



SLIBVERWERKING AQUAFIN

Gent

Greenfield Energy Production site (Waste processing installation), which processes municipal wastewater sludge that is dewatered if necessary and incinerated, whereby the resulting energy is used to primarily produce high-pressure steam and secondarily electrical power. / civil study sludge processing installation



Status

2023 - 2026



Services:

Civil Engineering



Sectors:

Civil works: Industrial plants



Client:

NV BESIX S.A.



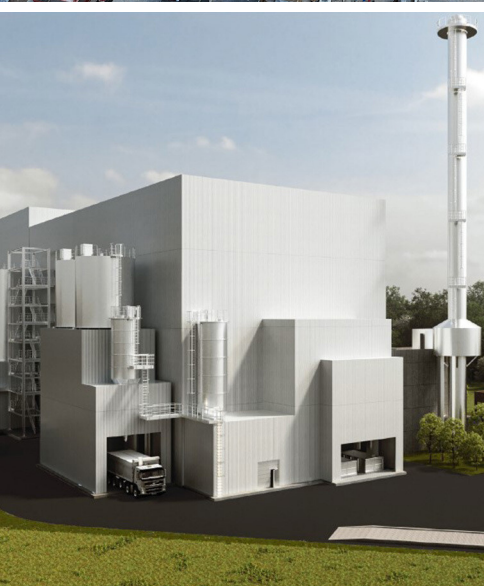
Architect:

BV OYO architects



Area:

10000 m²



General

In the Port of Ghent, Aquafin is constructing a new sludge mono-incineration plant, which will be operational from 2027. Its construction is a tour de force not only in terms of scale but also technically. For BM Engineering, it is a project in which the Civil and Industrial MEP departments put their integrated approach to industrial installations into practice.

The installation, named 'FOSTER', is being built in the Ghent port area. Aquafin awarded the design, construction, financing, operation and maintenance of the sludge mono-incinerator to the consortium BESIX Group-Indaver until 2046. The installation will process the water treatment sludge from the domestic wastewater of approximately four million inhabitants and thermally upgrade it into energy for ArcelorMittal, with the aim of processing the sludge in the best possible way with maximum recovery of energy and raw materials. In choosing the location, Aquafin took CO2 emissions into account. From this perspective, the site in Ghent proved to be the most favorable location. In the long term, phosphorus can also be recovered from a residual stream (raw materials recovery). The installation plays an important role in the circular economy by recovering raw materials and energy and returning them to the cycle.

The site consists of various buildings and process-technical structures. In the tipping hall, trucks unload the sludge into a storage bunker. From there, it is conveyed via moving floors to the production hall, where thermal processing, energy recovery and flue gas cleaning take place. In addition, the project includes an administrative building, technical rooms, a 50m high chimney and various ancillary buildings with storage silos.

From A to Z

BM Engineering is responsible for the civil component and building services, under the coordination of FOSTER EPC TM, of the project. This includes the study and design of pile foundations, building foundations and concrete and steel structures. The team is involved in the entire process: from preliminary study and support for the environmental permit to detailed design and site supervision. The most important civil structure on the site is the bunker in which the sludge is stored. It is approximately 40 meters high, extends 5.5 meters below ground level and measures 38 by 22 meters. Approximately 3,500 m³ of concrete was used for its construction, which was realized using a slipform in just three weeks (24/7). For the construction of the underground bunker, temporary anchored sheet piles were also used.

In addition, a production hall is being constructed with a steel structure of almost 31 meters high. This structure (56 m by 26 m) must be built around third-party installations. The stability studies therefore started from the loads originating from process equipment, whose force effects had to be integrated into the stability model. This required close collaboration with various partners, including Doosan Lentjes, which is responsible for a large part of the process installations.

Some notable figures

- 615 foundation piles
- more than 9,000 m³ of in-situ concrete
- almost 1 million kilograms of reinforcement
- approximately 400,000 kilograms of structural steel

Systems for a complex industrial installation

In the industrial parts of the installation, the machines are placed by specialized parties. The role of BM Engineering is to provide the necessary utilities, such as water and electricity, precisely in the right place.

Electricity is supplied from ArcelorMittal via a high-voltage cable. The entire installation is powered through transformers and distribution boards. The electrical network is split into essential and non-essential consumers. Critical systems, such as fire detection, camera surveillance and safety installations, remain operational in the event of a power failure via an emergency generator.

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Much attention to fire safety

In the production hall, temperatures can rise to 60 degrees. Therefore, a system for natural cooling via roof and facade grilles was provided. Based on a specialized CFD analysis (Computational Fluid Dynamics), it was investigated how air flows behave in the hall, so that efficient natural ventilation can be integrated. In the tipping hall, smoke detection and an SHEV system (Smoke and Heat Exhaust Ventilation) are provided for smoke and heat extraction via hatches in the roof. In the high spaces of the installation, special aspiration detectors are used, which are better suited for large industrial volumes than smoke detectors. Fire safety is a crucial point of attention within this project. In addition, a complex sprinkler installation was designed, partly because flammable materials are present in the production hall. In close consultation with the insurer and other involved parties, a system was developed in which sprinkler heads are strategically placed around installations and pipelines. In case of fire, the extinguishing water is collected in a sealed tank so that contaminated water does not end up in the environment.

The added value of BM Engineering

The added value of BM Engineering lies in the integral approach to stability and building services. Within the Industrial MEP operation, the MEP installations (Mechanical, Electrical & Plumbing) are closely aligned with the structural design and the industrial process from the design stage. Because these disciplines work together within the same team, technical installations, pipelines, ducts and penetrations can be correctly integrated at an early stage. Through BIM models, all disciplines are also digitally coordinated. This was particularly important in this project due to the collaboration with various external partners and suppliers of process installations, allowing conflicts to be detected in time and execution on site to proceed more smoothly.

Construction partners

- Client: Aquafin NV
- Contractor: FOSTER SPV (consortium BESIX and Indaver)
- Architect: OYO Architects
- Civil engineering and Industrial MEP: BM Engineering