

Pipeline Gas Sales from the Rio de Janeiro Novo Gramacho Landfill



Landfill Gas to Pipeline Gas

One of the world's largest high-BTU landfill gas projects is now operating to compress and clean landfill gas from the Novo Gramacho landfill outside of Rio de Janeiro and provides pipeline quality gas while displacing purchased natural gas.

The *Gas Verde Project* upgrades flows to 20,000 nm³/hr (12,000 SCFM) of landfill gas, making it truly world-scale. The product gas is sold and used by Petrobras to displace purchased natural gas. Future expansion to produce liquid CO₂ is planned.

The project is owned by Gas Verde S.A. and was spearheaded and developed by FirmGreen, Inc. The project benefited from a loan guarantee of the USA Export-Import bank, the first biogas project for the agency.

The state of the art facility is noted for complete removal of water, H₂S, siloxanes, and VOCs along with the removal of CO₂, N₂ and O₂. Landfill gas contains these impurities and at Novo Gramacho multiple steps of gas processing are applied.

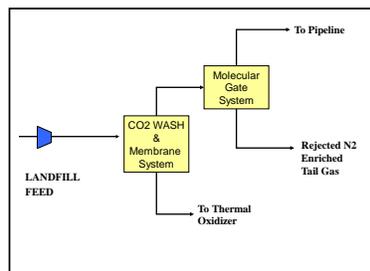
The process steps include feed compression in a series of Guild designed and packaged oil flooded screw compressors followed by sulfur removal.

The VOCs contained in the landfill gas are removed in a CO₂ Wash system licensed by Acricion Technologies and designed and packaged by Guild. The CO₂ Wash uses liquefied CO₂ to scrub the VOCs from the landfill gas. Though smaller CO₂ Wash systems have been operated, the Novo Gramacho project is the first application of the technology on such a large scale.

After VOC and partial CO₂ removal the remaining impurities are the residual CO₂ along with N₂ and O₂. The removal of these remaining impurities is accomplished by a membrane unit, using Air Liquide membrane modules, followed by a Guild Molecular Gate PSA system.

As with the feed compression and CO₂ wash, the membrane unit and Molecular Gate unit were designed, packaged and supplied by Guild Associates.

The stage-wise approach allows for automatic purity control and independent adjustment of each stage to manage the unavoidable variations in the feed gas composition. The inclusion of N₂ rejection with the Molecular Gate unit eliminates any concern with high levels of N₂ from the gathering of the landfill gas.



Production of the pipeline gas included the installation of an expanded gas collection system at the landfill. The project provides major environmental benefits including removing up to 1.4 million metric tons per year of greenhouse gases.

Over 60 Molecular Gate units have been provided to date with 20 used in biogas service (landfill and digester gases).

About Guild Associates

Guild provides adsorption and catalyst systems to a variety of markets, as well as shop fabricated engineered systems. Guild Associates is the licensee of the Molecular Gate™ technology originally developed by Engelhard Corporation (now a part of the BASF Group) and has provided all systems to date.

About FirmGreen

Headquartered in Newport Beach, CA, FirmGreen, Inc., is a privately held, integrated energy company participating in virtually all aspects of the global green energy business. FirmGreen® identifies, develops and commercializes new and emerging technologies, and alternative fuels that promise to play an increasingly important role in the world's energy mix.

Contact

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