

Wärtsilä Power Plant

Parnaíba IV Brazil



Fast Track to Reliable Power

Energy security has become a priority in Brazil as electric power supply has not kept pace with robust demand growth. Hydropower is the dominant source for electricity production, accounting for approximately 70% of Brazil's installed capacity¹. However, droughts and diminishing reservoir levels in recent years have threatened capacity sufficiency. With supply deficits projected to occur by 2016, new thermal plants are needed to meet the country's growing power requirements². By integrating natural gas production with power generation, ENEVA's Parnaíba Complex in Brazil's northeastern state of Maranhão provides access to a guaranteed fuel supply and reliable energy production.

Although Parnaíba I, II and III gas-fired power plants were under construction, free market demand for flexible, low-cost power led to development of the usina termelétrica (thermoelectric power plant) Parnaíba IV. The plant was fast tracked for completion, with a timeline of about one year from contract signing to commissioning. Meeting this ambitious schedule required a company with the experience and resources to undertake full engineering, procurement and construction (EPC) and the technology to deliver efficient power generation with high availability. Wärtsilä was selected by ENEVA to provide the complete "gas to wire" solution for Parnaíba IV that included all equipment and infrastructure needed to generate power.

Parnaíba IV is a 56 MW power plant comprised of three Wärtsilä 18V50SG gas engines. It is the first power plant in Brazil to employ the Wärtsilä 50SG engine, the largest gas engine on the market. The Wärtsilä 50SG engine has a high efficiency rating of nearly 50% and can provide quick start, fast ramping, and reliable baseload capabilities. By combining multiple Wärtsilä 50SG generating units into a single plant, Wärtsilä's technology solution mitigates the risks associated with maintenance outages. The modular architecture of Wärtsilä power plants affords the ability to rapidly and frequently change load without sacrificing efficiency or affecting the maintenance schedule. In addition, some engines can be offline while still retaining the bulk of plant output, offering high power reliability. The technical and economic benefits of flexible power generation led to the selection of internal combustion engine (ICE) technology for Parnaíba IV.



Parnaíba IV power plant is a partnership between ENEVA (formerly MPX Energia), E.ON and Petra Energia. Natural gas for the Parnaíba Complex is currently produced from a gas field belonging to one of the 8 onshore blocks by Parnaíba Gás Natural (formerly OGX Maranhão).

ENEVA operates 2.4 GW of power generating assets in Brazil and owns interests in the above mentioned natural gas blocks in the Parnaíba Basin. E.ON, one of ENEVA's shareholders, is one of the largest investor-owned power companies in the world with a global generating asset portfolio. Wärtsilä has an established presence in Brazil, having constructed 29 power plants in the country since 1990 with a combined capacity exceeding 2.5 GW. With a staff of more than 500 employees in Brazil, Wärtsilä also supplies O&M services at many of those facilities. Because of this track record and experience with Brazilian infrastructure and regulations, Wärtsilä was able to demonstrate the ability to deliver a turnkey EPC solution including generating units, auxiliary systems, soil leveling, landscaping, concrete installation, building infrastructure and substation construction.

Although the Parnaíba Complex is strategically located adjacent to natural gas fields and key transmission lines, the area is in a remote location which presented challenges for furnishing the goods and materials necessary for building the power plant. Parnaíba IV is approximately 300 kilometers from the Maranhão capital São Luís and Atlantic seaports. The nearest town, Santo Antônio dos Lopes has a population of just over 14,000. During construction, approximately 300 Wärtsilä project staff and contractors were housed in a nearby city, with all necessary support services coordinated by Wärtsilä.



To meet the growing power demand, Parnaíba IV has ready option available to double its capacity by adding more engine and auxiliary modules.

To expedite construction, Wärtsilä built the plant in modules. Each module is pre-engineered and fabricated to interface with other modules, which simplifies installation at the project site. The modular design and standardization of components allows for expansion flexibility in the future. The capacity of Parnaíba IV can easily be doubled to meet growing power demand by adding more generating sets and auxiliary modules. This feature was an important factor in the selection of Wärtsilä technology.

Parnaíba IV went online in December 2013 – a mere 11 months after construction had begun and 13 months from contract signing. The plant received authorization for commercial operation in December 2013 and is currently supplying full load to Brazil's National Interconnected System.

Parnaíba IV is an example of how Wärtsilä's modular plant architecture and global network of resources translate into remarkably fast, complete EPC solutions for efficient and reliable power.

MAIN DATA

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| Customer..... | ENEVA and partners |
| Type..... | Wärtsilä 50 gas power plant |
| Operating mode..... | Flexible baseload |
| Gensets..... | 3 x Wärtsilä 18V50SG |
| Total output | 56 MW |
| Fuel | Natural gas |
| Scope...EPC (Engineering, Procurement & Construction) | |
| Delivered..... | 2013 |