



Farm Power Northwest

Five sites in WA and OR

Dairy Manure-to-Biogas CHP Systems



A methane transport pipeline conveys biogas to a 1,000 kW reciprocating engine at Farm Power-Tillamook

Quick Facts

LOCATION: Five projects in Northwest
 MARKET SECTOR: Agriculture
 FACILITY SIZE: 1,400 to 2,500 cows/site
 FACILITY Total Installed Capacity: 4.25 MW
 EQUIPMENT: 750 kW or 1,000 kW lean burn reciprocating engines at each site
 FUEL: Conditioned biogas
 USE OF THERMAL ENERGY: Digester and occasional greenhouse heating
 CHP Performance: Meets 100% of digester thermal loads. Electrical output is sold to the local utility
 TOTAL PROJECT COST: \$3.5 to \$4.1 million per site
 YEARLY SAVINGS: From electricity sales, CO₂ offsets, fertilizer, and animal bedding
 PAYBACK: NA
 CHP IN OPERATION SINCE: 2009

Farm Power Development Plan

Farm Power Northwest has developed a business that builds community anaerobic manure digesters serving multiple farms to turn collected manure into electricity, fertilizer and bacteria-free animal bedding. Farm Power Northwest has installed five 750 to 1,000 kW lean-burn reciprocating engine CHP projects in the Northwest; at Lynden, Rexville, and Enumclaw, Washington; and at Tillamook and Misty Meadows dairy in Oregon. Each digester project costs \$3.5 to \$4.1 million to build. The installed projects accept manure from a total of 15 dairies. Farm Power-Tillamook collects pumped or trucked manure from 5 farms hosting over 1,800 cows. Electrical energy produced from the digester biogas is sold to Tillamook People's Utility District. Farm Power received a USDA Rural Energy for America (REAP) grant of \$100,000 and a \$2.65 million loan guarantee for the Tillamook facility.

Reasons for CHP

Standard practice for the dairy industry is to collect and store manure in an uncovered lagoon, resulting in methane releases to the atmosphere. Most WA and OR dairies are too small and don't have the time or expertise to build and operate their own digesters. Farm Power Northwest solves this dilemma through building community digesters that serve multiple farms. In addition to electrical energy, the digester projects compost and dry manure solids to use as a pathogen-free natural bedding for the cows. Manure liquids are treated, stored and returned to the farms for use as a nutrient rich fertilizer. The five Farm Power sites in the Northwest were installed between 2009 and 2012.

Environmental Benefits

Each lactating dairy cow can produce more than 100 pounds of manure per day. Collecting manure and transporting it to a digester keeps the rain out of manure that would otherwise be stored in a lagoon, reducing the volume that must be stored and spread while also preventing manure from contaminating surface water runoff. The elimination of open manure lagoons results in reduced odors, less exposure to vector-borne diseases, improvements to local air quality, and improved hygienic standards on the farm.

Greenhouse gas emissions are also reduced as methane that would naturally be released to the atmosphere is combusted in engines and converted to carbon dioxide and water vapor. Greenhouse gas offsets are leveraged as methane is documented as being 23 times more potent a greenhouse gas than carbon dioxide.

Farm Power Northwest pays farmers a rate per cow for their manure and/or provides cow bedding material to offset the cost of wood shavings that farmers have traditionally used. While sending manure to the digester provides on-farm labor reduction benefits, each digester requires at least a half-time employee to operate it. Waste heat from engine water jacket cooling is used for digester heating and, at the Farm Power-Lynden site, provides radiant floor heating at an adjacent greenhouse. Electrical energy produced at this site is sold to Puget Sound Energy to offset the costs of wages, services, utilities, trucking, payments to farmers, and property taxes.



Manure can be transported to an anaerobic digester to produce biogas for use as fuel in a reciprocating engine to produce electrical energy and recoverable waste heat.

Carbon Offsets

Farm Power Northwest-Lynden works with the Climate Trust to provide California Carbon Offsets under the California Air Resource Board protocol. The project receives payments for each metric ton of carbon dioxide equivalents removed from the atmosphere. Credits earned by the site are eligible as compliance offsets for use in California's cap-and-trade program. The sale of offsets helps businesses and industries reach their carbon reduction goals while bringing in additional revenue to the Farm Power project.

Digestion Benefits

The digestion process reduces odor-causing compounds by 50% to 90%, while destroying insect larvae and weed seeds in the manure. Manure fecal coliform bacteria are reduced by 99%. Manure solids are reduced and the nitrogen in the digested solids is available in a form that facilitates uptake by plants. Digestion provides a closed-loop source for fertilizer.

"It's like our own little gas well except we're not taking it out of the ground. We're harvesting it from manure."
-Daryl Maas, co-founder of Farm Power Northwest

For More Information

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More CHP Project Profiles:

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