Methane emissions in the waste sector. The case-study of Germany.

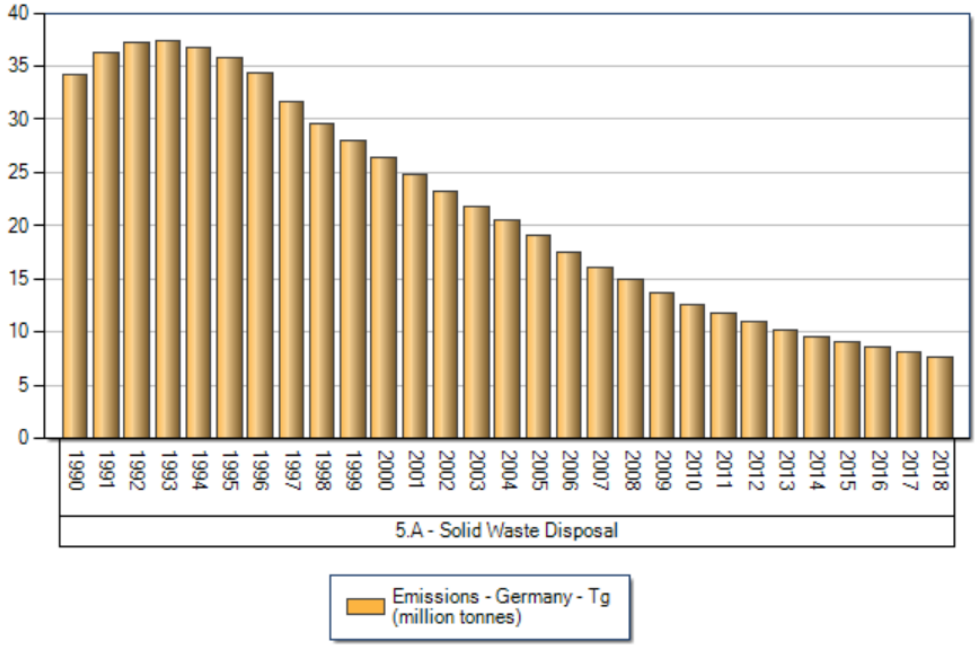
Methane emissions are a greenhouse gas which is around twenty-five times more harmful than CO_2 over one hundred-year period (and eighty-six times over a twenty-year period). Methane emissions are strictly related to waste management, when it comes to solid waste disposal. Around the world, landfills are the third largest source of methane. Currently, 70% of waste is landfilled worldwide, often in an unregulated way. Furthermore, previsions from the World Bank say that the generation of waste will increase by 60% by 2050. It is therefore of utmost importance to tackle landfill gas emissions all over the world.

Reduction of methane emissions might be achieved through the development of new technologies but a key solution is simply landfill diversion. Landfill diversion is about making sure that each waste stream finds the most suitable treatment option among complementary technologies at the different level of the waste hierarchy. Under the waste hierarchy, non-recyclable waste has basically two possible treatments: disposal in landfills or energy recovery. Waste-to-energy has a number of advantages: avoidance of methane emissions; recovery of energy and materials; reduction of the waste's volume; abatement of odour nuisance; saving of valuable land and of course hygenisation.

According to EUROSTAT, almost half of the European Member States still send to landfills more than 40% of their municipal waste. In 2018 only, methane emissions from landfills in the EU27 member states plus UK generated around 100 million tonnes CO_2 equivalent (source EEA), and they counted for more than 20% of the total European methane emissions. To tackle climate change, this process needs to be reverted as soon as possible. Luckily, European best practices exist, and pave the way for the implementation of more sustainable waste management frameworks. This is the case of Germany.

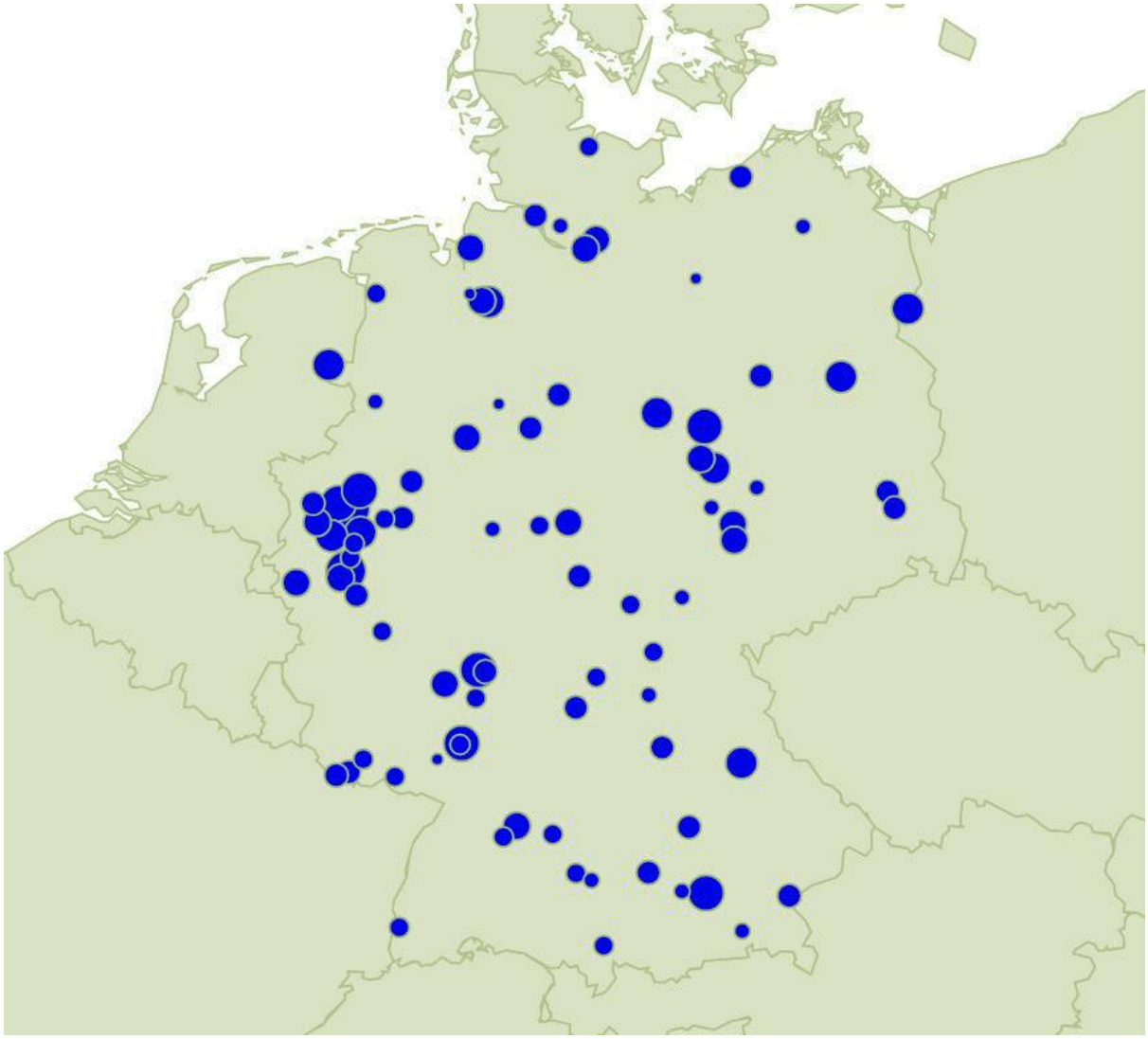
In the 1970s, Germany had around 50,000 landfills. In 2005, a ban on landfills for untreated organic waste was applied. Today, in a country of 83 million inhabitants, there are less than 300. In 2017, the World Economic Forum named the country recycling world champion. Currently, around 60% of municipal waste is recycled and around 40% is treated by waste-to-energy plants.

As a result, the amount of gas produced in landfills has been decreasing continuously since the 1990s. Methane emissions from landfills passed from almost 35.5 million tonnes in 1990 to 7.5 million tonnes in 2018. Recently, landfill operators have agreed with the environment ministry to reduce methane emissions from landfills by a total of one million tonnes of CO_2 equivalents by 2027.



In parallel, the role of waste-to-energy plants increased. In Germany, the number of waste-to-energy plants rose from 48 in 1990 to 98 in 2018, with a capacity of about 26 million tonnes of non-recyclable waste. Thanks to stringent emission control the air leaving waste-to-energy plants has often fewer fine particles than found in the air of big cities. Also, dioxins and other pollutants, which were an issue in the 1980s, are no longer an issue, a fact that is all the more impressive as waste incineration capacity has more than doubled since 1985.

Waste-to-energy plants treating municipal waste supply to consumers electricity, heat and steam which contribute about 1% to the final energy consumption in Germany. The electricity generation from municipal waste is more than 5500 GWh. Furthermore, the recovery of metal such as iron, copper and aluminum, is a common feature that prevents further energy-consuming extraction of raw material and related greenhouse gas emissions.



Map of waste-to-energy plants in Germany. Source CEWEP

In conclusion, reduction of methane emissions in the waste sector is a challenge where every sector has a role to play and that can be partly solved by following the waste hierarchy with more recycling and the complementary development of energy recovery for non-recyclable waste.

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