WATER PUMPING
High Efficiency Alternative to Conventional Electric Pumps

FEATURES & BENEFITS
Benefits relative to electric–motor-driven pumps include:
• Lower operating cost
• Waste heat from engine available for space heating, water heating, and process uses
• Higher reliability, with backup during electric power outages
• Better partial load performance
• Lower overall life-cycle cost

DEFINITION
Natural gas engine-driven pump systems use a reciprocating natural-gas-fueled engine as the prime mover. The natural gas engine replaces the traditional electric motor as the energy source. The driven pumps can be either reciprocating or rotary, including centrifugal (radial-flow), mixed-flow, or axial-flow (propeller); also screw pumps or compressors.

INTRODUCTION
There are two broad categories of natural gas engines, auto-derived and diesel-derived (based on whether the original liquid-fueled technology was developed for gasoline or diesel engines).

Auto (gasoline)-derived engines are less than half the cost of diesels of the same horsepower (HP), which makes them attractive for light-duty applications, less than 150 HP. They typically run in the 1,800-3,000 RPM range, using 9,000-11,000 BTU per HP-hr. of natural gas fuel.

Diesel-derived engines cover such a large size range that other categories are used to describe them, such as "low-speed" (less than 1,000 RPM). They have a wide variety of duty ratings, and typically use 7,000-11,000 BTU/HP-hr, with the larger, slower engines being more fuel-efficient.

HOW NATURAL GAS ENGINE-DRIVEN PUMPING SYSTEMS WORK
The natural gas engine-driven pump system is similar to the traditional pumping systems that are driven by electric motors, gasoline or diesel reciprocating engines, or steam engines. The load from the pump machinery, generally constant for 168 hours per week, is no different--only the engine varies.

The possibility of heat recovery from a gas engine (heat exchangers extracting heat from either, or both, engine coolant and exhaust gases) as shown in the diagram on the right, offers an economic advantage over electric motors. For example, if space heat in fall, winter, and spring and an absorption chiller in summer are required near the pumping facility, then engine waste heat may be used year-round to increase savings.

LOCAL INSTALLATIONS

<table>
<thead>
<tr>
<th>Customer</th>
<th>Equipment</th>
<th>Size (HP)</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amherst Waste Water</td>
<td>Energen Tech</td>
<td>1,200</td>
<td>Amherst</td>
</tr>
<tr>
<td>GM Powertrain</td>
<td>Waukesha</td>
<td>1,060</td>
<td>Tonawanda</td>
</tr>
</tbody>
</table>

VENDORS
• Caterpillar Engine
• Cummins Engine
• Energen Technologies
• Waukesha Engine Division

FOR FURTHER INFORMATION
• National Fuel Gas Distribution Corp., 6363 Main St., Williamsville NY 14221-5887; phone (716) 857-7776; or www.nationalfuelgas.com
• Energy Solutions Center Inc., 400 N. Capitol St., NW, 4th Floor, Washington DC 20001; phone (202) 824-7150; or www.energysolutionscenter.org

NATIONAL FUEL STATEMENT
At National Fuel, we believe in providing information on natural gas technologies, enabling our customers to make informed decisions on their energy needs. This information covers existing technologies, new technical developments, emerging breakthroughs in energy use, and energy-saving ideas still in development.