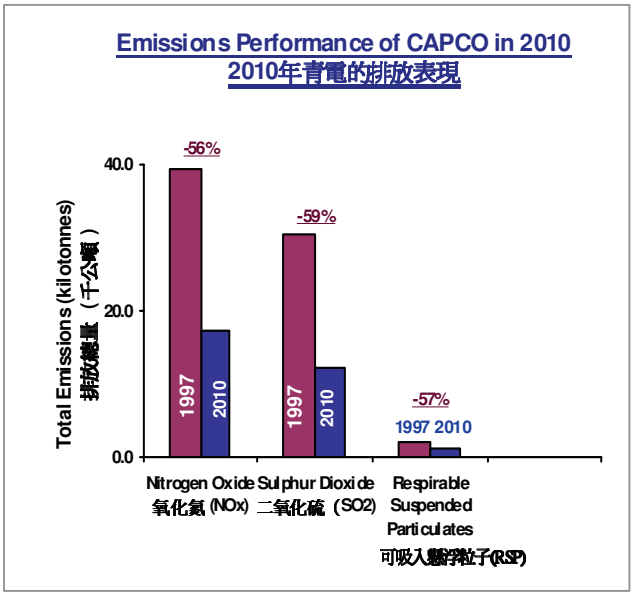
Castle Peak Power Company Limited--Emissions Control Project
Background Information

Overview of Castle Peak Power Station after retrofit of EC facilities

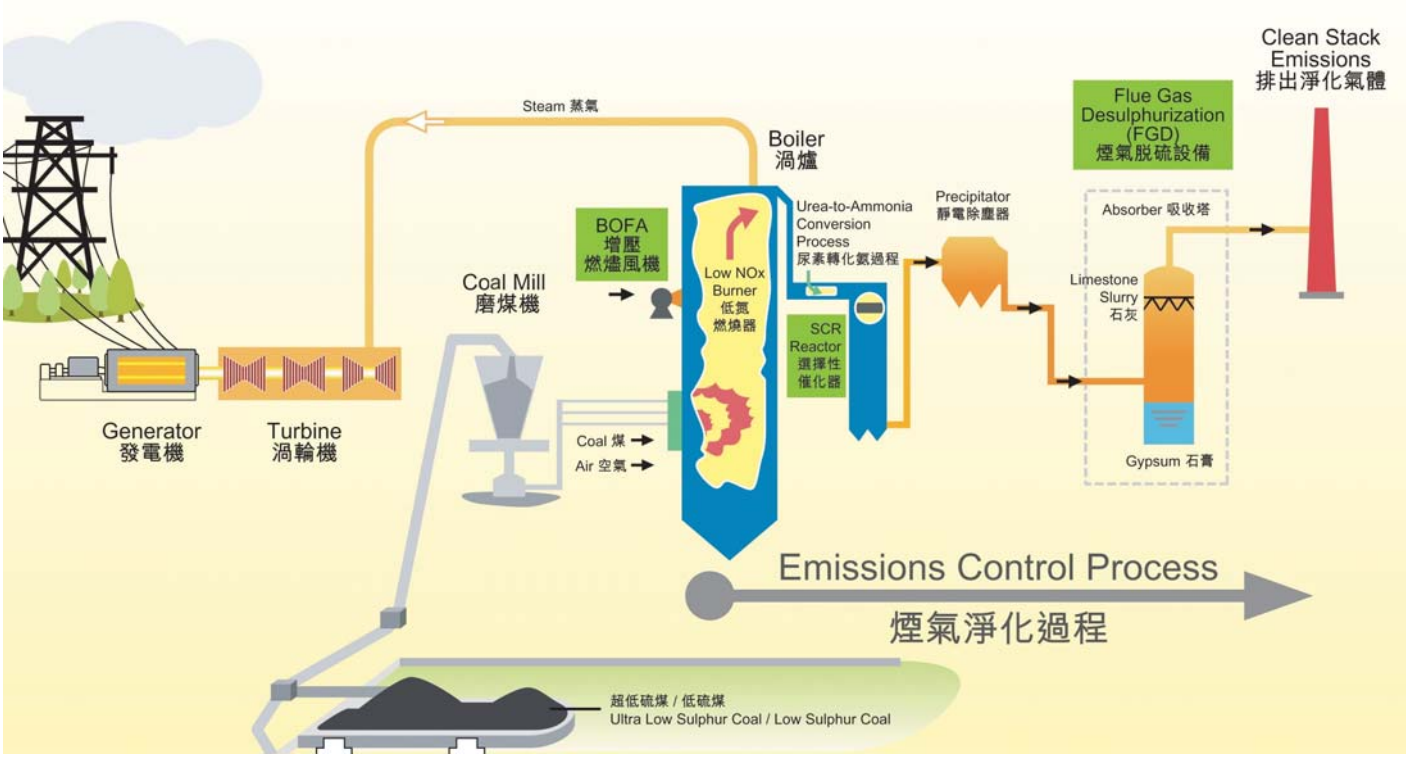
In meeting the 2010 emissions reduction targets jointly set by HKSAR and Guangdong Provincial governments with the aim to reduce the emissions in the Pearl River Delta (PRD) Region, Castle Peak Power Company Limited (CAPCO, a joint venture between CLP Power Hong Kong Limited and ExxonMobil Energy Limited) commenced the Emissions Control (EC) Project at Castle Peak Power Station (CPPS) since 2007. The project is one of the largest engineering projects in terms of scale and complexity in Hong Kong over recent years.

Completion of the project in 4 months ahead of schedule by early this year is attributed to collaborative efforts from government authorities, CAPCO, the contractors and staff members. It gives CPPS a further lift of the already high-standard performance, making it one of the cleanest coal-fired power stations in the world. It also marked a key milestone in achieving material emission reduction, and signified CAPCO's determination in contributing to air quality improvement.

The EC Project comprising three types of emissions control technology helps reduce Nitrogen Oxide (NOx), Sulphur Dioxide (SO2) and Respirable Suspended Particulates (RSP) emissions produced from each of the four largest generating units at CPPS from the existing low level. Through this crucial measure, and together with other emission reduction efforts we have made, CAPCO outperformed the 2010 emissions reduction targets set by the HK SAR Government. CAPCO recorded a material reduction across all three emissions – 56% in NOx, 59% in SO2 and 57 % in RSP by all generation facilities - from 1997 (the base year of the targets set). It contributes in the pursuit of air quality improvement in both HK and the PRD region.



Project Details



The Emissions Control Project refers to retrofitting four power generating units with the largest capacity at Castle Peak Station. Each generating unit will be equipped with three types of emission control equipment, namely **Boosted Over Fire Air (BOFA)** and **Selective Catalytic Reduction (SCR)** for reducing NOx and **Flue Gas Desulphurization (FGD)** for reducing SO2.

The greatest challenge of the project was to retrofit all three types of emissions control technologies at an operating power plant at the same time, which is among one of the projects of this kind in the world. Three of the four units that are connected to the EC equipments are currently in full operation while the last unit is undergoing the final stage of testing and is expected to complete by Q2 2011.

How EC Equipments Reduce Emissions:

1. **Boosted Over Fire Air (BOFA) --** *Suppress formation of NOx*
   NOx is produced when nitrogen and oxygen combine during combustion. BOFA aims to change and optimize combustion of coal so as to suppress formation of NOx during the combustion process and reduce NOx emission. Installation of BOFA equipment in power generating units involves a lot of complex retrofit work and requires 500 tonnes of steel. After retrofitting, BOFA equipment will be a part of the coal-fired boiler.

2. **Selected Catalytic Reduction (SCR) --** *Turn NOx in the flue gas into water vapour and non-toxic nitrogen gas*
   Flue gas passing through BOFA will move on along the ductwork to the next emissions removal process. Passing through the SCR equipment which makes use of chemical reaction of Ammonia (NH3) and NOx, NOx in flue gas is converted into water vapour and non-toxic nitrogen gas and become part of the constituents of normal breathing air. NOx emission in the flue gas will further be reduced upon processing of SCR.

3. **Desulphurization (FGD) equipment --** *Remove SO_2 from flue gas*
   After removing NOx through BOFA and SCR, the flue gas will be transmitted to an absorber tower, in which the flue gas will be sprayed and reacted with alkaline limestone slurry. During the process, SO_2 in flue gas will be neutralized by limestone to form gypsum, a useful construction material.

   Meanwhile, RSP, which has been 99% removed by the electrostatic precipitator, is also further reduced in the process of desulphurisation.

By-product of the Project--Gypsum

The EC Project brings along additional environmental benefits. Gypsum, a by-product of the desulphurization process, is recycled for making cement and other construction material. Since the phasing-in of three units, nearly 30,000 tonnes of gypsum have been produced by the Project during the past few months.

EC Project Milestones

Date	**Project Milestones**
May 2006	Completion of front-end engineering design work
July 2007	Commencement of site work
July 2007 to April 2009	Relocation of six operational facilities to allow space for the construction of new facilities
August 2009	The first equipment of the project-- BOFA of unit B1 commenced operation
September 2009	Completion of civil works
August 2010	The 1st generating unit B2 was connected to three types of EC equipments and commenced operation
October 2010	The 2nd unit B1 was connected to EC equipments and commenced operation
February 2011	The 3rd unit B3 was connected to EC equipments and commenced operation
March 2011	Completion of the project The 4th unit undergoes the final stage of testing and is expected to commence operation in Q2 2011

Interesting Statistics about the Project

Work area	40,000m^2, equivalent to 4 times of Hong Kong Stadium
Work scale	• Relocation of 6 operational facilities • Construction of four 40-metre tall absorbers, 6 buildings, 24 tanks, 15 material transfer towers, 3km long new duct work and 2km long conveyor belt
Material used	Over 25,000 tonnes of steel and 1,100 piles which is sufficient for building 5 trident public housing blocks
Number of major contractors participated	44 in total
Jobs created	9,000
Total man-hours	13.5 million man-hours
Staff nationalities	Over 20 countries covering Chinese Mainland, the United Kingdom, the US, Canada, France, Germany, Switzerland, Denmark, Australia, New Zealand, Philippines, Pakistan, Indonesia, India, Vietnam, Japan, Singapore, South Africa, Nepal and Malaysia

Other Contributions by CLP/CAPCO in Improving Air Quality

Year	Emission Control Measures
1991	Installation of electrostatic precipitator - achieving a substantial removal of 99% in respirable suspended particulates (RSP) during coal-fire power generation
1993	Installation of low NOx burners – bringing along NOx reduction during coal-fire power generating process
1994	Daya Bay Nuclear Power Station commenced operation. Pioneered introduction of the near-to-zero-emission nuclear power to Hong Kong that has brought great improvement in emission reduction.
1996	Black Point Power Station commenced operation. CAPCO introduced natural gas for power generation to achieve effective control in emissions while meeting increasing electricity demand.
2005	Ultra low sulphur coal that contains only 0.01% of sulphur was introduced for power generation. It was one of the important measures adopted by CAPCO in pursuing 2010 emissions reduction targets
2007-2009	Multiple plant improvement measures were taken, such as boiler optimization and refurbishment of low NOx burners to strive for further improvement in emission control for meeting the 2010 targets
2010	EC equipments started to phase-in, making contribution to meeting the 2010 targets
Q2 2011	EC Project completes testing and commences full operation

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