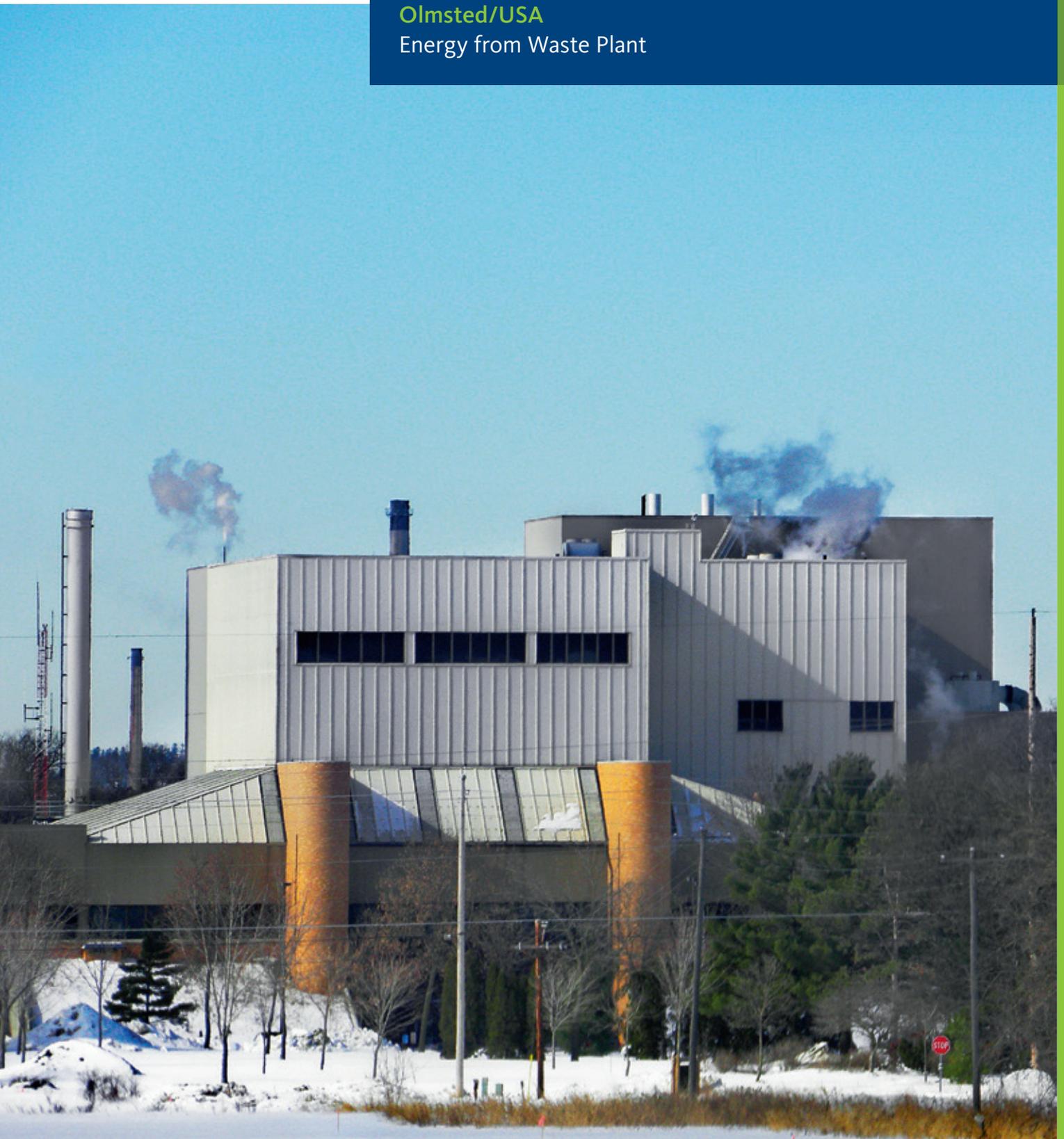


Hitachi Zosen INOVA

Olmsted/USA
Energy from Waste Plant



200 tpd, 23 MWth

Flexible Use of Energy through Sustainable Waste Management

Hitachi Zosen Inova's expansion of the energy from waste plant in the small American city of Olmsted, Minnesota, not only created additional thermal processing capacity, but also brought the city a reliable and safe step closer to its ultimate objective: to divert 90 % of its waste from landfills. Moreover, now 37 public and private buildings can be supplied with heat and electricity from the plant's waste heat recovery.

Olmsted has been sharing its thermal waste treatment facility with Dodge County since 1987. The community pursues an all-encompassing waste management concept. Its short term objective is to reuse approximately 37 % of the 150,000 tonnes of waste produced each year, to treat another 50 % thermally, and to only landfill the remaining 13 %. Long term, 90 % of the waste produced would be recycled or thermally treated. The two original process trains implemented in 1987 would soon no longer accommodate the needs of a growing population. It was decided to expand the facility by one additional train. Hitachi Zosen Inova won the bid to engineer, procure, and commission the complete combustion and flue gas cleaning train. The project began in 2007 and was completed three years later at the beginning of 2010 when the facility started its operation. It now has the capacity to process an additional 200 tons per day (180 Mg per day).

Proven Grate Technology

A crane thoroughly mixes the heterogeneous waste upon arrival at the plant. The waste is then pushed onto the Hitachi Zosen Inova five zone grate and becomes completely burnt out. A wet expeller discharges the resulting bottom ash. The ash is de-watered and compacted before a vibrating conveyor transports it downstream for further processing. A fully integrated combustion control system allows quick and simple adjustments so the combustion conditions can adapt to the continuously changing waste composition. This ensures the steady and efficient operation of the system.

Optimum Combustion and Flexible Use of Energy

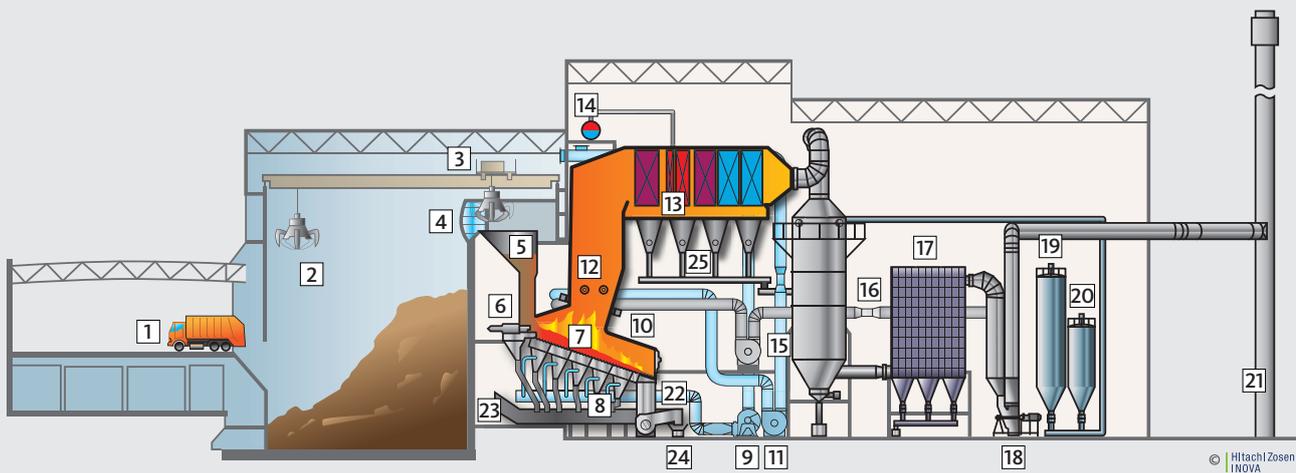
The thermal energy released during the combustion process is used in a two pass horizontal boiler which produces approximate 61,000 lb/hr (27.7 Mg/hr) of superheated steam. The chosen parameters of 635 psia (44 bara) / 655°F (350°C) ensure high energy efficiency. The superheated steam is expanded in a condensing turbine.

The new and the two existing trains were combined to form an efficient heat and power coupling. The thermal energy can either be converted to up to 5.5 MW of electrical power in a turbine generator or a slip stream can deliver heat into the district heating grid. This concept allows the plant the required flexibility to supply electricity or heat to 37 public and private buildings depending on the season.

Efficient Flue Gas Cleaning

The flue gas cleaning system uses a Selective Non-Catalytic Reduction (SNCR) process to lower the nitrogen oxides (NOx) formed during combustion. This process takes place at flue gas temperatures of 1,560°F to 1,830°F (850 – 1,000°C) and uses aqueous ammonia as reduction medium. Lime slurry and activated carbon injected into a spray dryer serve to remove acid gases, such as hydrogen chloride and sulfur dioxide, and heavy metals that are entrained in the flue gas. Heavy metals adsorb to the activated carbon and are removed in a downstream baghouse (existing). The cleansed flue gas is then released into the atmosphere via a stack.

Continuous gas measurements and monitoring ensure that all values fall below the mandatory emission limits at all times.



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INOVA

Waste Receiving and Storage	Combustion and Boiler	Flue Gas Treatment	Residue Handling and Treatment
1 Tipping hall	5 Feed hopper	15 Flue gas recirculation fan	22 Bottom ash expeller
2 Waste pit	6 Ram feeder	16 Spray dryer absorber	23 Siftings conveyor
3 Waste crane	7 Hitachi Zosen Inova grate	17 Baghouse	24 Vibrating conveyor
4 Crane control room	8 Primary air distribution	18 Induced draft fan	25 Boiler Fly Ash conveyor
	9 Primary air fan	19 Lime silo	
	10 Secondary air injection	20 Activated carbon silo	
	11 Secondary air fan	21 Stack	
	12 Start up burners		
	13 Two-pass boiler		
	14 Steam drum		

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General project data	Owner and operator	Olmsted County
	Start of operation	2010
	Total investment	~ 100 Million US Dollars
	Scope of Hitachi Zosen Inova	Design and Supply of Chute to Stack Equipment (21 Million US Dollars)
Technical data	Capacity of new 3 rd train	200 tpd (7.5 Mg/h)
	Number of trains	1 (3 rd unit addition)
	Calorific value of waste	4000 BTU/lb (HHV) – 6400 BTU/lb (HHV) 8.1 MJ/kg (LHV) – 13.1 MJ/kg (LHV)
	Thermal capacity	90 MMBTU/hr (HHV) – 23 MWth (LHV)
	Waste oil	0.5 GPM
Combustion system	Grate type	Hitachi Zosen Inova grate
	Grate size	Length: 33.5 ft (10.2 m), width: 9.8 ft (3.0 m)
	Grate cooling	Air cooled
Boiler	Type	Two-pass boiler, horizontal
	Steam quantity	61,000 lb/hr (27.7 Mg/h)
	Steam pressure	635 psia (44 bara)
	Steam temperature	655°F (346°C)
Flue gas treatment	Concept	SNCR DeNO _x , spray dryer absorber, existing baghouse (reused for new unit)
	Flue gas volume	29,400 scfm (46,300 m ³ /h)
	Flue gas temperature	284°F (stack inlet) (140°C)
Energy recovery (by others)	Type	Extraction-condensation turbine
	Electric power	5.5 MW (max. generator output)
	District heating output	8.5 MMBTU/hr (2.5 MWth) (max.)
Residues	Bottom ash (wet)	12,350 tons/year (11,200 Mg/a)