

World's Best Power Plants



Even with a site altitude of 1845 m above sea level and 36°C ambient air temperatures, there is no loss of output from the Wärtsilä generator sets operating at the Plains End plant located near Denver, Colorado, U.S.A.



The Plains End plant consists of 20 Wärtsilä 18V34SG and 14 Wärtsilä 20V34SG gen-sets and is generating a total of 227 MW.

LARGEST NATURAL GAS RECIPROCATING ENGINE PLANT

WÄRTSILÄ

Owned by Cogentrix and located near Denver, Colorado, U.S.A., the Plains End I plant consists of 20 Wärtsilä 18V34SG gen-sets, which started commercial operation in 2002. In 2006, Cogentrix purchased an additional 14 Wärtsilä 20V34SG gen-sets, extending the existing site with "Plains End II." The new extension was handed over in May 2008, and is generating a total of 227 MW for the grid and has regained its ranking as the largest natural gas-fueled reciprocating engine power plant in the world.

Plains End has helped introduce Wärtsilä technology into the U.S. market to satisfy a need for peaking power resources able to supply significant ancillary services benefits. During operation of the first block of 111 MW generating capacity, other important benefits provided by Wärtsilä technology were identified and easily justified procurement of the second block of 116 MW.

Benefits recognized by both the owner and the utility include the ability to operate efficiently at minimum plant output, which allows Wärtsilä customers the opportunity to sell "spinning reserve." Another benefit recognized by Xcel Energy, the local utility that operates its own high-voltage transmission system in the Colorado region, is Plains End's ability to provide rapid up and down regulation.

The standard benefit of start-up taking less than 10 minutes provides Xcel Energy with ready reserve power. The additional benefits of spinning reserve, up/down regulation and black-start capability are also considered to be ancillary services, something required by all transmission grids to maintain system stability.

The majority of the time, the Plains End plant operates in nonspinning reserve mode but should the need arise, it can reach full output in less than 10 minutes from a warm start.

The second mode of operation is spinning reserve. When operating in spinning reserve mode, the plant is in operation at minimum load. Automatic signals from the grid dispatch center will increase the plant output if the grid requires additional electricity or, if system demand is falling and the plant is operating above its minimum load, the plant output ramps down until the minimum load is reached.

Annual operation time at Plains End totals 500 to 1500 hours. Both operating time and dispatch frequency are heavily dependent on the balancing requirements made by the Xcel Energy system, which includes a lot of wind power. The normal fluctuations that result from wind power generation systems are balanced by the Plains End regulation reserve service. Xcel's energy generation mix also includes large coal plants, and Plains End also provides spinning and nonspinning reserve to cover any disturbances in this source of supply.

The main benefits provided by reciprocating internal combustion engines are high efficiency at minimum load with all gen-sets in operation load and high levels of starting reliability. Because Wärtsilä gas-engine power plants offer high levels of efficiency at part load, customers in U.S. energy markets can profit while also selling into the spinning reserve markets. Revenue from both the energy market and the ancillary service market can thus be generated simultaneously. 🌱