₂ emissions through recycling, from recent studies based on LCA methodology.

Data are variable, reflecting different assumptions or technology and geographical context, but consistent.

For biomass based materials, differences are also associated to consideration of C sink or energy use biomass saved



AMBIENTEITALIA
ISTITUTO DI RICERCHE

Estimation actual and future effects: methodology

The estimate reduction in primary energy need (and GHG emissions), generated through recycling, is based on data showing that 40 million tons of materials were re-used by Italian industry (deriving from consumption and production cycles). A certain amount of these materials is imported. Estimation does not consider some materials, like compost or inert.

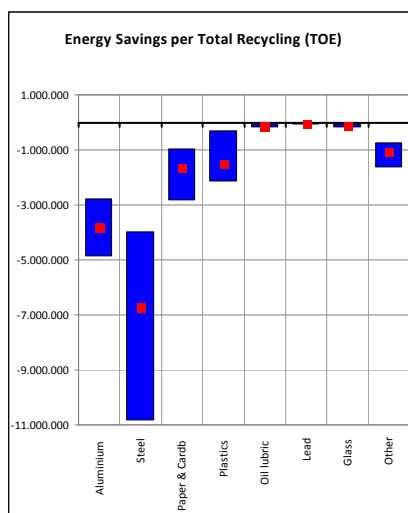
Both the estimate energy and GHG figure was based on coefficients that incorporate differences between recovered material and virgin material yields, according to a Life Cycle Assessment approach.

Data show the range available according to different sources and the median of the values.

For the future, the study assumes the increase to be evenly distributed over all types of materials.

AMBIENTEITALIA
ISTITUTO DI RICERCHE

Actual benefits of recycling in Italy: energy savings



In 2006, energy savings achieved through recycling are estimated to be worth 15 million TOE of primary energy.

This figure represents

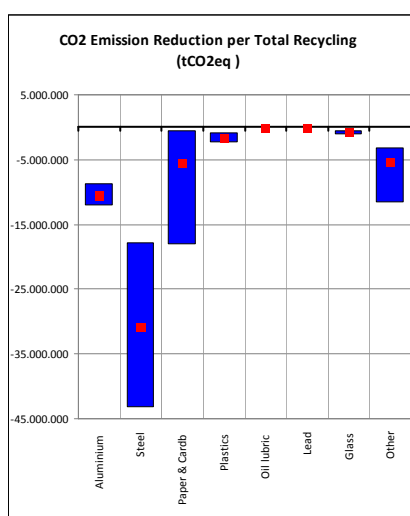
⌘ 8% of total domestic energy consumption (approx 196 million Toe)

⌘ 38% of the industry sector's consumption (approx 40 million Toe).

Part of the energy savings is achieved abroad, i.e. upstream from the industrial processes that take place in Italy.

AMBIENTEITALIA
ISTITUTO DI RICERCHE

Actual benefits of recycling in Italy: greenhouse gas emissions reduction



In 2006, achieved reduction of green-house gas emissions through recycling are estimated to be worth 55 million tons of CO2

This figure represents

9.5% of domestic gross emissions (which stand at 581 million tons)

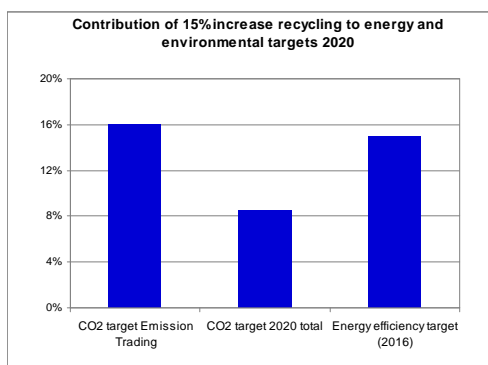
44% of emissions generated by energy consumption and specific industry emissions (126 million tons).

As is the case for energy savings, part of the emission reductions are achieved upstream from the industrial processes that take place in Italy.

AMBIENTEITALIA
ISTITUTO DI RICERCHE

A moderate increase of recycling contributes to reach the Italian energy and climate targets

Domestic recycling by itself (i.e. without considering collected materials destined to export) should reasonably achieve a 15% increase by 2020. This implies moving up from a 48% recycling rate to reach for a 55.2% recycling rate. A 15% increase in the collection of materials should achieve energy savings worth 2.3 million TEP and reduce greenhouse gas emissions by 8.2 million tons.



An increase by 15% of the domestic industrial recycling rate should correspond to:

- a 16% CO2 emission reduction imposed by Emission Trading;
- a 15% increase in energy efficiency affecting all sectors within 2016;
- 9% global reduction of CO2 necessary to achieve the 2020 reduction targets.

AMBIENTEITALIA
ISTITUTO DI RICERCHE

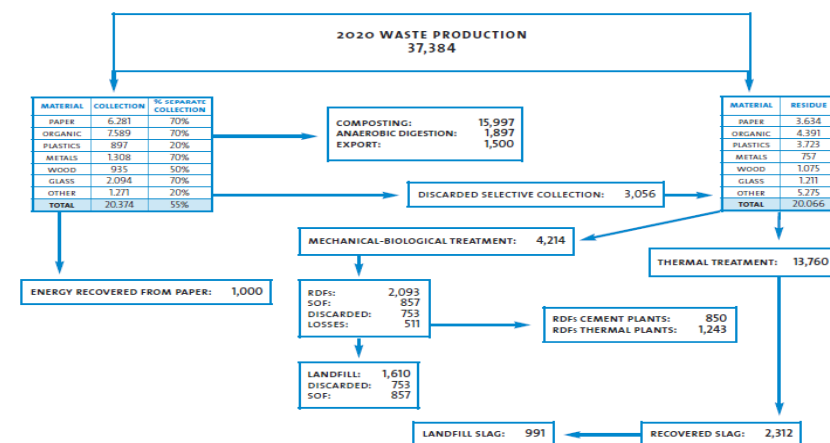
Recycling and new MSW Management

The study shows that much can be done already by stricter implementation of the existing EU waste management legislation. For Municipal Solid Waste the proposed 2020 scenario is based on:

- **the increase in recycling (55%):** since 2006, recovered quantities will double (climbing from 8.4 to 20 million tons of material). Compared to the current situation, the increasing share of recycling and composting or anaerobic digestion abate CO2 emissions by 4 million tons and determine 900,000 Tpe worth of energy savings.
- **the replacement of landfills by waste-to-energy plants:** every ton of materials diverted from landfilling and destined to energy recovery prevents the production of 420 kg of CO2. The 2020 scenario comprises an estimate 12,660 GWh of electricity produced from wastes and approximately 750,000 TEPs worth of thermal energy. Overall, the energy balance for waste treatment and disposal operations accounts for savings that are worth 3.25 million TEP. Treatment generate additional 0.3 million t CO2eq, considering avoided emissions (principally displacing natural), but cut over 8 million tons CO2eq of landfill emissions.

AMBIENTEITALIA
ISTITUTO DI RICERCHE

Municipal Solid Waste Management: scenario 2020

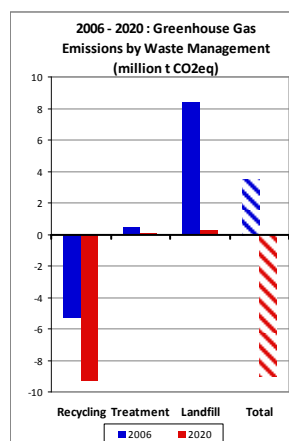
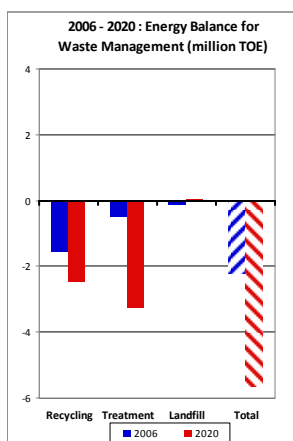


AMBIENTEITALIA
 ISTITUTO DI RICERCHE

Energy and climate effect of new MSW management

The foreseen waste management system should achieve a total amount of **5.7 million Toe energy savings in 2020** (which become 3.2 million Toe if recycling is excluded), and a **total reduction of 9 million tons CO₂ equivalent emissions**.

Hence the 2020 scenario offers, as compared to the present state of affairs, to **reduce energy consumption by 3.4 million ToE** and to **abate emissions contributing to climate change by 12.5 million tons**.



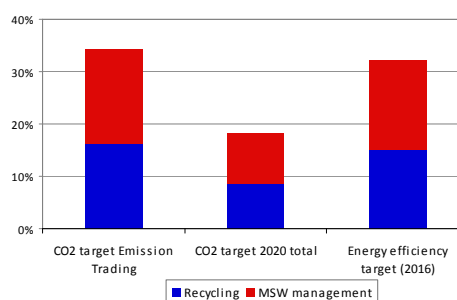
AMBIENTEITALIA
 ISTITUTO DI RICERCHE

Conclusion

The combined effects of recycling and the improved management of urban wastes is worth 32% of the target for energy efficiency and 18% of the overall required reductions in CO2 emissions.

In the light of the critical contribution that waste recycling and a more environmentally conscious management of urban wastes could make for the attainment of energy efficiency objectives and for the reduction of gases contributing to climate change, **it may be necessary to implement political and economic instruments that act as incentives and cancel, instead, the perverse incentives which today impede such desirable**

Cumulative contribution of 15% increase recycling + new MSW management to energy and environmental targets 2020



AMBIENTEITALIA
ISTITUTO DI RICERCHE