IEA Bioenergy
Technology Collaboration Programme

Sorting technologies

Case study about MSW sorting facility in Italy- Eco+Eco Srl

Summary Series

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SUMMARY

This report presents a mixed waste sorting facilities in Italy, Eco+Eco srl, based in Fusina, near Venice (Italy,) which converts residual municipal solid waste (MSW) after separated collection into Solid Recovered Fuel (SRF) in two separated lines (L1 and L2). Part of the produced SRF is used to feed a co-incineration plant to generate electricity in situ. Metals present in the unsorted MSW are sorted out (7,700 ton/year) and sent to recovery, while the aggregates (i.e., gravel, sand, glass, and ceramics) are at present either sent to reuse or to landfill. L1 produces only bio-stabilised waste (RDF, Refuse Derived Fuel), at present only partially treated in L2 to be upgraded to SRF of Class 3.3.2. according to ISO 21640:2021 "Solid recovered fuels — Specifications and classes", while the remaining residual part is treated by other companies. The co-incineration plant is not able to take all the produced SRF which is also sold on the marked. From 2026, with the addition of a second co-incineration line, all the produced SRF will be use in situ. The SRF production plant is currently being revamped and it is expected that by the end of 2025 it will be able to sort out almost 6,000 t/year of plastics from the income MSW, reducing landfilling of residues and fossil fuel consumption both avoiding plastic burning in the co-incinerator and material transport by trucks within and outside the plant. The final flow chart of the plant once revamped is reported in the figure on the next page.

CONCLUSION

Eco+Eco plant treats residual MSW produced by approximately 840,000 inhabitants of Venice Province and up to 37 million tourists per year and converts it into high quality SRF used to either generate electrical power directly on site or sold as fuel to other plants or cement kilns. At present the plant allows a good management of the unsorted MSW generated in the province of Venice, characterized by a high urbanization and an impressive touristic pressure. The present technology sorts out recyclable materials and produces SRF with a biogenic carbon content of around 60% of the total carbon. Part of the

produced SRF feeds a co-incineration plant located inside the same area. The revamped SRF production plant is expected to be operating by the end of 2025, while a second co-incineration line will be operating in 2026. Revamping and upgrading of the plant will drastically reduce fossil fuel consumption thanks to automatization and by reducing material transport by trucks within and to outside the plant. The upgrading will also decrease auto-power consumption and will make easier the management and the maintenance of the plant. The improvement in progress will allow to:

- recover a larger quantity of recyclable material from the MSW prior the energy recovery (e.g., around 6,000 ton/year of plastics);
- reduce the amount of material sent to co-incineration, by coupling the bio-stabilization process and the new more efficient sorting technology for material recovery;
- increase the calorific value of the produced SRF up to 35% with respect to untreated original MSW;
- improve co-incineration process, flue gases treatment and bottom ashes quality, being the SRF more homogeneous than the untreated residual MSW;
- reduce the combustion of fossil-derived plastics, decreasing the related CO_2 emission into atmosphere.

Sorting recyclable material from residual MSW will strongly reduce landfilling, decreasing CO_2 emission due to combustion of fossil-plastics and/or transport of SRF inside and outside the plant, and indirectly saving virgin plastic material production. The total saved emission of CO_2 is estimated from 42,000 to 64,000 ton/year if all the sorted plastic is recycled, or a more reliable amount ranging from 29,000 to 45,000 ton/year if only 70% of the sorted plastics will be recycled. The energy recovery from the high quality SRF a fuel which is 30% lighter than the unsorted MSW, but with higher calorific value and more homogeneous characteristics will lead to fully oxidized ashes that can be used in construction industry and makes easier the plant management and flue gas treatment. In conclusion Eco+Eco plant will provide an example of MSW management covering an extended and complex area, such the Venice Province able to “closing the circle”.