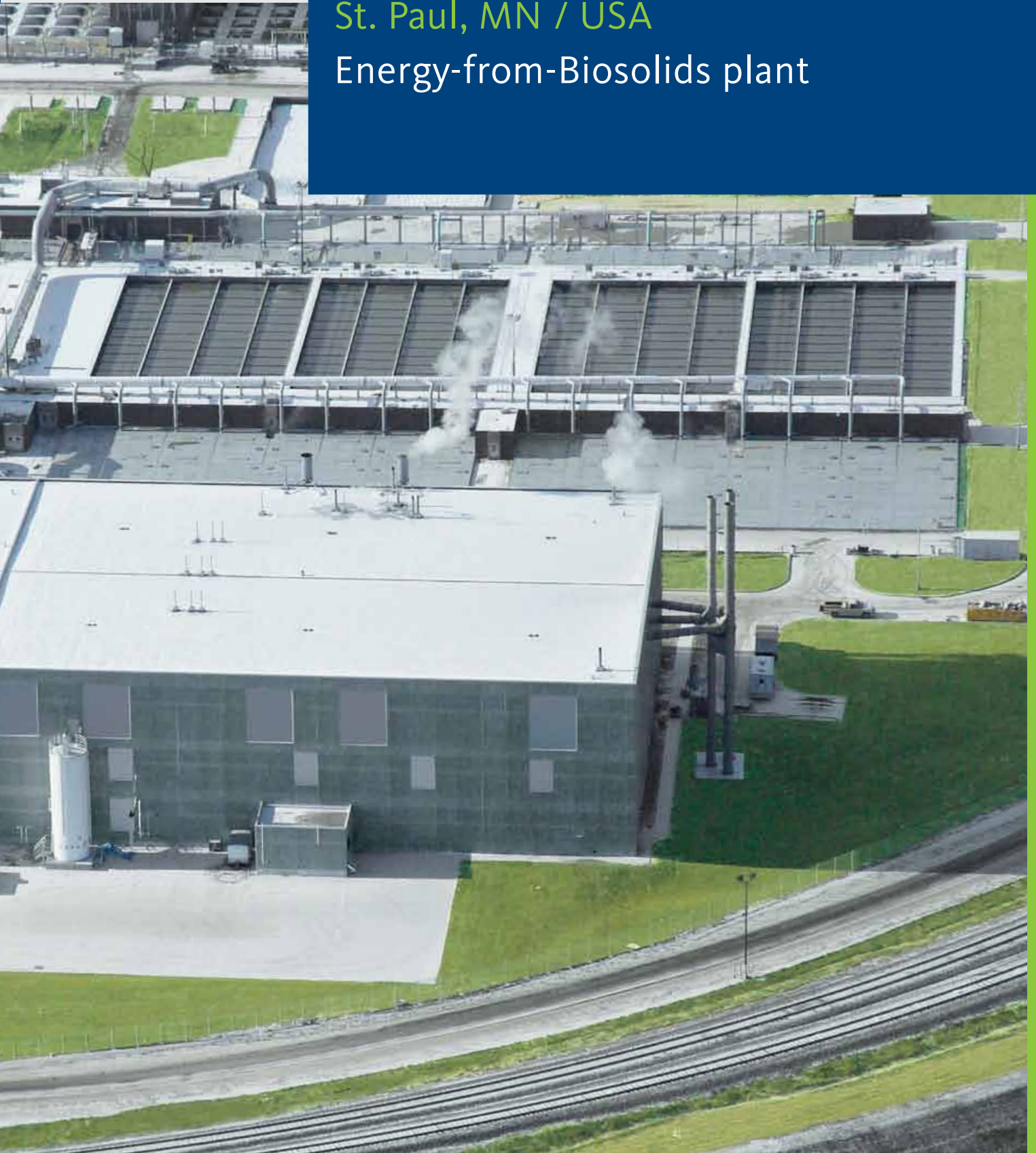


Hitachi Zosen
INOVA

St. Paul, MN / USA
Energy-from-Biosolids plant



Award Winning Metropolitan Council Environmental Services Waste Water Treatment Facility

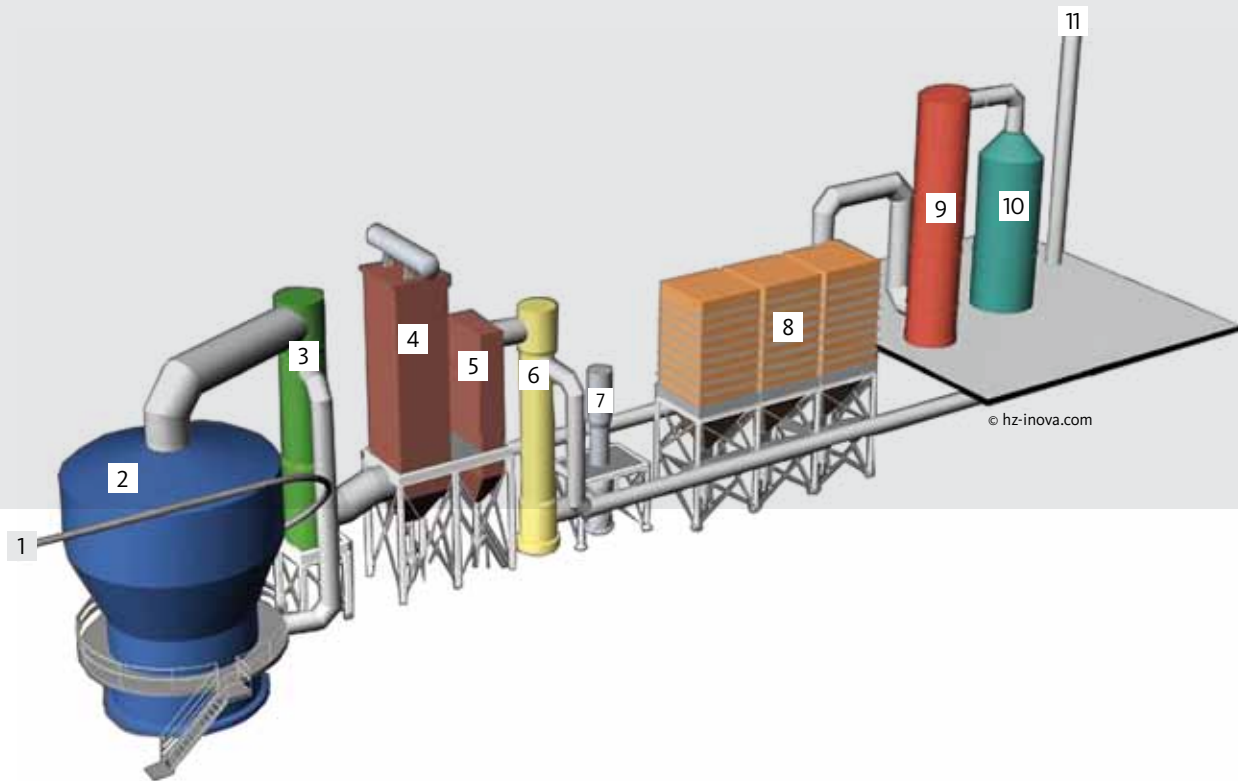
The Metropolitan Council Environmental Services' new waste water treatment plant in St. Paul, Minnesota uses state-of-air thermal treatment and air pollution control equipment to set the standard for Energy-from-Biosolids facilities within the US.

The Metropolitan Council is the regional planning agency serving the Twin Cities seven-county metropolitan area and providing essential services to the region. The Council works with local communities to provide these critical services:

- Operates the regions largest bus system
- Collects and treats wastewater
- Engages communities and the public in planning for future growth
- Provides forecasts of the region's population and household growth
- Provides affordable housing opportunities for low and moderate income individuals and families
- Provides planning, acquisitions and funding for a regional system of parks and trails
- Provides a framework for decision and implementation for regional systems including aviation, transportation, parks and open space, water quality and water management

The Council is committed to environmental stewardship, sustainable solutions, and reduced energy use.

The Councils new multi-million dollar plant handles on average 190 millions gallons of waste water each day. Within the facility is a solids handling building equipped with Inova fluid bed reactors and air pollution control systems. The project was on EPC turnkey basis and included in addition steam distribution, feed water treatment, deaeration, heating, power generation, ancillary systems, instrumentation and controls.



Biosolid Delivery and storage	Combustion and steam generator	Flue Gas Treatment	Energy
Biosolids storage 1 Biosolids transport	2 Inova fluid bed In bed burners Over bed burners Primary air fan 3 Primary air heater 4 Boiler 5 Economizer Fly ash conveyors Sand silo	6 Secondary heat exchanger 7 Carbon tower 8 Fabric filter 9 Wet scrubber 10 Wet electro-static precipitator 11 Stack Ash silo Ash transport equipment	Turbine Generator

The three Inova fluid bed reactors and air pollution control systems began operation in late 2004 and in the first year of operation, reduced the air pollutants by more than ninety-five percent compared to the existing multiple hearth furnaces (MHFs). By replacing the MHFs with the fluid bed systems, the plant reduced its use of natural gas by more than eighty percent. Each of the process trains are rated at one hundred and five dry tons per day with thirty percent solids content, and the energy is recovered in the form of high pressure steam to generate approximately four megawatts of electrical power and to provide building heat.

Each air pollution control train consists of a fabric filter for particulate removal, activated carbon tower to capture mercury, a Ring Jet® scrubber for acid gas control and a wet electrostatic precipitator (ESP) for final cleanup. A primary air heater, capable of preheating the combustion air to over one thousand degrees Fahrenheit eliminates the need for auxiliary fuel during normal operation. A secondary gas-to-gas heat exchanger reheats the wet flue gas leaving the wet ESP to two hundred and fifty degrees Fahrenheit in order to minimize the plume.

General project data

Owner and operator	MCES
Start-up of operation	2004
Scope of Hitachi Zosen Inova	Complete combusting part, steam generator, flue gas treatment

Technical data

Annual capacity	85,000 t/a (dry) [77,185 MT/a]
Number of trains	3
Throughput per train	105 DTPD [95 DMTPD]
Calorific value of waste	10,000 Btu/lb (combustible solids) [23.2 MJ/kg]
Thermal capacity per train	9.4 MW (th)
Waste type	Domestic biosolids

Combustion system

Type	Hitachi Zosen Inova fluid bed
Size	22 ft (orifice plate) [6.7 m]

Steam generator

Type	Vertical
Steam quantity per train	25,000 lb/hr [11,338 kg/hr]
Steam pressure	450 PSI [31 bar]
Steam temperature	750°F [399°C]
Flue gas outlet temperature	420°F [216°C]

Flue Gas Treatment

Concept	Fabric filter, carbon tower, wet scrubber, wet electrostatic precipitator
Flue gas volume per train	25,000 SCFM [40,190 Nm ³ /hr]

Energy recovery

Type	Turbine-Generator
Electric power output	4 MW (e)