

The International WTERT Council and WtERT Germany

– International Network on Waste to Energy (WtE) –

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1. Background

The participation and acceptance of Waste-to-Energy (WtE) in modern waste management has increased considerably in some countries of the European Union. Previously seen as polluting facilities, WtE plants are now considered as one of the cleanest and safest ways for treating and recovering municipal solid waste (MSW). The perception and value of waste has also changed in the last 20 years. Formerly seen as a useless *object*, waste is now seen as a valuable resource. WtE technologies together with recycling are the backbone of modern waste economy and the only real solutions for treating waste in an environmentally friendly way.

The aim of WTERT (Waste to Energy Research and Technology Council) is the identification of the best available technologies for the recovery of energy or fuels from municipal solid waste and other industrial, agricultural and forestry residues. Therefore the council conducts additional academic research as required, and disseminates this information by means of its publications, website and annual meetings. In particular, the international network strives to increase the global recovery of energy and materials from used solids and to develop the economic and environmental performance of Waste-to-Energy (WtE) technologies in the United States and worldwide. The guiding principle is that responsible management of waste must be based on science and best available technology and not what seems to be inexpensive now but can be very costly in the near future. That's why the Waste to Energy Research and Technology Council brings together engineers, scientists and managers from universities and industry. [1]

2. History

Starting point of the Waste to Energy Research and Technology Council was the formation of the Earth Engineering Center (EEC) in 1995. Its original mission was to direct engineering research on processes and products that balance the increasing use of materials, the finite resources of the Earth, and the need for clean air, water and soil.

Over the years the focus of the ECC changed to advancing the goals of sustainable waste management worldwide, especially in the United States. Economic development has resulted in the annual generation of billions of tons of used materials which are a considerable resource and, when not managed properly, constitute a major environmental problem in industrial and developing nations. Therefore the EEC examines the improved use of waste as a resource and the adequate recovery or disposal of the increasing waste amounts. In collaboration with the U.S. Energy Recovery Council, the EEC formed the Waste to Energy Research and Technology Council under the leadership of Professor Themelis (Columbia Universität, New York, USA) in 2003. [2]

Until today other sister organization joined the original Council: China 2006, Canada 2007, Greece 2008, Germany 2009 and Japan as well as Brazil. At the moment additional sister organizations in France, Italy and Great Britain are under development.

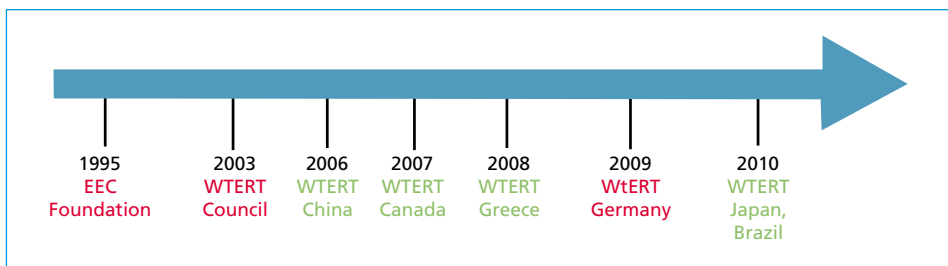


Figure 1: Development of the network

3. WtERT Germany

In 2009 Professor Martin Faulstich (TU München, Institute of Resource and Energy Technology; Chairman of the Board of the ATZ Development Center; Chairman of the German Advisory Council on the Environment) and Professor Peter Quicker (RWTH Aachen, Unit of Technology of Fuels) founded WtERT Germany as the German branch of the council in Sulzbach-Rosenberg with the help of Martin GmbH für Umwelt- und Energietechnologie and E.ON Energy from Waste.

At the moment the German platform is working for an expansion of their network and for the acquisition of experts, which have the possibility to transfer information and knowledge via the international association. The website of the German branch of the network offers an informative platform by a continuous update in order to gain news in the field of WtE.

The primary aim of the German sister organization is the development of Waste-to-Energy in the European member states due to the high diversity in the European waste management. While Germany, Sweden and the Netherlands are the leading countries relating to a sustainable waste management, with a low landfilling rate of 4 % due to a high thermal recovery and recycling rate, while the rest of the member states especially the EU-15 are still affected by a high waste disposal rate.

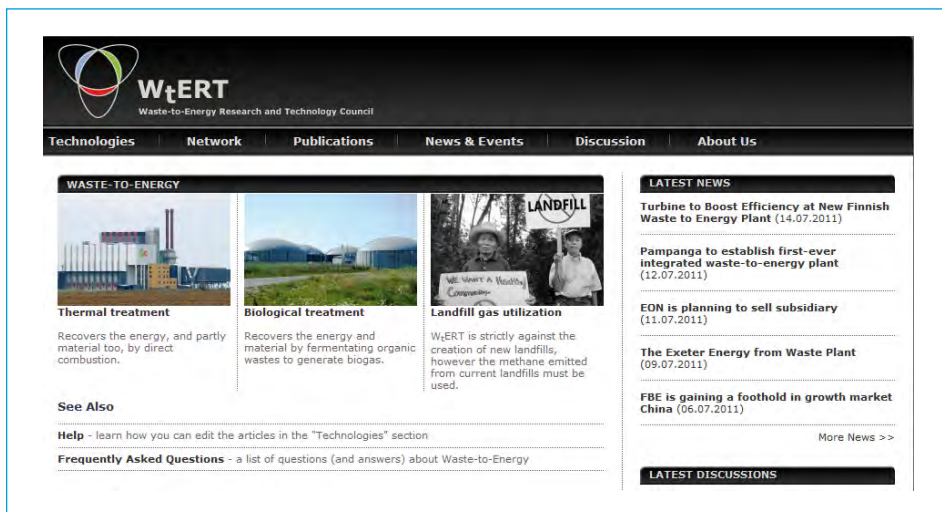


Figure 2: WtERT Germany Website

Source: WtERT Germany GmbH, An der Maxhütte 1, 92237 Sulzbach-Rosenberg, <http://www.wtERT.eu>

The German part of the Waste to Energy Research and Technology Council wants to change this by promoting energy and material recovery from waste. That's why the network in Germany wants to bring together the experience gained in the country and spread it – even beyond the German borders – to achieve an ecologically sensitive waste management in Europe. Of course the platform in Germany is also supporting the global development of the waste management by cooperation with the other sister organizations.

The German branch of the council offers an international platform for the exchange of state-of-the-art information in the field of thermal and biological treatment of waste and landfill gas utilization as well as the formation of new networks by bringing together professionals.

The networking und knowledge transfer should additionally be strengthened by the organization of annual meetings. The first Annual Meeting Europe was held from the 12th to the 14th of October 2010 in Brno, Czech Republic, focusing on the topic *Waste-to-Energy in Eastern Europe*.

The conference started with a visit of the Brno Waste-to-Energy plant SAKO Brno that was recently successfully renewed with the help of several funding options. Over 200 experts and specialists from 15 different countries who attended the conference gain insight into the WtE technologies of the eastern and southeastern European countries and their further development and market-specific optimization possibilities and finical facilities.

Today, more than 240 members from industry, university and governmental sectors make up the WtE network of experts in Germany. They have the possibility to interact with each other, promote their scientific research, as well as to download other's research, get informed about the latest events in the field of waste management and read daily related news. Furthermore current problems and questions can be discussed in a forum.

To become a member and start taking advantage from these and more benefits, just go to <http://www.wtERT.eu> and fill out the *Join Us* form. The membership is free.



Figure 3:

First Annual Meeting 2010,
MVA SAKO Brno, CZ

4. Status of WtE in Europe

Waste-to-energy (WtE) is an important technology for municipal solid waste (MSW) management that refers to modern treatment practices for waste that cannot be recycled in other ways. It is therefore offering great opportunities for the reduction of the waste volume that would otherwise have to be landfilled, as well as for generating heat and power. It has been used widely in Europe without any adverse health effects. [5]

EU member states can be categorised into three waste management groups, clustered according to their strategies for diverting MSW away from landfill and their relative shares of landfilling, material recovery and incineration. The first group with only 8 of 27 EU countries maintain high levels (each more than 25 %) of both material recovery and incineration. These are countries like the Netherlands, Germany and Denmark. The second class are countries between group 1 and 3, like Ireland, Spain and Portugal. These member states are on the right path for the development of a sustainable waste management. The most of the new member states, like Malta, Bulgaria or Romania, belong to the 3rd waste management group with worst waste management practices (less than 25 % of both – material recovery and waste incineration) and a landfilling quote of more than 70 %. [6]

But this might change soon. Broadly speaking, waste management has improved in almost all European member states in the recent years, as more waste is being recycled and less landfilled. According to Eurostat's statistics in 1995, 62 % of MSW was landfilled. In 2009 this has fallen to 38 % and is continuing to fall. EU policy instruments, such as the Landfill Directive 1999/31/EC and the Packaging Directive 1994/62/EC have been so far mostly effective in new member states in terms of decreasing the waste being landfilled. [7] In addition, the combination of the Renewable Energy Directive 2009/28/EC, that sets targets for electricity supply from renewable sources, and the new Waste Framework Directive 2008/98/EC, that introduces a new waste management hierarchy, according to which waste-to-energy incineration is considered a recovery operation rather than disposal (providing certain efficiency circumstances), could increase WtE.

Consequently, there is also a huge gap in the WtE development in Europe, resulting in several EU countries already experiencing a hold in the expansion of the WtE due to a possible national overcapacity, while the majority of the EU countries still have major under-capacities or no waste incineration at all. The result is a significant decrease in the

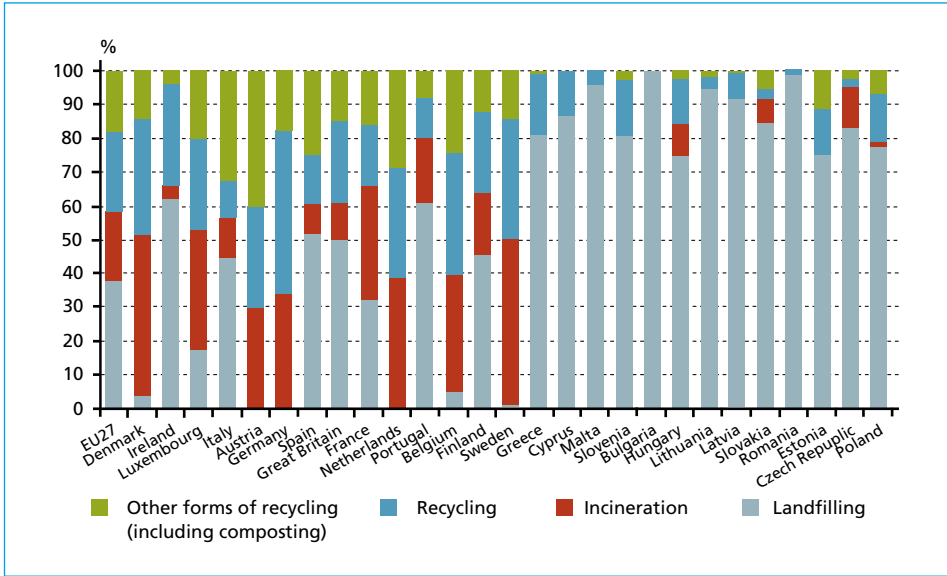


Figure 4: Treatment of municipal solid waste in the EU-27 in 2009

Source: Eurostat. Eurostat.ec.europa.eu: Municipal waste generated and treated in 2009. [Online]; 2010 [cited 2011 May 5. Available from: <http://appsso.eurostat.ec.europa.eu/nui/show.do>

overall investments into the WtE technology in Europe in the last few years, since the investment into waste incineration in the countries with most developed waste management seems to be slowing down.

A study made by the Swiss consultancy Vaccani, Zweig & Associates in 2010 showed that orders for incineration plants (including upgrades of existing plants) in Europe fell from 29 (2007) to only 9 (2009). [9] Between 1995 and 2001 the first period of continuous growth of the WtE market in Europe took place, whereby additional capacities of about 10,661 tons per day (tpd) are created. WtE orders grew also in between 2001 - 2010, where they achieved an annual average of 11,740 tpd, reaching its peak with an annual average of 16,389 tpd in 2005. Finally, the WtE expansion phase was followed by a major decline in orders; when average annual WtE orders fell to 8,756 tpd in 2009. [10]

Another report made by the Swedish Waste Management Association [11] confirmed the expansion of waste incineration between the years 1997 and 2005. In this period, the total amount of MSW treated by incineration increased from 36 to 49 million tons. The largest increase took place in Germany (4 million tons) and Italy (2 million tons). Considering the amount incinerated per capita, Sweden, Denmark, Portugal and Austria have been the leading countries during the entire period.

Taking into consideration an average recycling rate of 42 % for household and commercial waste in Western Europe (which includes countries mentioned in Figure 5) or a minimum 300 kg/capita rate for residual waste that remain as not suitable for recycling, Vaccani [12] estimated that about 134 million tons (58 %) out of a total of 231 million tons of household and commercial waste generated in Western Europe would currently be suitable for waste incineration. However, six Western European countries have already reached overcapacities in WtE. These are: to a greater extent Luxembourg, Sweden, Denmark and the Netherlands

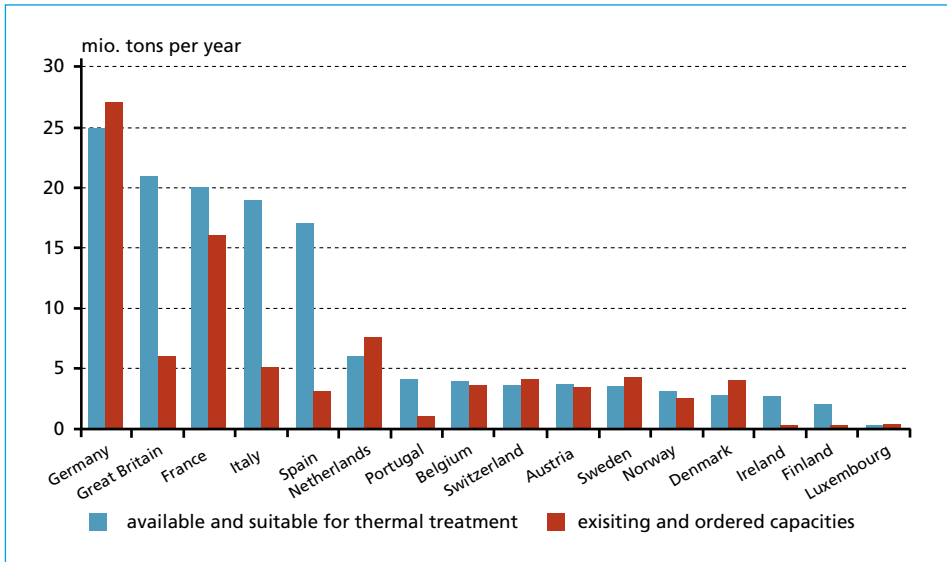


Figure 5: Capacities of 495 waste incineration plants (including RDF plants) in Western Europe (2009)

Source: Vaccani, A.: Überkapazitäten in der Abfallverbrennung in Europa. In: Thomé-Kozmiensky, K. J., (editor): Planung und Umweltrecht – Band 5. Neuruppin: TK Verlag Karl Thomé-Kozmiensky; 2011. pp. 31-38

and to a somewhat lesser extent also Germany and Belgium. As shown in Figure 5, these countries already have more existing and ordered capacities than waste capacities suitable for thermal treatment.

On the other hand, Western Europe as a whole still has about 50 million tons of waste suitable for waste incineration that is not being incinerated yet, so its' WtE capacities are used somewhat over 60 %, which is especially valid for countries such as England, Spain and Italy. [12]

Amongst Western European countries that are not experiencing a saturation of the WtE market yet, most prospective seem to be Great Britain, where many developers (operators) are present. The latest DEFRA list of Private finance initiative funded projects [13] contains projects of which 22 include WtE and RDF plants, while the UK Without Incineration Network is citing around 80 potential locations for WtE. [14] In 2010, Great Britain was the third year in a row the biggest and most dynamic market of WtE in Europe, followed by Italy, whose WtE orders in 2010 represented the biggest share or 23 % of the entire ordered volume in Europe that year (2,360 tpd of 10,264 tpd), making the country the principal market for WtE plants in Europe in 2010. [10]

An expansion of WtE is also expected in Eastern Europe, which includes countries listed in Figure 6. The trend has been set by many announced plans for WtE orders in the coming years.

Assuming a recycling rate of 38 % for the 67.1 million tons of the generated household and commercial waste in Eastern Europe (including Turkey) or a minimum 200 kg/capita rate for residual waste that remains as not suitable for recycling, a total of 42 million tons of waste should be available for waste incineration in Eastern Europe. Since the region almost

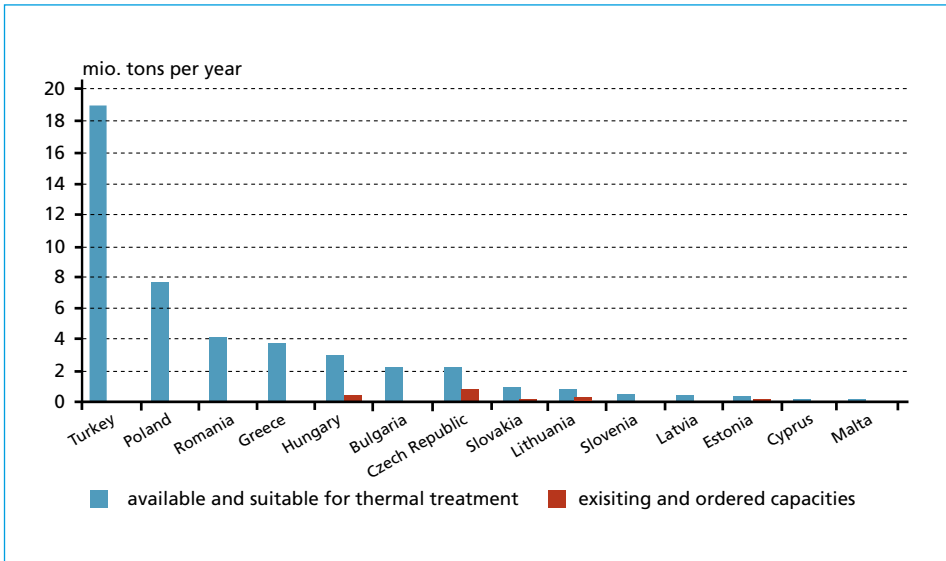


Figure 6: Capacities of the eight waste incineration plants in Eastern Europe (2009)

Source: Vaccani, A.: Überkapazitäten in der Abfallverbrennung in Europa. In: Thomé-Kozmiensky, K. J., (editor): Planung und Umweltrecht – Band 5. Neuruppin: TK Verlag Karl Thomé-Kozmiensky; 2011. pp. 31-38

knows no waste incineration, it could represent the biggest market potential of the next decade. The currently existent and ordered future WtE incineration capacities sum up to 2.1 million tons per year, which represents about 5 % of the total possible WtE capacity. [12]

According to current estimations, around 55 WtE and RDF projects are in progress and/or planned in the entire Eastern Europe, taking into consideration 13 countries (Poland, Hungary, Czech Republic, Slovakia, Slovenia, Romania, Bulgaria, Estonia, Lithuania, Ukraine, Croatia, Serbia and Bosnia and Herzegovina). However, with the exception of the Polish projects and the projects in Lithuania and Estonia, the realisation of planned capacities in other countries is still rather uncertain.

Furthermore, some European countries have a policy which limits incineration. In the following some example are mentioned. In order to avoid the further expansion of waste incineration, the Czech government issued a list of priority funded projects in 2009, according to which waste incineration was not to be financially subsidized. [15] However, the Czech ministry later changed its position on energy recovery from waste, enabling the funding of WtE projects from public sources through the Operational Programme on the Environment. [16] According to an announcement in 2007, France has decided to limit incineration together with landfilling, even though a large share of the country's waste is treated with incineration at the present. Also, at a policy level Scotland has stated that at most 25 % of the waste shall be treated by incineration. The present Irish government is also against incineration and considers implementing an incineration tax with the purpose to obstruct a large scale development of incineration and promote composting and small MBT-facilities as an alternative to landfilling. According to their waste plans, Spain and Portugal want to focus on composting in preference to incineration since compost is demanded for soil improvement. [11]

It is therefore fair to conclude that, in spite of overall insufficient WtE capacities in Europe, the development of the market is still facing many challenges. Largest investors in WtE so far are dealing with overcapacities on one hand, while the states with undercapacities either struggle with the public acceptance of the technology, the lack of a WM strategy, or the lack of investment potential, making it difficult to predict the direction of the growth of WtE as well as its speed. In addition, the predictions about the expansion of WtE are mostly based on the recent national waste production trends.

5. Conclusion

The named problems in Europe, which are globally more intensive, turns WTERT to an important and required instrument and constitution for the promotion and improvement of the global waste management. WtERT Germany addresses oneself to solve the problems in the European waste management.

6. Literature

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