

1.0 INTRODUCTION

De-NOx Technologies, LLC (DNT) is pleased to offer Dynamis Energy, LLC the following revised Firm Price Proposal for the design and supply of a urea-based SNCR system. This system is to be installed on one 200,000pph MSW Gasification unit in Boise ID. The proposed system will utilize 50wt% urea solution.

DNT will provide the process design, mechanical design, electrical and control design, equipment selection, equipment fabrication, injector supply, and process guarantees.

The major design parameters are presented in Table 1.

**TABLE 1**  
**Design Conditions**

Design Parameters	Typical
Combustor Steam Rate (pph)	200,000
Oxygen Level (% v)	4-6
Carbon Monoxide (lb/MMBTU)	<0.2
Load Range (%)	70-100
Furnace Exit Gas Temperature (degF)	1900-2000
Estimated MCR Reagent Consumption, GPH	5
Minimum Gas Residence Time after injection and before Boiler, sec	0.75
Design Uncontrolled NOX <sub>x</sub> (pph, as NO <sub>2</sub> )	50
Guaranteed Controlled NOX <sub>x</sub> (pph)	30

## 2.0 SCOPE OF SUPPLY

DNT will provide the following design services and equipment:

### 2.1 Equipment

- One (1) 6000 gallon non-metallic atmospheric pressure Storage Tank. The tank can be located outdoors on a properly designed level concrete foundation. It will be supplied with heating pads and temperature controls to maintain 80 degF at the local winter design temperature.

The storage tank will be supplied with:

- Side Bolted Manway
  - Corrosion barrier
  - UV resistant outer treatment
  - Hold Down and Lifting Lugs
  - Flanged fittings for Pump Suction, Vent, Fill, and Recirc
  - Isolation Valves
  - Level Indicator/Transmitter
  - Temperature Indicator/Transmitter
- One Control Module will be supplied to be located in a climate controlled enclosure (enclosure by others) in immediate proximity to the Storage Tank. This module will: 1)provide circulation and external heating of concentrated reagent, 2)filter and regulate the flow of reagent and dilution water, and 3)mix the reagent with dilution water for the boiler. The module will be pre-assembled.

The proper amount of reagent is determined based upon feedback from a CEM system, and algorithms resident in the PLC System. Urea will be metered to the boiler unit through positive displacement pumps. Materials of construction for the concentrated reagent and diluted reagent lines shall be SS piping and/or tubing. Duplex strainers of 316 SS construction, capable of continuous filtering of the reagent and dilution water shall be provided. The device shall be capable of being maintained while on line.

The Control Module will be supplied with a NEMA 4X enclosure which houses the Main Circuit Breaker/Handle, AB PLC components,,

motor starters, instrument/ power terminal strips, 24VDC Power Supply, and variable speed drives. The system will be capable of full manual operation from the face of the panel.

The Module will be supplied with reagent flow measurement, reagent circulation, external electric circulation heater, and automatic flush-out.

- Distribution Module. One Distribution Module will be provided in near proximity to the injection nozzles. The module distributes the supply of diluted reagent to each injector, as well as control atomizing air pressure. These modules are designed to save floor space and can be mounted on walls, columns, or over handrail.
- Dual Fluid Nozzle Atomizing Injectors. These injectors are DNT's proven and proprietary design. They have proven, excellent, service life on refuse and biomass units.

The exact location of these ports will be determined during the contract phase of the project. This proposal assumes 6 injectors generally located 0.5 sec prior to the first convective tube surface. The injectors are inserted and retracted by hand. Flexible hoses, attached to the injectors with quick connects, will be supplied.

2.2 Engineering and Start-up Services. These services would include:

- P&ID's, Equipment Arrangement Drawings, equipment fabrication drawings, logic and interconnect drawings
- Specify, select, purchase, prefabricate, and deliver the equipment specified above.
- Five Maintenance and Operation Manuals.

2.3 Provided by Owner

- Approximately 3 GPM of dilution water @ 80 psig to the Control Module. This dilution water should be softened and generally be of drinking quality.
- Compressed Air – Approximately 90 scfm at a minimum pressure of 80 psig to the Distribution Panel.
- Fused disconnects for power to the tank panel, heat tracing and Control Module, as follows:
  - Control Module – 480 VAC, 20 Amp.
  - Tank – 120VAC, 4000 watt
- All local permits and/or licenses.
- Compliance and/or Performance Testing.
- Terminations to the Central Control Station, any additions to hardware/software and graphics/configuration.
- All Receiving and Installation, including all piping heat tracing.

### 3.0 PRICING

The firm price for the Scope as described herein is [REDACTED] [REDACTED] freight excluded. The price includes 5 days of on-site Field Services for Mechanical Check-Out, Training and Start-Up. DNT's Terms and Conditions attached.

### 4.0 PROJECT SCHEDULE

Begin Equipment Design	At Notice to Proceed
Submit Mech and Elec Drawings for Approval	4 weeks after NTP
Shipment of Equipment	12 weeks after Approvals