

The P&T – Enplus “waste to energy” project for Genoa’s MSW

The project engineered by P&T and Enplus, assisted by SETA, has been submitted to 67 Councils of Genoa Province.

The plant system, to be placed on Monte Scarpino landfill is able to: continue up to 100% the MSW separation, obtaining compost from damp organic MSW fraction, extract the combustible component, shredding and drying it (also with the help of solar heat captured by the dendritic copper roof covering the whole plant), atomizing its organic (and glassifying its inorganic) part by plasma technology and extracting all the MSW energy by gas – steam combined cycle turbine system.

The technological system proposed for the Genoa metropolitan area (applicable to all other Italian cities with similar problems), is substantially a zero pollution system (conversion units have no chimney, not producing fumes and ashes) that is able to reduce by 100 to 10.000 times (according to the pollutants) the present limits to incinerator emission fixed by EU. As far as the glass – ceramic byproduct of the process (recyclable as abrasive or tile materials) if disposed, produces less leachate toxicity than a soda glass bottle. The Syngas, produced by plasma process is at zero dioxin and furans content (if burnt in a turbine, during infrequent transitory malfunctioning – even if not detectable – remains in any case several order of magnitude under the safety limits fixed by EU).

The plant system engineered by P&T and Enplus is composed of: 3 lines for MSW separation and recovery, a bio – cells and seasoning yard compost production system, a shredding/drying system to process the combustible component, 8 plasma converter modules each one with a 2 ton/h reactor, a combined cycle power plant with 2 gas turbines and a steam turbine fitted with a thermal recovery system for teleheating and telerefreshing to be (freely) delivered to flower green houses and refrigerated stores created after reclaiming the landfill. The energy balance achieved by the power plant engineered by P&T and Enplus performs a 42% of energy content of MSW transformed into electricity (resulting in more than 32 electrical MW). This enables the electrical self – sufficiency for the main and secondary plant and ancillary components and produces a consistent electrical surplus to be sold to the grid.

Considering that the plant system must convert “waste to energy” the unsorted MSW exceeding the sorted collection planned target (42%), it must be able to process about 300.000 ton/year of fresh MSW. In so producing daily 95 ton of recovered byproduct, 290 ton of dump organic matter for composting, 353 ton of combustible matter and displacing to landfill only 84 ton of inerts.

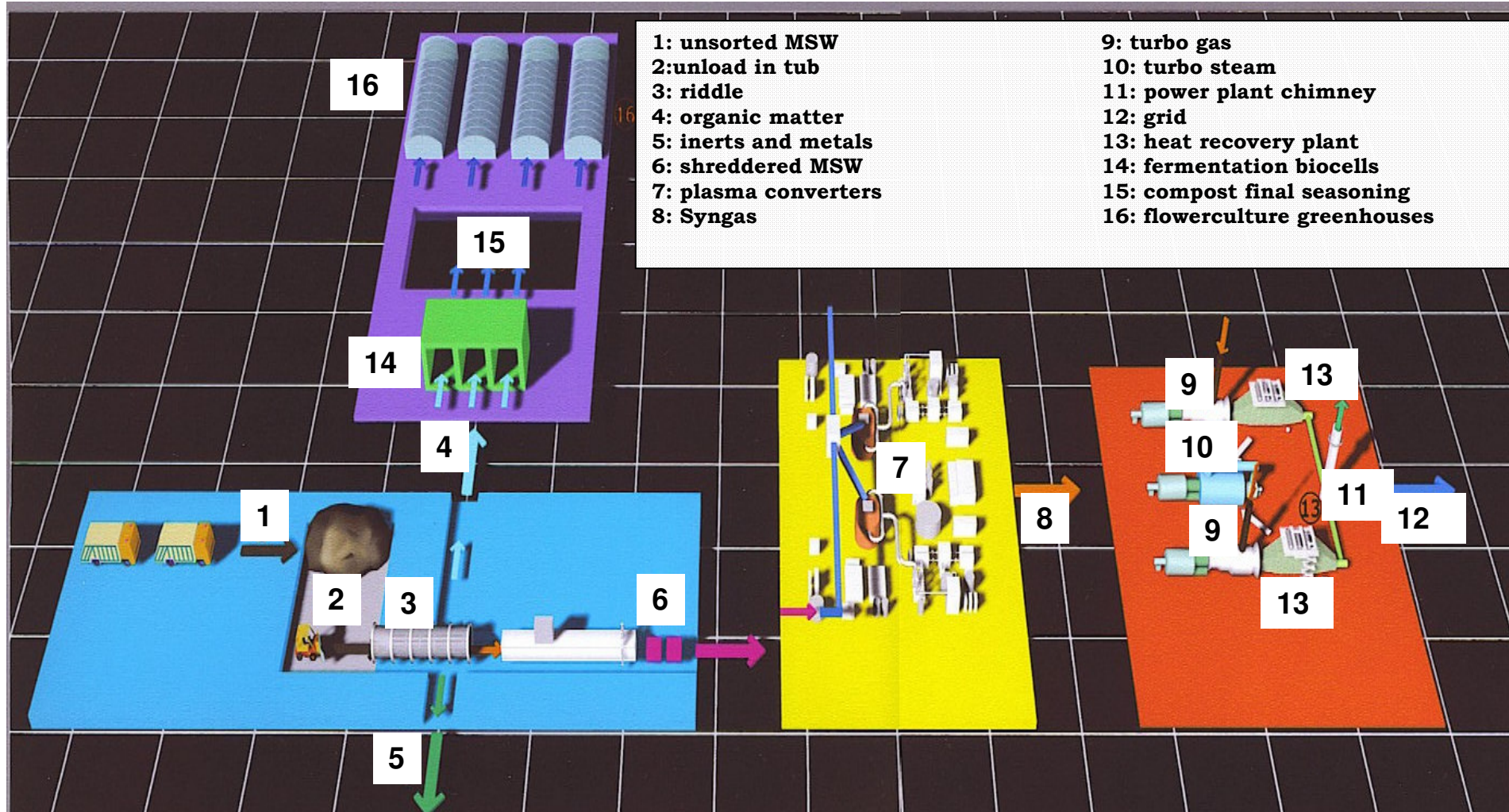
The plant operation creates 190 jobs, 60 of which for the plasma and power plant sections (many other jobs will be created by connected green house cultivation and refrigerated logistic chain).

Including the heavy landfill reclaiming activities and connected civil works to be developed on the difficult orography of Monte Scarpino, necessary to create all the areas for the plant, the compost production, the green houses and cold stores, the global “turn key” investment reaches 150 million €, recoverable in 6 years by selling power to the grid and by tipping revenue. The resulting project is sustainable both from a financial and economic point of view with consistent operating margins in different scenarios: with or without *green bonds*. In case of green bonds scenario the proposed plant permits to reduce to an half the present disposal tip.

The plant may be employed to reclaim all the landfill (landfill mining and connected “waste to energy” conversion) transforming the landfill in a “clean energy recovery center” able to produce low cost H₂ for urban sustainable transport and connected development of local and northern Italy high tech Companies operating in the frame of the expected *hydrogen economy*.



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Plant system flow – sheet



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Plant layout showing the roof structure



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Plant view from east (roof covered with dentritic copper)



Rendering of the future plant positioned on existing Genoa landfill (Monte Scarpino flanks)