Techno–economic evaluation of solid waste treatment technologies– An implementation in the region of Attica (Greece)

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Waste legal framework (1)

- In order to improve waste management of each member state, EU has established a legal framework.
- This framework contains policies and quantitative targets.
- The Directive (EU) 2018/850 states that by 2035 the amount of municipal waste landfilled must be reduced to 10% or less of the total amount of municipal waste generated (by weight).
- According to the Directive 2008/98/EC and the directive 2018/851/EU, the preparing for re-use and the recycling of municipal waste (paper, metal, plastic and glass) shall be increased by 2035, to a minimum of 65% by weight.
Similar objectives have been set by the Directive (EU) 2018/852 (amending Directive 94/62/EC on packaging and packaging waste). No later than 31 December 2030, materials contained in packaging waste must be recycled up to:

(i) 55 % of plastic;
(ii) 30 % of wood;
(iii) 80 % of ferrous metals;
(iv) 60 % of aluminium;
(v) 75 % of glass;
(vi) 85 % of paper and cardboard.
The region of Attica

- The administrative region of Attica has an area of 3.808 km², (about 2.9% of the surface area of Greece).
- In 2011, there were about 3,827,624 inhabitants. Newer estimations doesn’t change significantly this number (more than 33% of the population of Greece).
- Is the most densely populated area in Greece (1005 inhabitants /km²).
- About 45% of the Greek Gross domestic product is produced in Attica.
Waste management in Attica—current state

- It is estimated that about 1.9 million tones of waste are produced in 2020.
- Treatment methods are mainly recycling, composting and landfiling.
- Treatment facilities include two sorting centers of recyclable materials (total capacity 140,000 tones) and one mechanical and biological treatment plant (capacity 260,000 tones).
- Treatment facilities are inadequate for an ecologically proper management, while the participation of the population at the separation at source is low.
- About 80% of the produced quantity is deposited in landfills.
The construction of ten waste treatment facilities is proposed as first stage of the improvement of waste management.

Three mechanical treatment plants / sorting centers for recyclable materials (total capacity of 220 000 t/year)

Three mechanical and biological treatment plants for mixed waste (total capacity 520 000 t/year)

Three composting plants for (selected) organic waste (total capacity 70 000 t/year)
In addition to the aforementioned facilities, an incineration plant of 100 000 t/year is also calculated and can be constructed. The plant can produce energy from the residue of the other plants and/or selected waste.

The total initial cost is 220 000 000 €

A gate fee in landfills can be avoided (45 €/t). Recyclable materials and compost can be sold in (local) market.

As a result, the plants can be economically viable (IRR = 6.2% in 10 years):
In order to increase separation at source, specific measures are proposed, in cooperation with the food companies, restaurants, super markets, etc.

The construction of the plants and the proposed measures in separation at source and reverse logistics are going to increase recycling and composting.

The proposed plan can reduce significantly the amount of waste that damped into landfills. (about 530000 t/year less)

As a result, the measures are going to contribute positively to Greece achieve the EU legislation goals.
The presented plan is the first stage of an ecologically proper waste management Attica. After the construction of the plants, and the implementation of measures, new plants can be evaluated.
Thank you for your attention

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