

# Energy Infrastructure

## Plymouth State University Plymouth, New Hampshire

**Operating Fuels:** No. 2 and No. 6 Oil

**Electric Capacity:** 2.5 MW

**Steam Capacity:** 58,000 lb/hr

**Budget:** \$6.4 million

**In Service Date:** 1993



### Simple Cycle Diesel Engine With Auxiliary Boilers

NORESCO was selected to develop a cogeneration facility by the University System of New Hampshire as a result of a competitive bid process in April 1991. The cogeneration facility relocated Plymouth State University's source of steam to the perimeter of the campus in order to free up valuable space in the center of the campus for academic uses.

Plymouth State University occupies 170 acres on both sides of the Pemigewasset River and comprises 45 academic, residential, and administrative buildings, as well as playing fields, courts, and parkland. The college offers A.A., A.S., B.A., B.F.A., B.S., M.B.A. and M.Ed. degrees and the Certificate of Advanced Graduate Studies (CAGS) in Education. Approximately 3,500 undergraduates and 500 graduate students are enrolled in 50 undergraduate programs in liberal arts, education, business, and physical education, two graduate programs, the CAGS program and a continuing education division.

The facility utilizes a base-loaded diesel engine with heat recovery in the engine exhaust, designed to produce 1,250 kilowatts of electricity, and 16 million pounds per year of 95 PSIG steam. Auxiliary steam capacity is provided by three conventional firetube boilers with a total capacity of 58,000 pounds per hour. An additional 1,250 kilowatts of electric

generating capacity provided by a high-speed diesel will back-up the primary generator and provide peak shaving and back-up capability.

Because of its location near college facilities and residences, noise emissions were also considered critically important. The new facility was designed to control noise to 40 decibels at the property line, which is less than the current ambient noise in the neighborhood. Construction of the new, state of the art facility commenced in the second quarter of 1992, and commercial operations commenced in December of 1993. NORESCO developed, financed, constructed and is responsible for the day-to-day operations of the electrical and thermal energy facility.

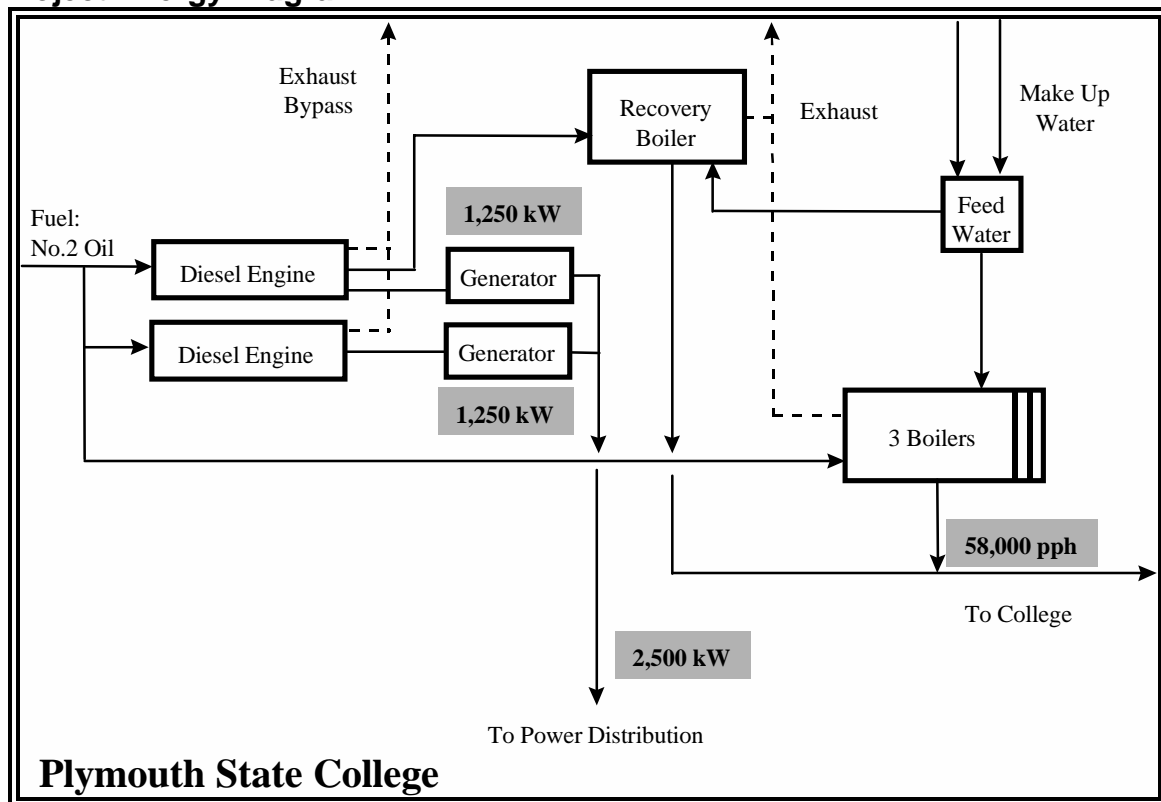
NORESCO developed, financed, constructed and is responsible for the day-to-day operations of the electrical and thermal energy facility. The facility replaced an antiquated boiler house located in the center of the campus. The old boiler house was subsequently demolished. NORESCO arranged a 20 year tax-exempt financing structure for the facility.

Stack emission controls at the plant are "state-of-the-art". The diesel exhaust system incorporates a Selective Catalytic Reduction (SCR) system designed to remove 90% of nitrous oxides (NOx) formed during combustion. The auxiliary boilers are fired with #6 oil and are fitted

with flue gas recirculation and low-NOx burners. Outsourcing of the power generation and heat recovery services to

NORESCO has decreased the University's operating costs.

**Project Energy Diagram:**



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