

IGCC/联产/CCS中美研讨会

THE SEMINAR OF IGCC/CO-PRODUCTION/CCS

Hangzhou Huadian Banshan Power Generation Co.ltd

April,2009



中国华电集团公司
CHINA HUADIAN CORPORATION

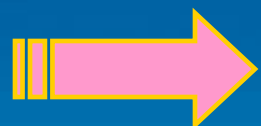
公司概况

OVERVIEW OF COMPANY

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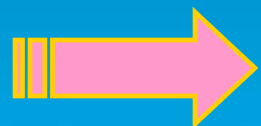
The northern part of the famous traveling city



Invested by Huadian Power International Co., Ltd. and Zhejiang Energy Investment Group



The total installed capacity of gas-vapor combined cycle units is 1,000,000 kilowatts



The main tracking power plant of zhejiang electric network and the leading emergency power supply of Hangzhou





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Two Coal-Fired Units



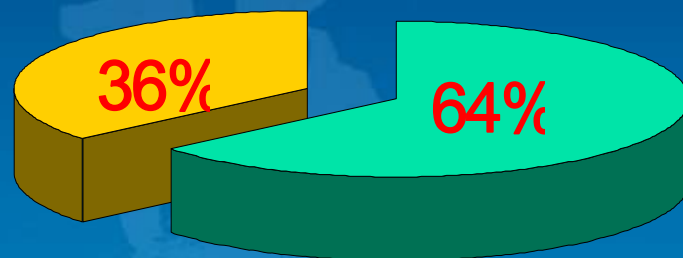
Three Gas-Vapor Combined Cycle Units

Established in 1959, experienced five expansion and new construction over time

More than 1200 employees

Total installed capacity is 1435MW, including 265MW of coal-fired units and 1170MW of 3* 390MW gas turbines

杭州华电半山发电有限公司股份比例



Shareholders

■ 华电国际电力股份有限公司

■ 浙江省能源集团公司

Bearing “safety,efficiency,creativity and development ”as motto,taking green and reliable energy supply into responsibility,focusing on win-win situation both enterprise development and environmental protection.





In 1999, the gas desulfurization demonstration project was built and put into operation, it reduces about 10,000 tons of SO₂ emission annual and thus be promoted by government as the State Environmental Protection Project.

浙江半山发电厂2×125MW烟气脱硫工程

国家环境保护百佳工程

国家环境保护总局
二〇〇三年七月





Flue Gas Desulphurization Project

In 2005, the company became the largest gas electric power generating base of the downstream area of the state "West-East Gas Transmission" project

In June 2007, the company took the initiative ,and closed down two 50MW small thermal power units , six months ahead of schedule.





BanShan No1--9FA

Thermal Boiler





Currently, the progressing IGCC power generation projects because of its good performance ,energy-saving ,environmental advantages and extending industrial chain, has been listed in national “ 863” plan by China Ministry of Science and Technology.



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IGCC发电示范工程介绍

IGCC Power Generation Demonstration Projects

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项目概况

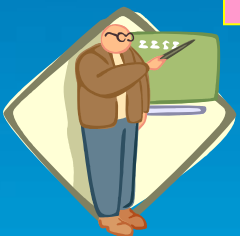
Project Outlook

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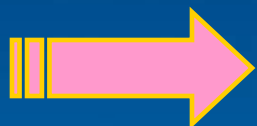
Located in the site
of removed first-
stage 12MW unit
and second –stage
two 50MW units



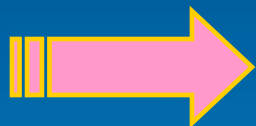
1×12MW

2×50MW

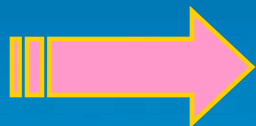
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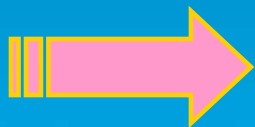
1 set of 20MW IGCC unit with output about 228MW



E class duty-heavy gas turbine with average output about 121MW



Three-pressure condensate steam turbine without return heat, average output about 107MW



**Three-pressure
reheat self-
deaerator natural
circulation boiler**

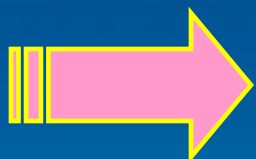




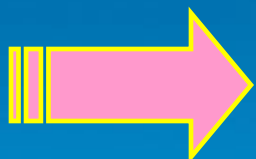
The project construction site is adjacent to Beijing-Hangzhou Grand Canal, and adopt canal water as water resource.

Taking Inner Mongolia coal as design coal and transportation will be completed through the existed railway and downloading device, all the ash will be comprehensive utilized.

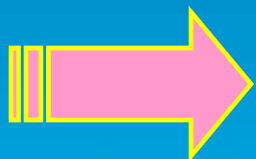
Transmission 220KV voltage through original out-line 110KV.



Total static investment is about 20 million, 8300 yuan / kW



Unit efficiency > 45% , Desulfurization efficiency > 98%



**SO₂ < 45mg/Nm³, NO_x emissions < 80mg/Nm³,
Particulate Matter emissions < 2mg/Nm³**

viewing integrated technology development and demonstration project construction as target, We'd like to achieve system integration and innovation, to maximize the homemade equipment through domestic manufacturing capacity, finally, to develop national intellectual property rights of 200MW-class IGCC module technology .





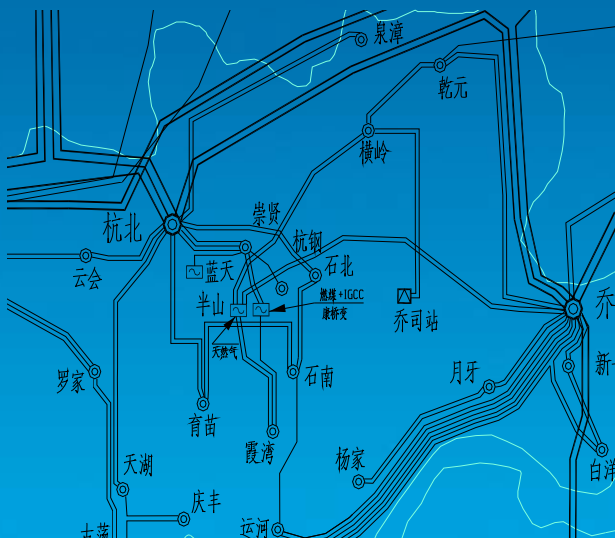
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工程进展

progress

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In 2005, decided to start the IGCC project through many research and analysis



In May, 2006, approved by China Huadian Group

In Oct, 2006, passed the initial assessment of the State Ministry of Science and Technology



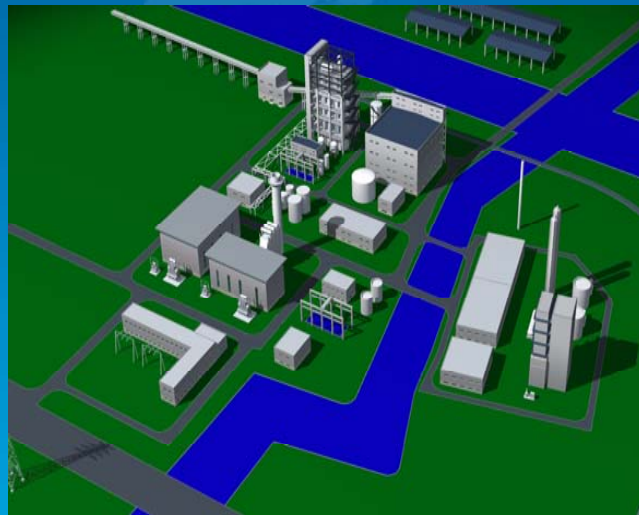
January 2007, it's listed in national "863" project
by China Ministry of Science and Technology.

In March of the same year, ZheJiang Development
and Reform Commission agreed to inclusion of our IGCC
project in Zhejiang Province "Eleventh Five-Year" electric plan
and to carry out primarily work.

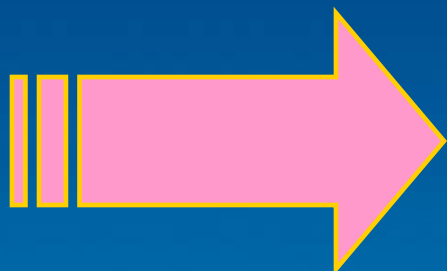


The feasibility study report has authorized by The State Electric Power plan and Design Institute.

A number of special review has passed to analyse and testify in technology, engineering, economic and other aspects.



PLANVIEW



Electric-Inline systems, water security, safety assessment, etc., have been successfully verified

Water projects, land use, planning, site selection ,etc, has been approved



Other related report excluding environment protection has been completed.

report on occupational disease prevention has been completed.



Six main equipment purchase contracts have been prepared. External work conditions such as coal supply, transport links have been meet. Anyway, construction site is ok.





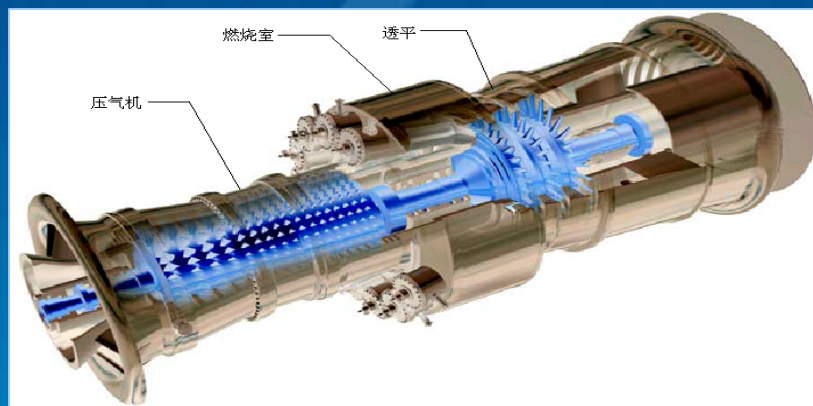
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课题研究方面

Technology R&D

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Coal-water slurry gasification technology, plus modification of E-class gas turbines and partly independent air separation technology.



The panel consists of Physics Research Office of Chinese Academy of Sciences, National Power Plant Combustion Engineering Research Center, Zhejiang Electric Power Design Institute, East China University of Science and technology, and etc.

Five sub-themes:

A 200MW-rate overall IGCC system optimization and integration and conventional island technology

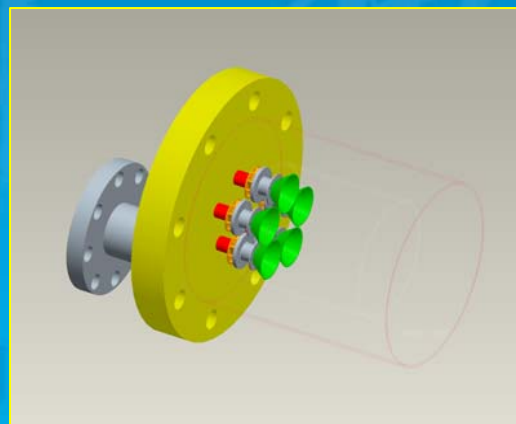


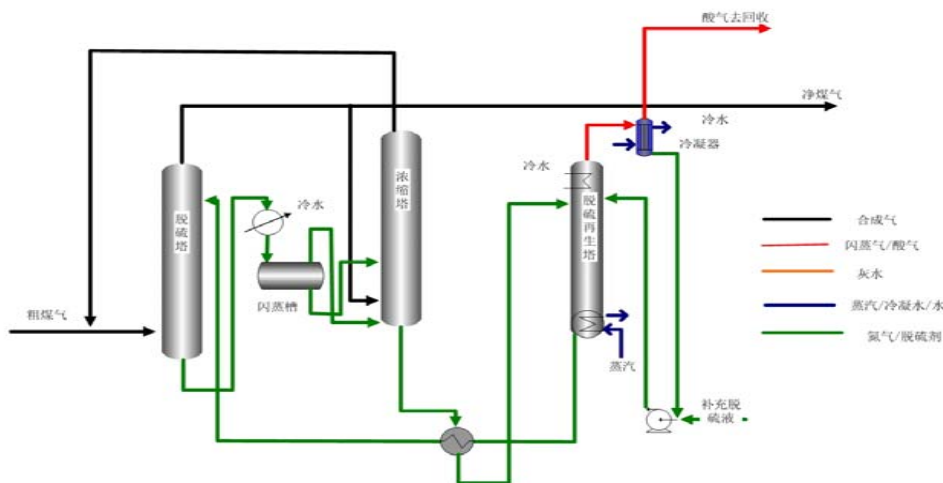
Gasification island technology

Gas turbine island technology

IGCC power plant design and automation control technology

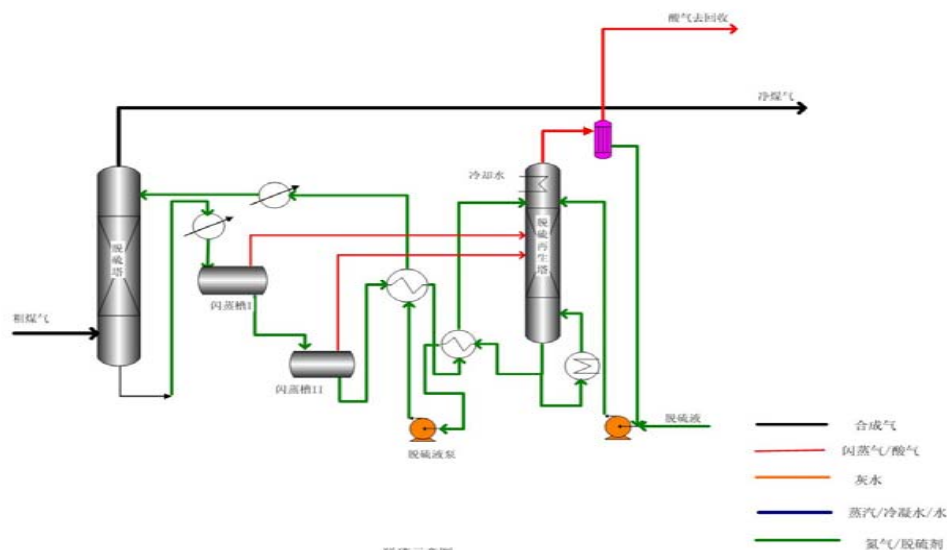
IGCC demonstration project and integrated operation technology





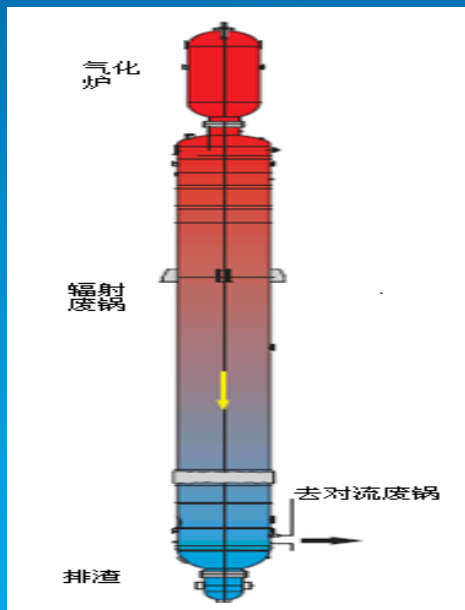
脱硫系统示意图

DESULFURIZATION SELECTION SCHEME



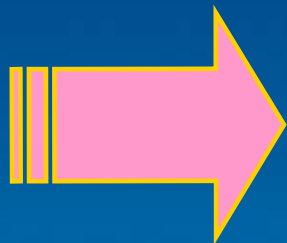
脱硫示意图

The owner as a project promotion coordinator ,actively organize the periodic IGCC meeting enclosing the main technology outline and performance to drive the key R&D technology.

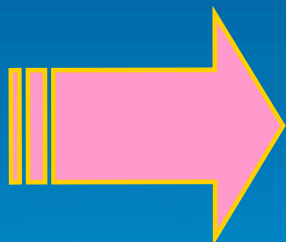


Initially completed the system configuration and optimization of parameters of gasification island, gas turbine Island, conventional island

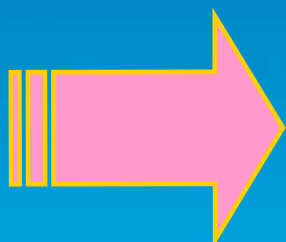
Selection scheme of three special heat exchanger, waste heat boiler and steam turbine



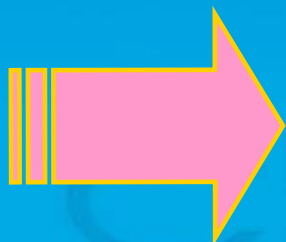
Completed studies in gasifier gas-solid two-phase flow and the slag particle deposition mural



Primarily simulated the technology parameters on gasifier and radiation waste boiler interface



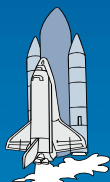
Completed the adjustment of the combustion chamber pressure test in full-size dimension , initial design scheme and configuration of saturator



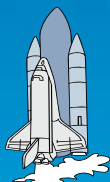
tentatively set some simulation of automation systems and combined-cycle operation of norms



At present, the IGCC project are focusing on two aspects:



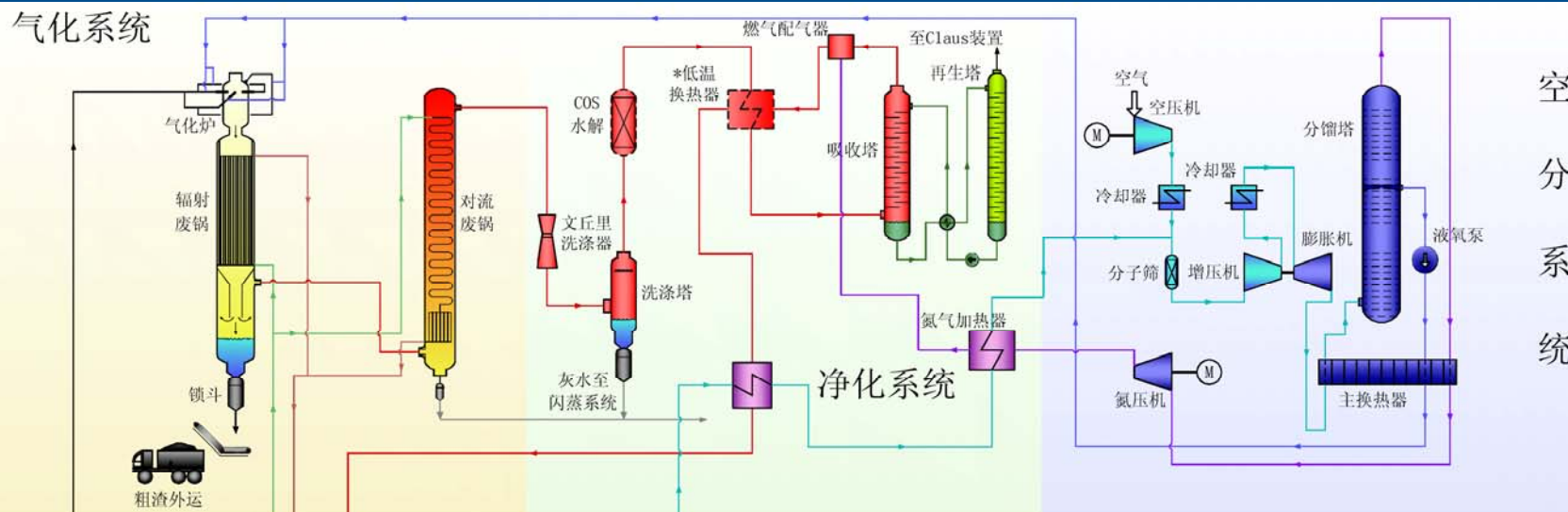
I) striving to be agreed by National Development and Reform Commission and to start the construction as soon as possible



II) developing the gas turbine system optimal performance analysis to further improve the system efficiency.



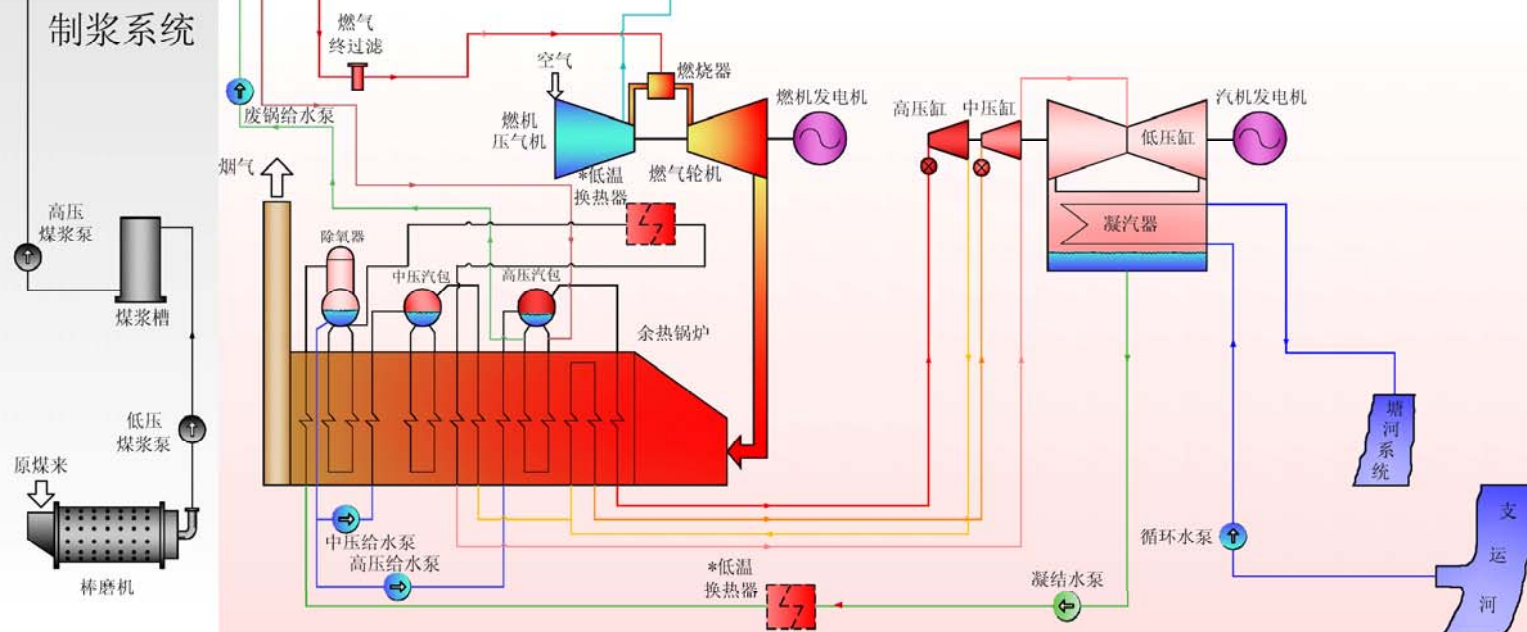
气化系统



空分系统

发电工艺系统

制浆系统





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Southern Company Air Blown TRIG™ at Orlando Utilities' Stanton Energy Center





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THANK YOU!



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