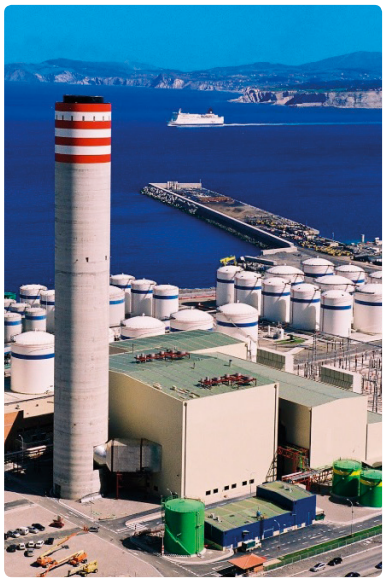
CASE STUDY

Variable Speed Drives in a CCPP
Bahia de Bizkaia Electricidad (Spain)



BBE is an 800 MW combined cycle electric power plant located on the outskirts of Bilbao, Spain.

Applications:

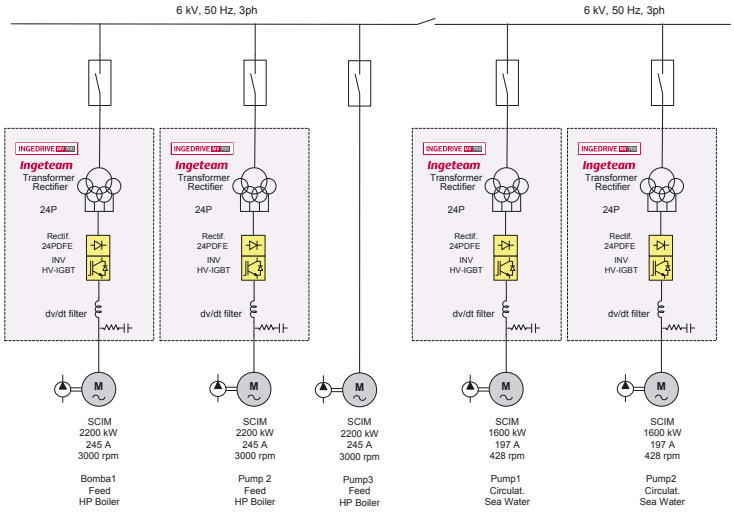
Metals: Mill stands, winders, pumps, fans.
Marine: Main propulsions, thrusters, pumps and compressors, dredgers.
Oil & Gas: Drillings, pumps, compressors, blowers.
Water, Wastewater and Power Generation: Fans and pumps.
Cement, Mining and Minerals: Mine hoists, grinding mills (SAG mills, ball mills), conveyors, crushers, fan

Boiler Feed Water Pumps (BFWP) are responsible for water supply into the steam generator of each gas turbine. Each pump is fed by 2,2MW Asynchronous motor, and water flow is regulated using throttle valves. Pumps are normally working well above real necessities due to factors like system redundancies, usual pump design over dimensions, or low partial loading of the plant. As a result, control valves are most of the time throttling great part of the flow, while motors run continuously at its rated speed, consuming high amounts of useless power and representing an inefficient control method. It soon became evident a great potential for energy saving using Variable Speed Drives for slowing the pumps and accommodate the speed to the real necessities of the plant.

40-50% Energy Savings — ROI < 1,5

Circulation Pumps (CP) are used in the open circuit cooling of the condenser using seawater. Pumps are fed by 1,6MW Asynchronous motors. Although no flow control was used, it was seen that flow was also well above the real necessities throughout different operation scenarios. Again, the use of VSDs would enable significant energy savings.

In February 2015, Ingeteam received an order from Bahía de Bizkaia Electricidad for the supply of **4 frequency converters, type Ingedrive MV700**. All four VFDs were successfully commissioned in Q4/15. BBE has reported energy savings in the range of 40-50%, which translate into more than 4000 Kg of CO2 per year, as well as a Return of Investment of less than 1.5 years.



www.ingeteam.com
ingedrive.info@ingeteam.com

Ingeteam

General Description

INGEDRIVE

Scope of Supply

Supplied equipment	Project management Basic and detailed engineering 4x Ingedrive MV700 converter with integrated 24 pulse phase-shift rectifiertransformer: · 2x 2000kW (BFWP) · 2x 1600 (CP) Commissioning and optimization After sales service [360ºCRS]

Technical Features

Converter type	Ingedrive MV700
Rectifier	24 Pulse Diode Front End, non-regenerative
Inverter	5-level VSI with HV-IGBT power semiconductors, using PWM modulation techniques based on voltage vectors
DC-Bus system	Consisting of high-capacity long-life polypropylene capacitors
Cooling method	Air cooled
Motor voltage	6600 Vac
Other features included	Sinus Filter; Output switches for by-passing the VSD in case of failure
Overall size	4975 x 2825 x 1605 (W x H x D in mm)

Other Data

	Before upgrade:
Pump type	Centrifugal pumps
Flow control method	Boiler Feed Pumps: Throttling valves Circulating Pumps: No control
	After upgrade:
Pump type	Centrifugal pumps
Flow control method	Boiler Feed Pumps: Variable Speed Drives Circulating Pumps: Variable Speed Drives
Energy savings	40-50%
Total CO2 reduction	4000kg (equivalent to 11,3 Gwh/years)

www.ingeteam.com
ingedrive.info@ingeteam.com

Ingeteam