

The SANA-model landfills



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Social value

Natural Attenuation (NA) plays a key role in the sustainable future of our landfills in the Netherlands, Europe and abroad. A source related approach, which leads to sustainable clean landfills certainly improves the negative image of a landfill for the public, local authorities/municipalities and private enterprises.

Sustainable aftercare and sustainable landfilling are appealing as an environment-friendly way to deal with our waste, especially in times of climate change and shortage of energy and raw materials. It avoids the uncontrolled emission of landfill gas and converts it into electricity. It allows the risk-free excavation of recyclable waste streams (waste mining), which can be converted into secondary raw materials and/or energy. And it allows safe redevelopment of landfill sites into residential, industrial or recreational areas.

The SANA-model facilitates the ideal world without waste (Cradle to Cradle®) and in this way it contributes to a sustainable society

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Sustainable Emission Reduction at Landfills, Clean Landfills for the Future

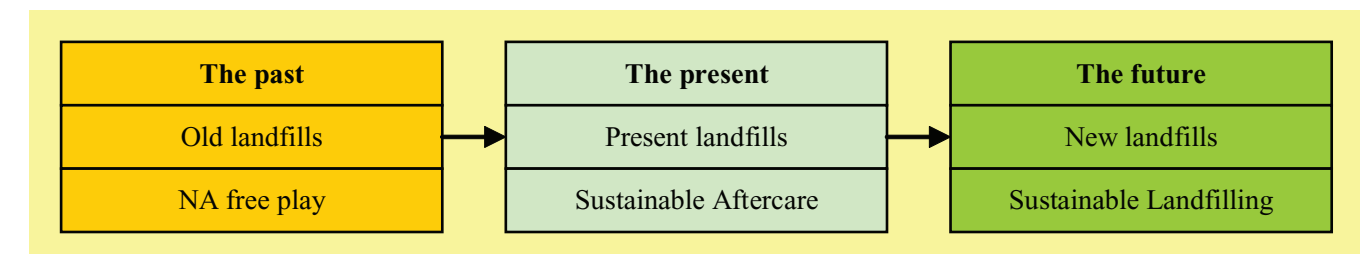
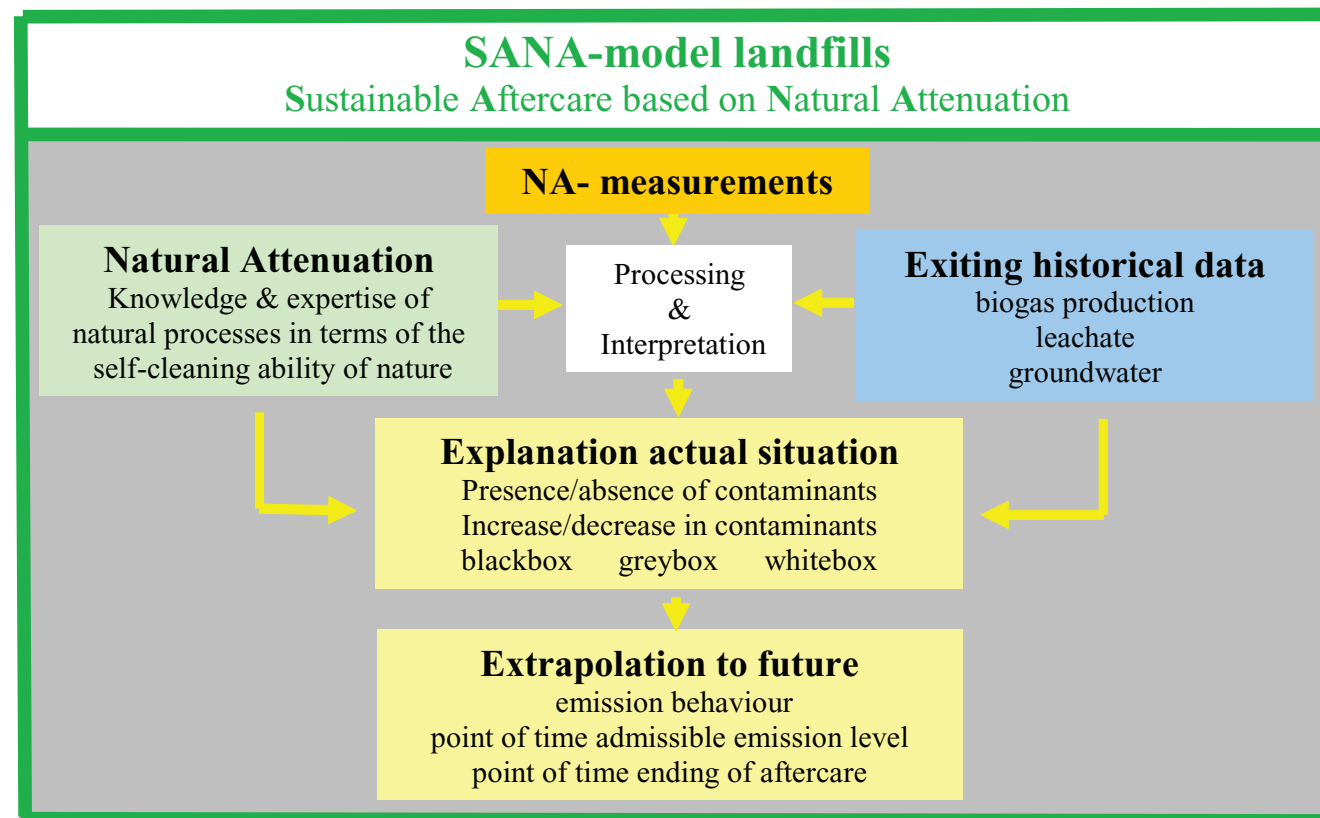
The SANA-model (SANA stands for Sustainable Aftercare based on Natural Attenuation) is a new technological concept, based upon the natural self-cleaning ability in landfilled waste, which requires that modern landfills should on the contrary not be covered by an impermeable top liner.

In landfilled waste different kinds of natural biochemical and geochemical processes occur, which reduce the emission of leachate and landfill gas to admissible levels, in technical jargon 'Natural Attenuation (NA)'. This natural self-cleaning ability only occurs in the presence of water. This is the main reason why landfilled waste should not be covered by an impermeable liner, which makes the infiltration of rain water impossible.

Current legislation focuses on the installation and maintenance of soil protecting measures such as impermeable bottom and top liners. This approach is expensive, leads to ongoing aftercare and burdens the next generations with an unsolved environmental problem. The waste remains as contaminated as it was on landfilling. Royal Haskoning's vision suggests that this is not a good example of sustainable policy.

The SANA-model developed by Royal Haskoning is a source related approach, which leads to less stringent aftercare or even discharge from aftercare. The SANA-model can be applied to all landfills in any location throughout the world. Application of the SANA-model results in a sustainable emission reduction, an improvement in the quality of the environment and a reduction of costs.

The SANA-model, sustainable emission reduction at landfills



The SANA - model

Harmful compounds in the waste body can seriously pollute the groundwater and landfill gas can lead to inadmissible emission to the atmosphere. The SANA-model aims to achieve a maximum feasible emission reduction, which will meet the requirements with respect to admissible emission levels. The SANA-model makes use of measurement techniques and interpretation techniques, by which the autonomic and/or enhanced natural self-cleaning ability (decay and immobilization) can be demonstrated.

From earlier research by Royal Haskoning it has already been demonstrated that the 3,800 closed landfills in the Netherlands, operational in the period 1950 -1980 and consequently without the legal required impermeable bottom - and top liners, were less contaminated than expected. This was the result of NA-processes occurring during decades since the start of exploitation of these landfills. So nature has done its work with the result that at more than 75% of all the old landfills, groundwater quality has not exceeded the admissible environmental limit values. The acquired knowledge has been converted to our present landfills by developing this practical SANA-model.

Allowing structural infiltration of water in landfills is a prerequisite for the continuation of the NA-processes, by which sustainable emission reduction is realized. Natural self-cleaning processes are slow processes, which take decades before sustainable emission reduction will be achieved. Until that time inadmissible emissions to the groundwater are prevented by an impermeable bottom liner. The autonomic NA-process can be enhanced and accelerated by additional infiltration of leachate/water (anaerobic degradation of organic matter) and/or aeration of the waste (aerobic degradation of organic matter).

Innovation and sustainability

The SANA-model is based upon a new and sustainable vision with respect to the aftercare of landfills on the pretext of 'not isolating, but tackling the problem'. It combines scientific and practical knowledge from demonstration projects into an integrated and practical concept.

Implementation and application

The SANA-model is and has been applied at landfills in the Netherlands and abroad. Across Europe the number of landfills is estimated at more than 150,000. The SANA-model can be applied to all landfills in any location throughout the world.

Sustainable aftercare at old and present landfills can easily be transformed to sustainable landfill concepts of new landfills to be designed. In this way knowledge is optimally used following the concept, "the past – the present – the future".

Costs and benefits

Besides the social benefits of a sustainable solution, application of the SANA-model also can amount to 30% cost savings compared to the traditional aftercare.