



# Sunnytek Solar Sweden

## City dump waste management hybrid solution



Sunnytek & Partners offers a solution for taking care of city dump waste and convert it to incomes instead of large land fills. We have made a design to handle all waste from municipality areas and process it to valuables in some way. Technology is not that complex but we have a different view how this is done that gives advantages and reasonable costs balanced to good incomes. Here we explain our solution and process in a simple way. Capacity covers 25 ton / day to 1000 ton / day in waste management.

**\*0 Yesterdays old solution** Landfill has been used since many years and this has created a lot off problems. Now there are hundreds of dump mountains that take over landscape and generate lots of problems in polluting the land scape. In most countries this will be stopped and forbidden soon and here a better solution is needed. EU area stopped landfills about 20 years ago and now we have almos zero in volume. This can easily be converted to incomes and not a growing problem.



**\*1 Arrival of valuables to plant.** Waste arrives by trucks like today where we start by measuring weight of all waste and generate a ticket for driver and also add into the logistic software. We use a system where there is service in most countries known for highest quality. Input is used to check what comes in over the day and to generate information for the billing system for dumping fees. In most cases there is a dumping fee like today the landfill is used and we have about same costs for our solution. This income is a substantial income over year and see that you pay what you create in waste.



### **\*2 Sorting and separating machine**

All is mixed and must be processed in a first step. Here we use same process as in Sweden to sort out valuables as metals from dangerous items. Incomes



here are rather large from the extra valuables. This is a mix of machines supported by humans to get all OK. Eyes are often best to see and manual sorting is always used with machines together.

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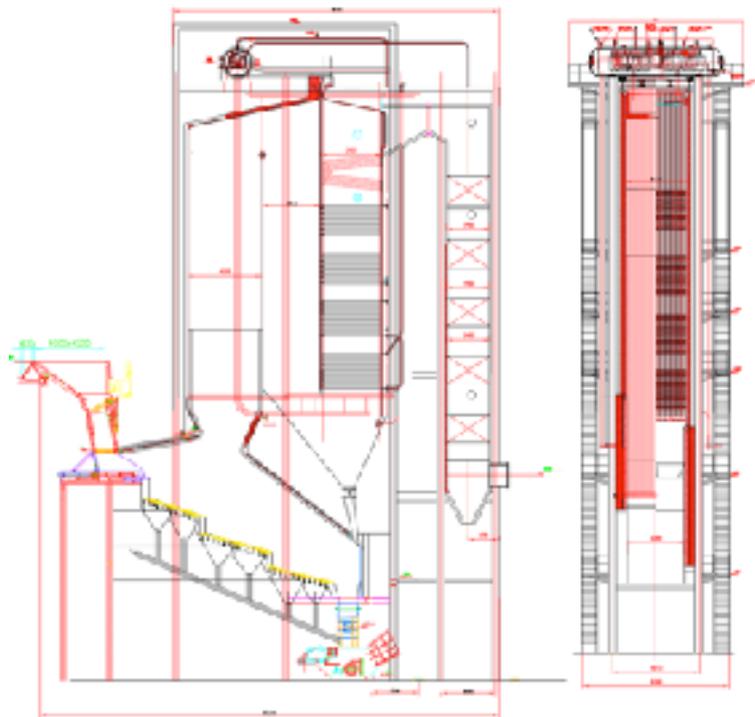
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**\*3 Pre-schredder mill** Size differs and to large objects can not be handled in the incinerator. Here we have a shredder that crush all to max 50 cm size. This is what boiler can handle and we see we have a steady flow of this material. Today most materials on a city dump is plastics and burnables and often 70 % of content have a reasonable good energy content when burned.

**\*4 Biomass boiler system.** This is the most critical part of the system. It is designed to handle biomass and a waste mix from a city dump and burn all correctly to steam with high pressure. Fuel is loaded by a feeder into an intake where it is portioned out into the angled moving 3 steps grate. Fans generate a high airflow to get intense heat and best



combustion. The fuel is often a bit wet and pieces are rather large so we need a long cycle time in the fire place and this is carefully controlled by a PLC control system by Siemens S7 design. Fire palace room is very high and designed to give complete incineration with lowest content of emission gases.



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Fire palace room is very large and covered by steel tubes with water inside that get heated by the combustion. This is efficient and losses are low. Outside there is a insulated wall with cover sheets at outside. Fans generate a strong wind through boiler so all burn fast and very intense.



Hot gases leave boiler room at top and is forced down through several sections of steel tubes in the economiser for heat recovery. There is also a air preheater section for airflow into boiler so we use hot air for combustion. Steel tubes are of special steel as combustion gases are very aggressive and hot. Water flow and condensate is handled by a number of pumps and here we use Grundfos from Denmark for best quality and lowest maintenance. Tubes in boiler are designed for the hard life when city dump waste burn and corrosive gases. Boiler have modern filter systems that fulfil all new EU demands in emissions.

- \* Ash removal and recovery and collection system so ash can be used as fertiliser. Silo system with extra filters for ventilation. Tank 200 m3 in steel. Pneumatic ash transporter.
- \* Multi Cyclone filter
- \* De-nitration NOX system with ammonia feeder
- \* De-acidification system of semi dry design
- \* Lime milk feeder and tank system with preparation unit.
- \* Bag filter system for particles in gases. Pulse jet cleaning system. Max 250 C temperature.
- \* Shock wave soot blower and dust system
- \* Slag handling system with feeders
- \* Reverse osmosis treatment system for water for steam production

Out put emissions as specified in EU and most of world to new demands.

* Particulate matter	Max 20 mg / Nm3
* HCL acid	Max 50 mg / Nm3
* HF Acid	To standards
* Sox	Max 80 mg / Nm3
* NOX	Max 250 mg / Nm3
* CO	Max 80 mg / Nm3
* Mercury + compounds	Max 0.05 mg / Nm3
* Cadmium+ Thallium etc	Max 0.1 mg / Nm3
* Sb+As+Pb+Cr+CO+Mu	Max 1.0 mg / Nm
* Blackness of exhaust	Ringelmann level
* Dioxin	0.1 Ng TEQ/ Nm3



Photo of control room lay out with Siemens PLC and software.



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## \* 5 Steam turbine

System use a conventional steam turbine matching size of boiler. Typical steam temperature is area of 400C with over heater and about 3.43 MPA in pressure. RPM is typical 3000 RPM with direct connection to generator. Turbine have a digital controller system.

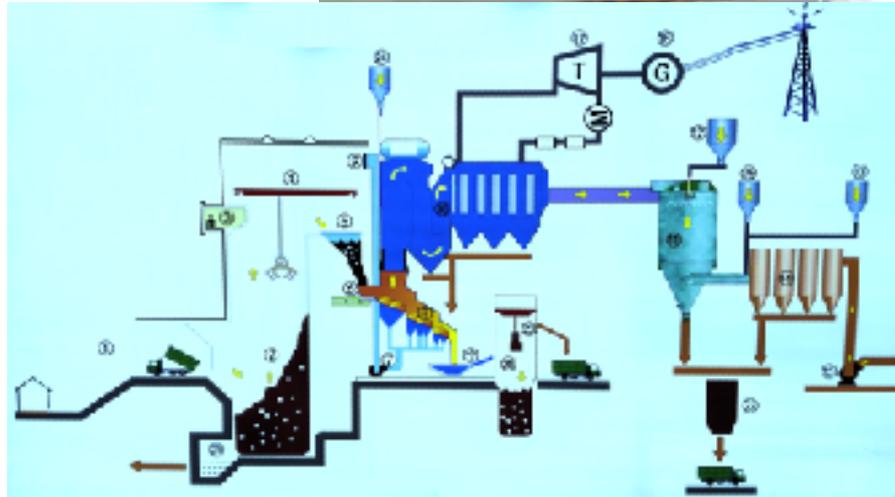


## \* 6 Generator

Generator is a horisontal shaft system of conventional design giving high voltage output. System can be a 50 Hz or 60Hz 3 phase as preferred if ordered correct at begin. Generator is conn acted to grid through a switch board and transformer for correct adaption.



**Block schematic of system.** Here is a principal layout of a system of waste management with most parts included. We do not include the sorting solution and manual blocking of undesired waste and metal scrap. Building is added outside machines upon what is preferred. As environment is rather clean the solution can appear nice and not disturbing.



## Solar power system.

All equipment needs power and there is an advantage to add a solar farm in the area on roofs and open spaces to generate more power. The plant needs 100 - 300 KW depending on size and we generate more than this value with on grid connected solar panels to make own power and also sell a little extra. We have a lot of building area where we can cower roof area with panels. It is also good to use a larger solar farm as sun on days can compensate to use more fuel in evenings for more KWH / year. Here we have more output than what waste only can produce. Play off get better and we share power lines. Hybrid solutions are very attractive and make our concept better.

