



ACEF

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Methane = 85x more potent GHG than CO₂ in the first 12 years and 23 times calculated over 100 years. Methane often dissolves within 10-15 years. Landfills contributing to approx. 5% of Global GHG production.



Decentralized collection and sorting creates uncontrolled hotspots and leakages of hazardous components to the environment potentially (often) ending up in rivers and oceans



When waste is ending up on a “landfill” untreated and not maintained it forms a threat to public health and the environment in general

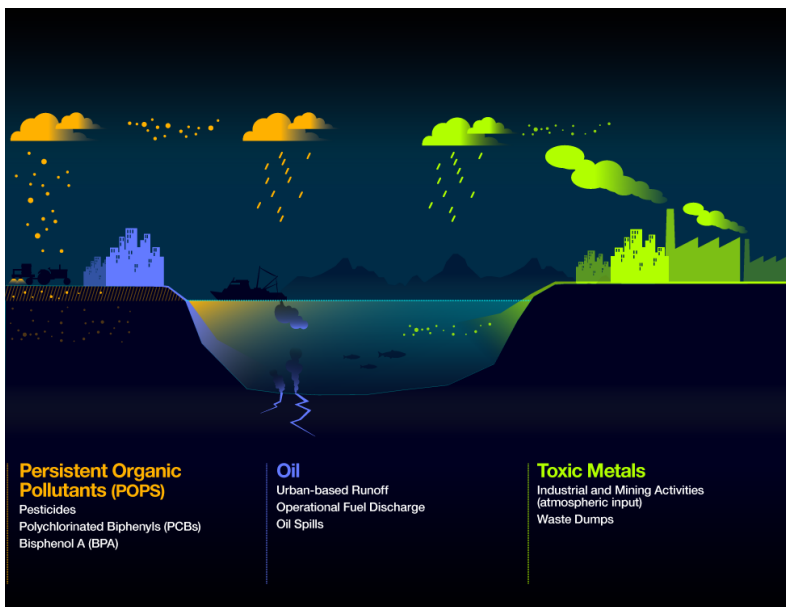


- Due to the lack of proper waste management legislation and/or enforcement, and because most of the waste processing is controlled by the informal sector. This sector is not properly regulated, and we see that this waste finds its way to the “cheapest” sink solution which is often not a sustainable destination such as dumpsites, rivers, oceans and the natural environment around us.
- On unsanitary landfills or dumpsites, the covering the “fresh” waste takes too long because concessionaires for waste picking need time to collect their valuables. In combination with local circumstances (hot, humid, non-existent landfill management processes) this may lead to uncontrolled fires because the produced methane gets in- or unintendedly lighted. These fires spread toxic fumes threatening public health locally and marine life worldwide.
- Dumpsites without proper protection layers, leach out liquids contaminating nearby groundwater reservoirs. The same reservoirs are used for drinking water preparation of the same city. Heavy metals and medicine particles ending up in drinking water impacting public health because they are hard to remove and require huge investments in proper sewage and drinking water treatment installations.

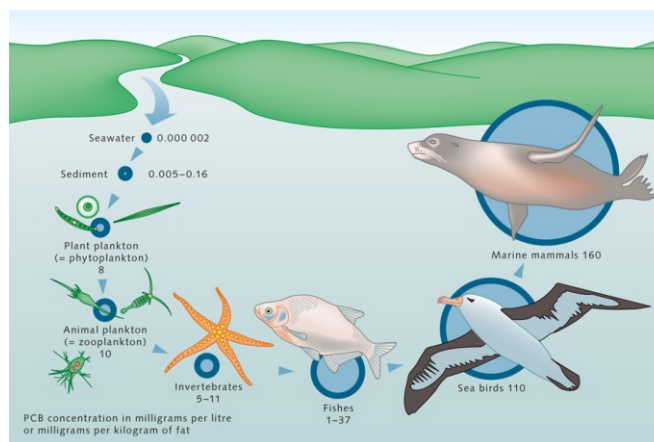
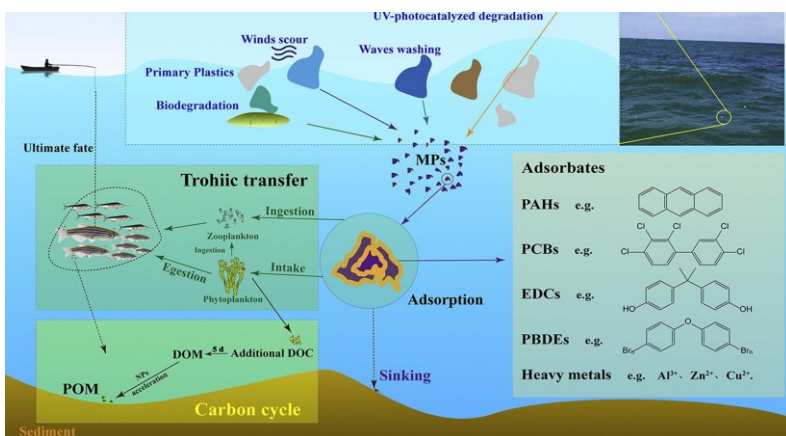




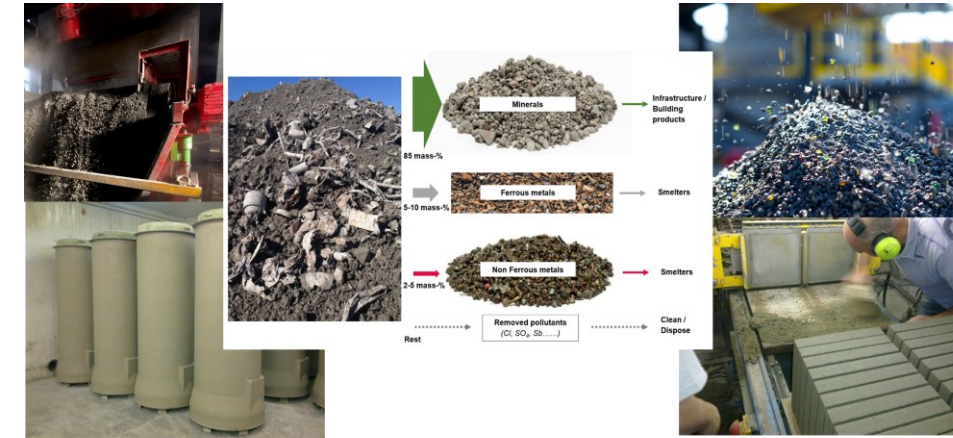
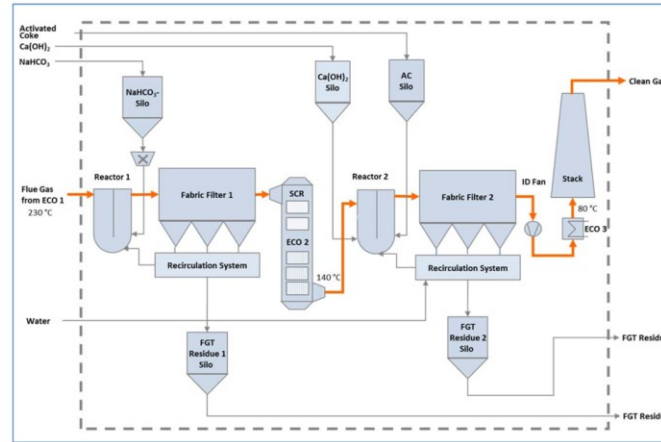
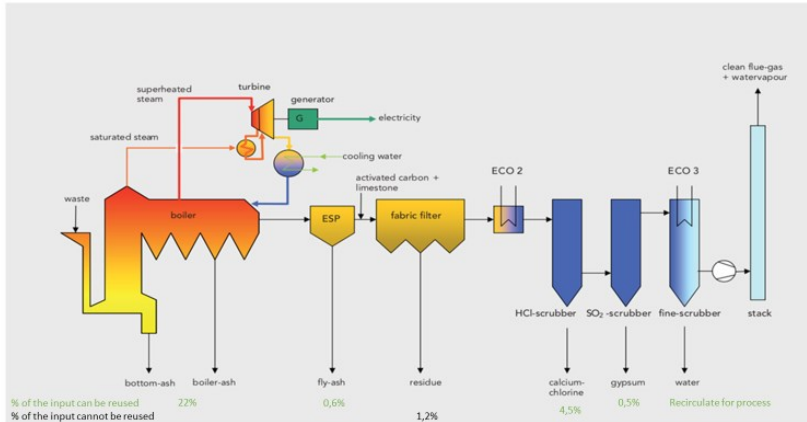
The effect of plastics and POP's ending up in the ocean



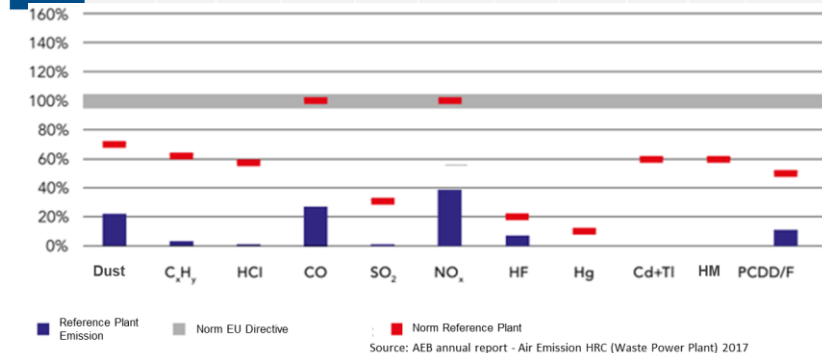
- Uncontrolled waste management systems causes leakages to the environment, meaning plastics ending up in rivers or directly into the ocean.
- These plastics enter the food chain of the ocean via small organism or by being directly consumed by the fish.
- Uncontrolled fires from waste dumps and landfills emitting toxic fumes as in dioxins, furans, heavy metals into the air which will rain out over fertile soil, in rivers and oceans
- Lack of emission regulations and enforcement causing industries emitting unnecessary toxic fumes into the environment including those of waste to energy with poor FGT systems.
- Technologies for capturing these toxic fumes are available, it will concentrate and accumulate all hazardous fractions from our consumption-based society.



Fly-ash or FGT cleaning residue and Bottom ash handling: accumulating all toxic and hazardous residues from our consumption society. Preventing them to enter into the environment uncontrolled.

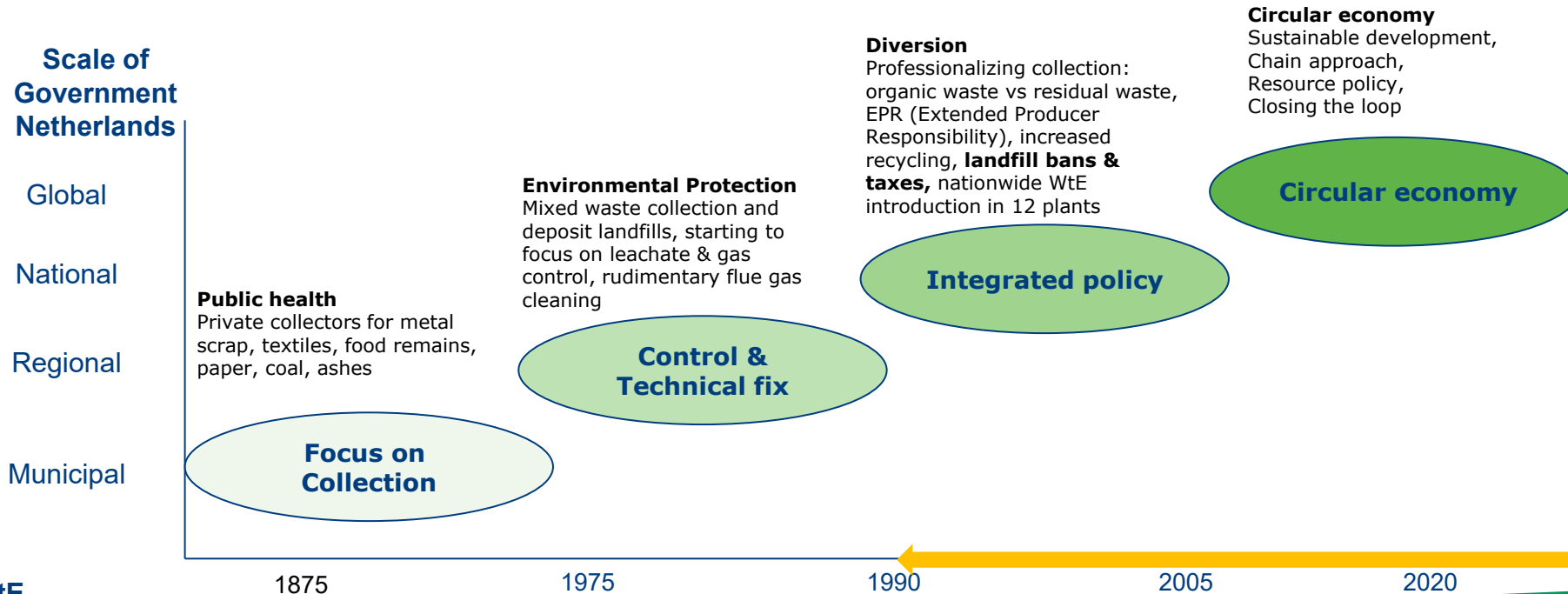


	Dust Mg/m ³	C ₂ H ₄ Mg/m ³	HCL Mg/m ³	CO Mg/m ³	SO ₂ Mg/m ³	NO _x Mg/m ³	HF Mg/m ³	Hg μg/m ³	Cd+TI μg/m ³	HM μg/m ³	PCDD/F Ng TEQ m ³
EU Standard	5	10	8	30	40	180	1	50	50	500	0.1
HE Emission	1.28	0.32	0.27	10.54	0.79	92.3	0	0	0	0	0.008



- Legislation on emissions are key in order to prevent toxic and hazardous components leaving the waste to energy plants.
- In the European Union these legislations are constantly being discussed and improved resulting in the latest update of the Best REFERENCE (BREF) 2019 documentation.
- Best Available Technology (BAT) documentation in Europe sets minimum standards for design of waste to energy plants**
- Technologies for lower emission at lower Capex and Opex are available and proven in several different projects over Europe
- Regulations in the Netherlands demanded **to create a free to use** product from bottom ash, leading to technological innovations resulting in products from bottom-ash at a cost equal to landfilling and improving recovery rates of waste to energy plants
- Flue gas cleaning residue produced in a dry/wet FGT system can be partly reused and partly needs to be immobilized for a specialized safe landfill.
- Flue-gas residue from a double dry system (required to achieve latest EU BREF emission regulation) needs to be completely immobilized and safely stored in a specialized safe landfill
- In this field improved immobilization technologies are being developed creating glazed products which can be safely reused in construction. Though for the moment they still come at high energy cost.

Proper waste management comes with policies and regulations on recycling- and environmental targets, together with a right set of incentives to drive innovation to the most sustainable long term solutions. “ The overall lowest costs for society”



Amsterdam WtE Development

1st generation 1917-1969
"destroy waste"



2nd generation 1969-1993
"some recovery and treatment"



3rd generation 1993-now
"designed to be CLEAN"



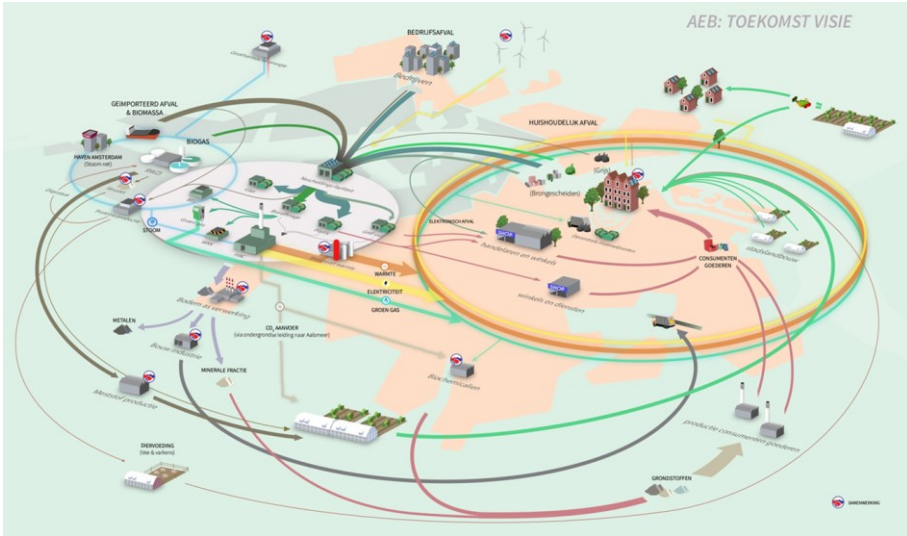
4th generation 2007-now
"designed for RECOVERY"



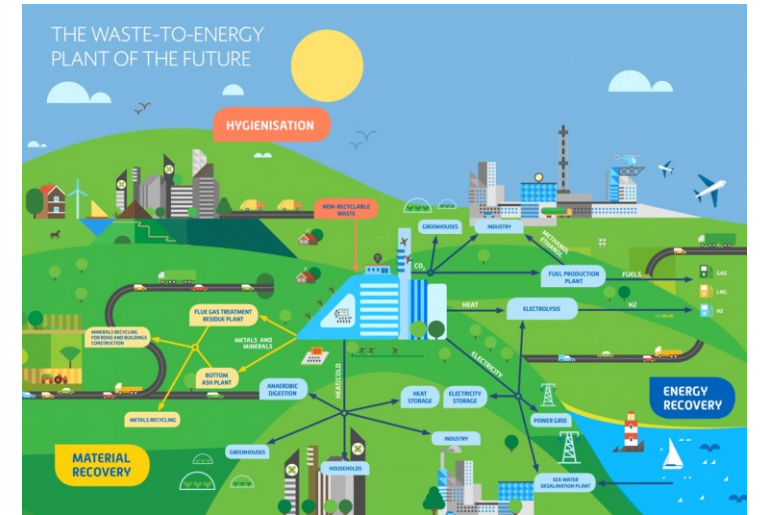
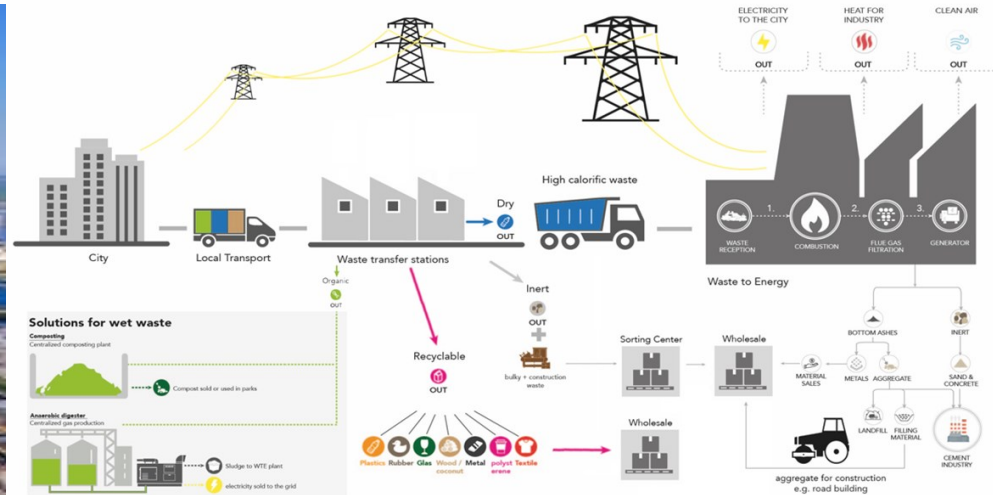
5th generation 2017-now
"ECO-Port"
integrated pre-sorting and materials recovery, bottom ash treatment, CCU



ECO-port developed for centralized waste processing



- In the Netherlands we found that activities around waste processing concentrated at location where waste to energy plant are built. (Amsterdam and Rotterdam)
- These processes benefit from logistics because all waste is brought to one location/area
- The sorting and optimizing processes benefits from each other waste streams minimizing transport costs
- Transport of the residuals/residues can be limited because the waste to energy plant is close
- These sorting and optimizing processes benefits from available waste heat (or steam) and other renewable energy from the waste to energy plant
- CO2 capturing and utilization; CO2 can be used in greenhouses but also as a commodity for the electrification of the chemical industry and carbonization in construction materials replacing cement.
- WtE as a baseload production unit could partly stabilize an electricity grid with ever higher input from Wind and Solar, overshoot production can be transferred into Hydrogen feeding the electrification of the chemical industry
- In areas with a high demand of drinking water, the waste heat can also be used for desalination purposes if the plant is based near to the sea.



Improved waste management system based on the right policies and regulations leading to more sustainable societies and kick-starting the circular economy



- Proper collection and processing infrastructure concentrated in ECO-ports, limiting uncontrolled leakages to the environment
- Improvement of working conditions for sorters and workers in the informal sector, giving them a formal status, bank accounts and education for their children
- Providing a safe and environmentally sustainable treatment solution for residual or end-of-life waste as part of the circular economy
- HE-WtE creates a higher return on electricity income, therefore can afford a lower gate fee and investments in sophisticated flue-gas treatment technologies to limit impact of GHG while providing a competitive alternative to landfilling both in terms of cost and environmental impact
- Eventually, with the right incentives (read: national or international integrated waste management policy) it will lead to a cleaner society at the lowest costs.
- Financing institutes should only invest in projects that are guaranteed to comply with minimum standards on emissions as in the EU directive 2010/75 updated BREF 2019



We are **AWECT**

We bring **high efficiency** technology and the knowledge of over 100 years in Waste-to-Energy to the rest of the world