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## Research and practice in waste management

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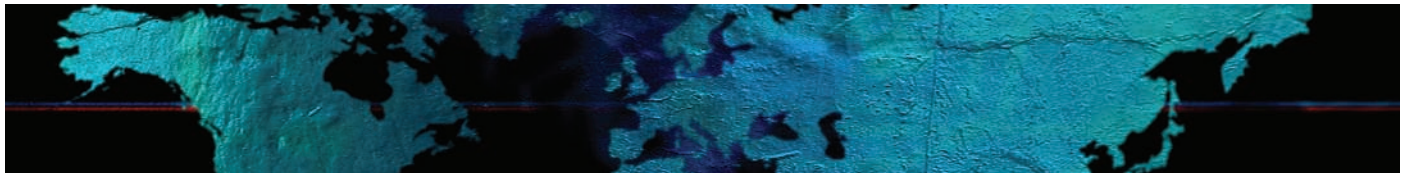
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Country trends



# Research and practice in waste management

JUDITH KAMALSKI

What happens to the things we throw away? Where does our household garbage go? And what about pharmaceutical waste or old computers? Figure 1 shows the hierarchy of our available options for waste disposal, from outright prevention to disposal in a landfill.

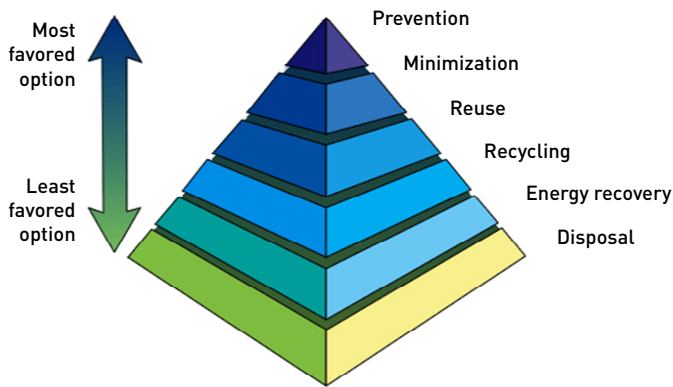


Figure 1 – The waste disposal hierarchy.

Waste is becoming an increasingly urgent problem, and many countries have policies in place to manage their waste. For instance, the European Union has had a Directive regulating landfill use since 2002. This is helping support research into waste management solutions. But does a highly performing research sector occur more frequently in the regions where waste management is under control or where it is still a major challenge?

**Research vs. reality**

In 2006 Eurostat investigated how each European country was distributing its waste across the options in the hierarchy. The differences are notable (see Figure 2). Germany and the Netherlands, for instance, recycle over 68 and 64 percent, respectively, of urban waste and only send one and two percent, respectively, to landfills. At the other end of the spectrum are countries such as Poland and Lithuania, both of which send 91 percent of their waste to landfill.

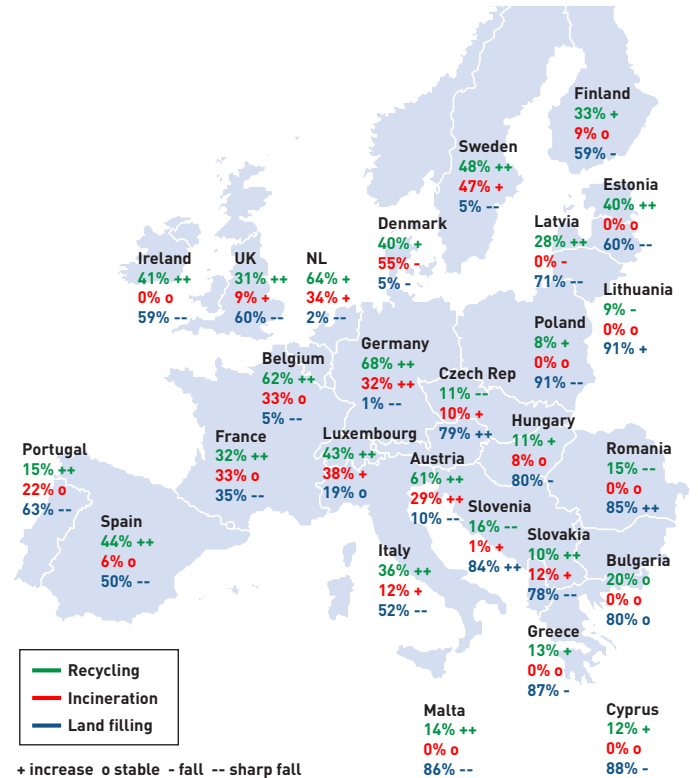


Figure 2 – Waste disposal techniques per European country in 2006. Source: Eurostat.

When we compare this to research output in “waste management and disposal”, we see countries like the UK, Spain, Poland and Italy are publishing a lot of papers and rely heavily on landfill. However, Germany, the Netherlands and Sweden also make the top 20, and they only use between one and five percent landfill. Therefore, there does not seem to be any correlation between research output and landfill use.

If we look at citations per article (see Table 2), France and Greece are in the top 20, and they also have high percentages of landfill (35 and 87 percent, respectively). On the other hand, Belgium also appears in the top 20, but it only uses five percent landfill.

This indicates that actual waste disposal techniques do not seem to be driven by the research done in the same country. Basically, a country might be producing excellent research on

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waste management, but this does not necessarily mean they are actually putting that research into practice.

**Policy matters**

Professor Ernst Worrell, from the Department of Innovation and Environmental Sciences at Utrecht University in the Netherlands, is not surprised that there does not seem to be a link between a country’s most used waste disposal technique and its research: “Though research into waste management options and technologies is, for a large part, driven by policy, it is not surprising that there is not a direct link between the type of publications and expected (or assumed) policy options in a given country. Note that other factors (e.g. presence of technology suppliers) may also drive the research portfolio in a country.

“After the introduction of new waste management systems in countries like Germany and the Netherlands in the 1990s, it seems that policymakers assumed this issue was under control. The need for research declined, even though no proper monitoring on a scientific basis has been done in these countries.

However, Prof. Worrell cautions against complacency, as countries that still have waste mountains to tackle do seem to be researching this issue intensely: “The UK has produced a large volume of publications on waste management in the past 10 years. It had to address this issue because it was

lagging behind other countries in Europe. In their wisdom, this development of new waste management practices has been accompanied by a research program that has delivered a wealth of research.”

So, according to Prof. Worrell, which are the countries to watch in the near future? “In my opinion, some of the Scandinavian countries (each with their own emphasis) are leading the way in finding sustainable ways to manage waste, with often a good mixed portfolio of policy instruments that include prevention, recycling, and final waste management options. In these countries you also see some strong research groups with a continuous output, as policymakers have remained interested in assessing the impacts and improving policies.

“My hope is that policymakers, not only in these selected countries, will continue to see the need to assess the effectiveness of policy and technology options to further optimize the use of materials and minimize waste generation. The future supply, use and disposal of materials will become an increasingly important challenge for our society, and hence in need of technology and policy development.”

**Further reading**

Milton, J. and Brahic, C. (2010) “Track that trash”, New Scientist, Vol. 206, Issue 2756, pp. 44–45.

Rank	Country	Percentage	Cites per article
1	United States	13.13%	1.41
2	India	3.90%	3.54
3	United Kingdom	3.57%	1.04
4	China	3.21%	1.96
5	Canada	2.81%	1.53
6	Brazil	2.69%	1.12
7	Japan	2.27%	1.84
8	Spain	1.91%	1.91
9	Poland	1.81%	0.49
10	Taiwan	1.75%	1.59
11	Italy	1.59%	1.08
12	Germany	1.56%	1.60
13	Australia	1.52%	1.23
14	Korea, Republic of	1.49%	1.92
15	Sweden	1.47%	1.23
16	Netherlands	1.27%	1.45
17	Turkey	1.21%	2.52
18	France	1.21%	2.32
19	Mexico	0.77%	1.43
20	Denmark	0.74%	1.57

Table 1 – Top 20 most productive countries in research on waste management and disposal in 2006 and 2007. Source: Scopus.

Rank	Country	Cites per article
1	India	3.54
2	Colombia	3.50
3	Malaysia	2.56
4	Nigeria	2.53
5	Turkey	2.52
6	Bangladesh	2.50
7	Thailand	2.36
8	France	2.32
9	Hong Kong	2.23
10	Uruguay	2.14
11	Jordan	2.07
12	Greece	2.07
13	Cuba	2.00
14	Belgium	1.98
15	China	1.96
16	Portugal	1.95
17	Korea, Republic of	1.92
18	Spain	1.91
19	Singapore	1.85
20	Japan	1.84

Table 2 – Highest cites in 2008 per article from 2006 and 2007, per country, for countries with more than five articles on “waste management and disposal” in 2006 and 2007. Source: Scopus.