中華電力
CLP Power

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Capco 青山發電有限公司 Castle Peak Power Co. Ltd.

Emissions Control Project at Castle Peak Power Station "B" Units

Environmental Impact Assessment

青山發電廠”B”廠機組排放物控制工程 環境影響評估

Executive Summary

行政摘要

June 2006
二零零六年 六月

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青山發電有限公司

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青山發電廠"B"廠機組排放物控制工程 環境影響評估 - *行政摘要*

June 2006 二OO六年六月

For and on behalf of
Environmental Resources Management
香港環境資源管理顧問有限公司

Approved: Dr Andrew P Jackson 簡信安
批核

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Date: 21 June 2006 二OO六年六月廿一日
日期

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1 INTRODUCTION

1.1 BACKGROUND

In support of the Government of the Hong Kong Special Administrative Region (HKSARG)'s regional air quality improvement initiative, the Castle Peak Power Company Limited (CAPCO), a joint venture between CLP Power Hong Kong Limited (CLP Power) and Exxon Mobil Energy Limited (EMEL), proposes to install additional emissions control facilities on their Castle Peak Power Station "B" Units (CPB) to further reduce air emissions from the operations of these units.

CPB units use pulverised coal as the primary fuel. All CPB units were commissioned during 1986 to 1990 with a unit size of 677 MW (gross).

It is CAPCO's objective to responsibly manage the environmental impact of their operations and to meet HKSARG's environmental license requirements while providing reliable electricity supply. Since its full commissioning, CPB has been retrofitted with low nitrogen oxide (NO_x) burners for the boilers, flue gas conditioning systems, and upgrades of the electrostatic precipitators (ESPs) in addition to boiler optimisation improvements in recent years for improved particulates and NO_x control. As a result of these measures and together with the introduction of natural gas in the mid 1990s and increased utilisation of ultra low sulphur coal, emissions of NO_x, sulphur dioxide (SO_2) and particulates from all CAPCO facilities have already been reduced by 77%, 44% and 70% respectively over the 1990 to 2005 period when the total electricity demand has grown by about 80%.

Based on the CPB emissions control project description included in CAPCO and CLP Power's 2005 Financial Plan which was accepted by HKSAR Government, the following additional emissions control facilities are currently proposed for implementation at CPB:

- Selective Catalytic Reduction (SCR) for NO_x reduction; and
- Limestone Flue Gas Desulphurisation (LS FGD) for SO_2 reduction.

While there are several other emission control technologies available for NO_x reduction, final NO_x control facility will be subject to design optimisation. For the purpose of this Environmental Impact Assessment (EIA) Study, SCR has been selected as the most conservative process with respect to environmental impact. This is due to the fact that the SCR system encompasses the facilities and elements associated with the other available NO_x reduction technologies.

These facilities are expected to result in significant emission reductions of NO_x and SO_2. Further reduction in particulate emissions is also anticipated as a result of the LS FGD process.

1.2 *OBJECTIVE AND SCOPE OF THE EIA*

As defined under *Section 9* (*4*) of the *Environmental Impact Assessment Ordinance* (*EIAO*)(Cap 499), the above-mentioned Emissions Control Project (the Project) is a material change to an exempted designated project (DP), the Castle Peak Power Station (CPPS) [Category D (Energy Supply), Item D.1 (Public Utility Electricity Power Plant) of Schedule 2, Part I], as a result of the changes introduced by the SCR and the LS FGD operations to the types and quantities of wastes, emissions and effluents. The Project also includes elements which will qualify as DPs in their own right under *Schedule 2* of the *EIAO*.

The main objective of this EIA Study is to provide a detailed assessment of the nature and extent of potential environmental benefits and impacts arising from the construction and operation of the Project in relation to the issues specified in the EIA Study Brief (No. ESB 134/2005), including air quality, noise, water quality, waste management, ecology, land contamination and landscape and visual impacts.

1.3 *APPROACH TO THE STUDY*

The assessments in this EIA Study are conducted using well-proven and internationally accepted methods based on the worst-case conditions associated with the construction and operation of the Project.

2 PROJECT DESCRIPTION

The Project will be located within the existing site of the CPPS. A brief description of the construction and operation of the Project is provided in the following sections.

2.1 CONSTRUCTION OF THE PROJECT

2.1.1 *Demolition and Relocation of Certain Existing Facilities*

While the existing generating units will remain in their current locations, some of their auxiliary and common facilities to the south of the generating units at CPB may be demolished or relocated within CPPS to provide space for the FGD, SCR and related facilities. The following demolition / relocation works are envisaged to be required:

- demolition of CPB Fuel Oil Day Tank (FODT);
- demolition of Dangerous Goods (DG) Store;
- re-routing of underground pipeworks;
- relocation of CO_2 storage tank;
- relocation of the LPG storage tanks; and
- relocation of the Intermediate Pressure Reduction Station (IPRS).

2.1.2 *Installation of the New Emissions Control Equipment and Facilities*

New facilities to be installed for the Project will include the SCR and FGD equipment, reagent and by-product handling and storage facilities associated with the SCR and FGD operations. An additional berthing facility for the loading and unloading of reagents and by-products will also be required. These are described in the following sections.

Installation of SCR and FGD Facilities

The SCR and FGD facilities will be retrofitted to the CPB generating units. The exact footprint of these facilities will be finalized upon design optimisation.

Provision of Reagent and By-product Handling and Storage Facilities

The major reagent and by-product handling facilities for FGD operations will include limestone storage facilities, limestone slurry tanks, gypsum dewatering and storage facilities, and handling and storage facilities for lower grade gypsum. SCR systems will require urea as the ammonia supply reagent, urea storage facilities, dissolvers, urea solution storage tanks and urea-to-ammonia reactors will be required.

Provision of Additional Berthing Facility

The SCR systems could require about 40,000 tonnes per annum (tpa) of urea, while the FGD systems could consume about 150,000 tpa of limestone and generate about 257,000 tpa of gypsum as by-product. The quantities of reagents required and by-product produced will be finalised during the design engineering phase. An additional berthing facility will be needed for the loading and unloading of process reagents and by-product.

The provision of additional berthing is by extending the existing Heavy Load Berth to form a multi-purpose wharf, providing a straight quay with the potential to accommodate ships with a wide range of loaded draft requirements. It is anticipated that the extension work will require some small-scale dredging for the foundations of the deck and for providing a sufficient turning basin for the different marine vessels' loaded draft requirements.

The preliminary general arrangements of the proposed facilities are shown in *Figures 2.1*.

2.2 OPERATION OF THE PROJECT

The operations involved in the control of emissions from CPB are summarised in the following sections:

2.2.1 Selective Catalytic Reduction Process

In the selective catalytic reduction (SCR) process, a nitrogen-based chemical reagent in the form of ammonia (NH_3) is injected into the flue gas upstream of the SCR catalyst. The ammonia will be generated from a urea-to-ammonia conversion system and will selectively react with nitrogen oxides (NO_x) in the presence of a catalyst to form nitrogen (N_2) and water vapour (H_2O). The reactions are essentially the conversion of various nitrogen oxides in the flue gas to nitrogen gas (N_2). The oxygen removed from the nitrogen oxides combines with hydrogen to form water (H_2O). The products of the reactions, nitrogen gas (N_2) and water (H_2O), are innocuous and exist naturally in the atmosphere in large quantities.

2.2.2 Limestone Flue Gas Desulphurisation (LS FGD) Process

In a LS FGD system, the flue gas enters a large vessel (usually known as the 'absorber'), where it is sprayed with or bubbles through limestone slurry in the absorber. The calcium carbonate ($CaCO_3$) from limestone in the slurry reacts with the sulphur dioxide (SO_2) in the flue gas to form calcium sulphite ($CaSO_3$). The calcium sulphite initially formed in the absorber is nearly 100% oxidised to form gypsum ($CaSO_4$, calcium sulphate) by the provision of oxidation air into the sulphite slurry in a separate vessel, or *in-situ*, depending on the technology design. The gypsum generated can be commercially recycled.

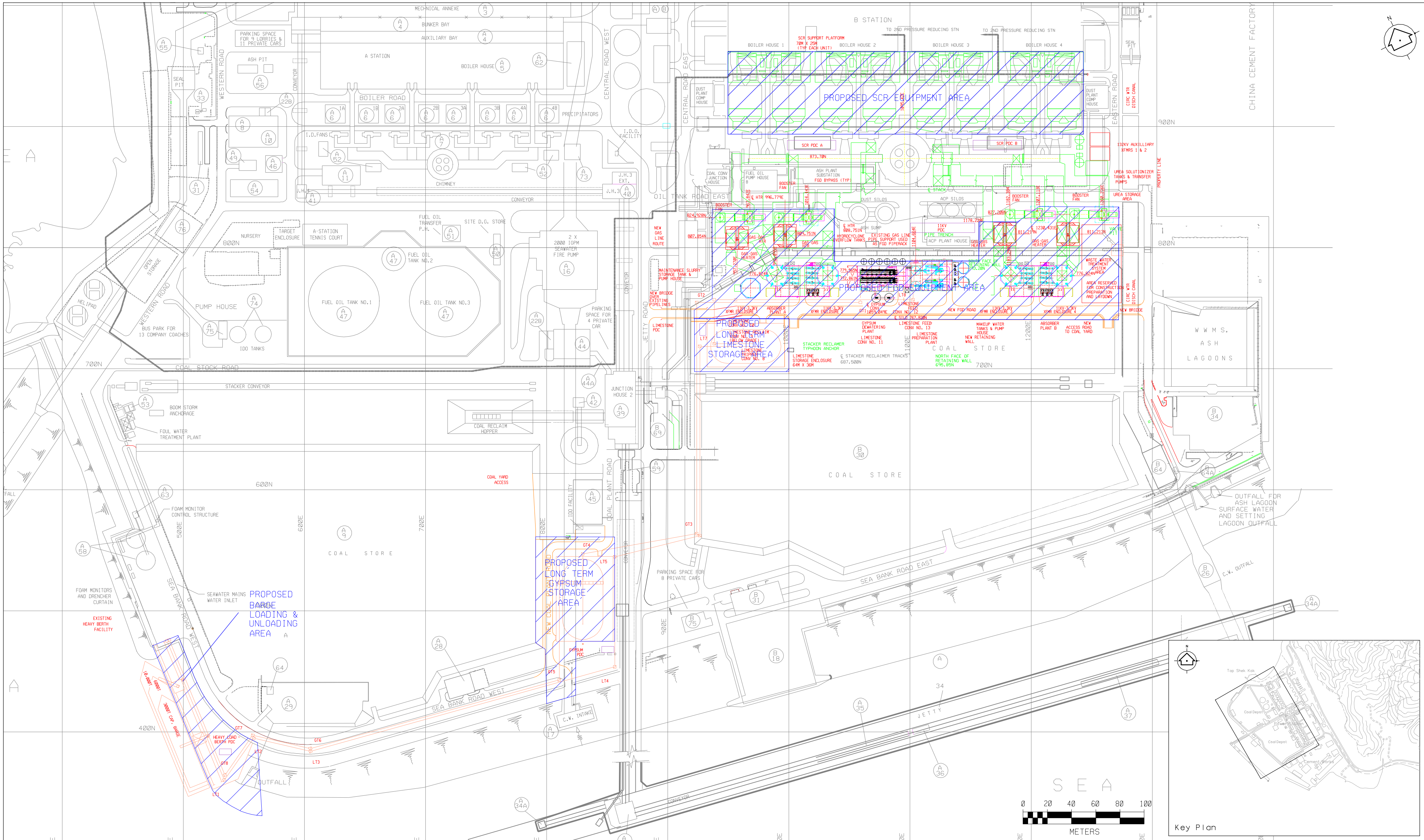

FIGURE 2.1

Overview of Project Site Preliminary General Arrangement

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The schematics of the emissions control systems are presented in *Figure 2.2*.

2.3 *PROPOSED PROJECT PROGRAMME*

Subject to timely agreement of a long-term environmental policy with the HKSAR Government and the successor regulatory regime, the currently envisaged project milestones are as follows:

Key Stage of the Project	**Indicative Date**
Finalisation of other major permitting requirements	2006
Completion of front-end engineering design	1st half of 2007
Commencement of relocation of existing facilities	1st half of 2007
Award of major contracts	2007
Commencement of retrofit site work	End 2007
Start-up of the retrofitted units	End 2009 to 2011

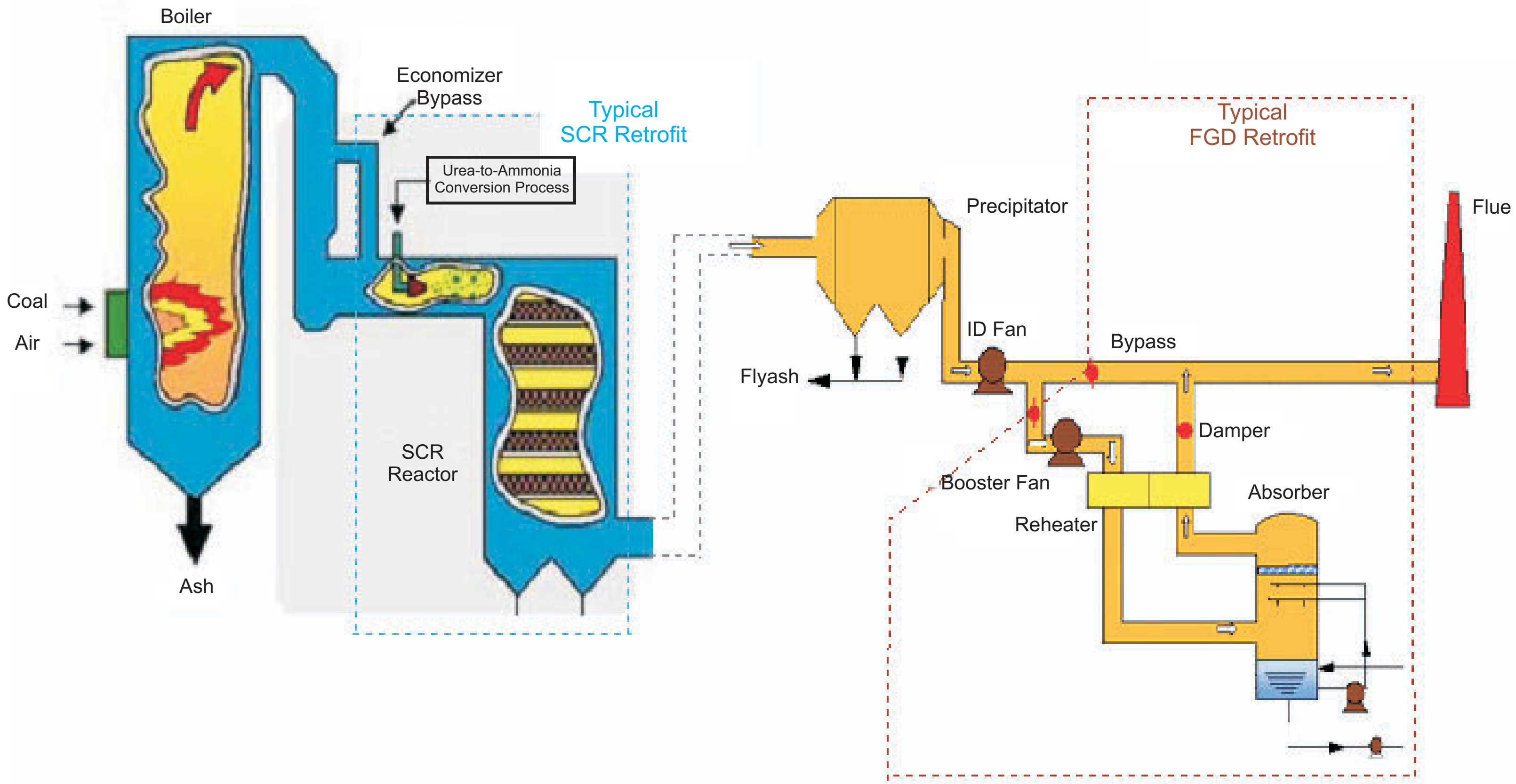

Figure 2.2

Schematics of Emissions Control System

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3 ENVIRONMENTAL IMPACTS

The environmental impacts associated with the construction and operation of the Project are summarised in the following sections.

3.1 AIR QUALITY

3.1.1 Construction Phase

Dust from excavation, site formation and construction activities is the only key air quality concern during the construction of the Project. Owing to the small scale of the civil construction requirement and the distance from the Air Sensitive Receivers (ASRs), no adverse dust impact is anticipated. In addition, only a limited number of diesel-powered equipment will be operated on site, and therefore impact from construction equipment is expected to be minimal. With the implementation of the dust control measures stipulated in the *Air Pollution Control (Construction Dust) Regulation*, no adverse air quality impact is envisaged from the construction of the Project.

3.1.2 Operational Phase

The operation will significantly reduce SO_2 and NO_x emissions. Further reduction in particulate emissions is also anticipated as a result of the LS FGD operation.

The following reduction efficiencies are used as the basic assumptions for the operational air quality assessment:

- SO_2 emission reduction by up to 90%; and
- NO_x emission reduction by up to 80%.

A comparative air quality assessment was conducted for CPB by scale model testing performed in a Boundary Layer Wind Tunnel to simulate the behaviour of the exhaust plume before and after installation of the proposed emission control equipment.

The modelled percentage reductions in SO_2, NO_x and particulates concentrations at the 36 ASR locations after implementation of the retrofit programme are similar in magnitude to the proposed emission reductions at source. The comparative study demonstrated that all the identified ASRs will have an improvement in air quality after the retrofit.

3.2 NOISE

3.2.1 Construction Phase

The construction noise assessment conducted for the Project indicates that the predicted noise levels at the noise sensitive receivers (NSRs) are expected to range from 43 to 51 dB(A) and are therefore well within the noise criteria. This is due mainly to the considerable separation distance and the screening offered by the topography and the existing buildings. In view of the assessment results, the noise generated during the construction phase is not expected to cause any adverse impact and mitigation measures will not be required.

3.2.2 *Operational Phase*

The noise levels at the identified NSRs (Sha Po Kong village and the planned holiday camp at Siu Lang Shui) from the operation of the Project have been predicted based on the specified maximum sound pressure levels (SPL) for the new equipment to be installed at CPB. The results indicate that the identified NSRs will be subject to noise levels which comply with both the stipulated daytime and night-time noise criteria.

The suppliers of the new equipment should guarantee the specified SPL by providing a certificate of measurement and verify the SPL during testing and commissioning in accordance with international standard procedures. If necessary, the suppliers should apply attenuation measures to achieve the guaranteed noise levels during the detailed design stage. With the noise specifications in place, further mitigation measures will not be required during the operational phase of the Project.

3.3 *WATER QUALITY*

3.3.1 *Construction Phase*

Water quality modelling has been performed to assess the construction phase impacts, with the assumption that no mitigation measures are adopted. The findings indicated that for both the dry and wet seasons, no exceedances of the Water Quality Objectives (WQO) and the evaluation criteria are predicted to occur during the dredging operations. The impact assessment has also shown that other land-based construction works, if properly controlled, are not expected to cause any adverse impacts to the surrounding waters and the sensitive receivers.

3.3.2 *Operational Phase*

No effluent is anticipated to arise from the operation of the NOx control system and hence water quality impacts are not expected.

In the LS FGD process, the gypsum slurry from the absorber unit is treated, resulting in dewatered gypsum and a small quantity of liquid effluent. The resulting effluent may have a small chemical oxygen demand and/or reduced dissolved oxygen concentrations. The effluent will be treated to comply with the discharge standards stipulated in the *Technical Memorandum on Standards for Effluents Discharged Into Drainage And Sewerage Systems, Inland And Coastal Waters* issued under the *Water Pollution Control Ordinance*. It is then added to the cooling water flows and discharged via the existing CPB sub-marine cooling water outfall, resulting in a small increase (about 0.02%) in the total flows from the outfall. The treated FGD effluent would not be expected to have any adverse effect on the temperature of the cooling water or on the quantities of residual chlorine in the discharge.

The high degree of mixing inherent in the coastal margin or coastal zone will result in rapid dilution of the effluent to very low concentrations and no exceedance of the WQO or evaluation criteria for dissolved oxygen (DO), dissolved metals, temperature, suspended solids (SS), salinity and sulphate is expected. As a result, further mitigation measures are considered unnecessary.

3.4 *WASTE MANAGEMENT*

3.4.1 *Construction Phase*

The key potential impacts during the construction phase are related to the management of dredged sediments, demolition materials, excavated materials and construction waste. With the implementation of the mitigation measures recommended, no adverse environmental impacts arising from storage, handling, collection, transport and disposal of wastes are expected.

3.4.2 *Operational Phase*

About 240,000 tonnes of commercial grade gypsum will be generated each year from the FGD process and can be commercially recycled in the Pearl River Delta and East Asia region. Similarly, the lower grade gypsum (about 17,000 tonnes per year) can also be reused for cement production. About 180 tonnes per day of sludge at 30% dry solids from FGD wastewater treatment per day is expected to be generated. Design optimisation of the FGD wastewater treatment system and exploration of additional disposal options, such as off-take by the limestone supplier and gypsum off-taker, are ongoing to further reduce the quantity of sludge to be disposed of at Government landfills.

With the implementation of the recommended mitigation measures, no unacceptable environmental impacts associated with the storage, handling, collection, transport and disposal of a small quantity of industrial waste and general refuse arising from the operation of the Project are expected.

3.5 *LAND CONTAMINATION*

A number of existing facilities at CPB, including the FODT, the DG Store, the IPRS, the LPG compound and the CO_2 tanks, are required to be demolished to accommodate the proposed emissions control equipment. A land contamination assessment was carried out at these areas following the methodology and procedures described in the Contamination Assessment Plan (CAP) which had been approved by the EPD. The land contamination assessment included soil and groundwater sampling, laboratory analyses for target parameters, preparation of a Contamination Assessment Report (CAR) and preparation of a Remediation Action Plan (RAP).

With the implementation of the remedial measures in the RAP, the hazard and environmental impacts associated with the potential land contamination and the handling and treatment of the contaminated soil and groundwater are considered very low.

3.6 ECOLOGY

The land-based construction works and operation of the Project will be conducted entirely within the existing industrial site of the CPPS and therefore no impact to terrestrial ecology is envisaged.

The literature review of the existing marine ecological resources in the Study Area identified two key sensitive receivers, namely the Sha Chau and Lung Kwu Chau Marine Park and the habitat of the Indo-Pacific Humpback Dolphin (*Sousa chinensis*). The assessment of the potential construction and operational phase impacts to marine ecological resources has indicated that no significant adverse effects will arise from the proposed construction works. Impacts are predicted to be confined to the area to be dredged and the area for the construction of the additional berthing facility, both of which have low ecological sensitivity.

The predicted changes to water quality attributable to the construction and operational activities are not expected to cause exceedances of the WQOs, and therefore no impacts to the marine ecological resources or marine mammals are anticipated.

Mitigation measures designed to minimise impacts to the population of Indo-Pacific Humpback Dolphins that use the area include restrictions on vessel speed and adopting the local construction practice of using bubble curtains/jackets during percussive piling work for the construction of the additional berthing facility. Other mitigation measures designed to mitigate impacts to water quality to acceptable levels (i.e., compliance with WQOs) are also expected to mitigate impacts to marine ecological resources.

3.7 LANDSCAPE AND VISUAL CONSIDERATIONS

It has been confirmed that the height of the proposed structures associated with the Project will not exceed the existing maximum building height of +83 mPD and no additional chimney will be erected in the Project. In accordance with the requirements of the EIA Study Brief for the Project, detailed landscape and visual impact assessment is not required for this EIA Study.

As all the new structures and emissions control equipment of the Project will be located within the existing industrial setting of CPPS, it is not expected to result in any negative impact on the surrounding landscape. With the adoption of a colour scheme that complements the industrial surroundings of the existing CPPS, the Project is also expected to have a very low visibility.

4 OVERALL CONCLUSIONS

The Project will result in significant reductions in emissions of SO_2 and NO_x. A further reduction in particulate emissions is also anticipated as a result of the LS FGD operation.

The detailed impact assessment concluded that no adverse environmental impacts are envisaged in the areas of air and water quality, noise, waste management, land contamination, ecology and visual appearance during both the construction and operational phases.

目錄

1 *引言*

1.1 *背景*

青山發電有限公司（以下簡稱「青電」）爲中華電力有限公司（以下簡稱「中電」）及埃克森美孚能源有限公司（以下簡稱「埃克森美孚」）的合營機構。青電建議爲青山發電廠B廠機組（以下簡稱「青山B廠機組」）加裝額外的排放物控制設施，進一步減低運作這些機組所產生的空氣排放物，以支持香港特別行政區政府（以下簡稱「香港特區政府」）所倡導的改善本地區空氣質素的方案。

青山B廠機組現時以粉煤爲主要燃料。這些機組在1986至1990年間陸續投產，每台的定額總發電量爲677兆瓦。

青電的目標，是提供可靠的電力，並且負責任地管理發電廠營運對環境的影響和達致香港特區政府有關環境牌照的要求。青山B廠機組在全面投產後，已爲鍋爐加裝低氮氧化物的燃燒器、加裝煙氣處理系統、近年更優化鍋爐及改良靜電除塵器，藉此加強對粒狀物和氮氧化物的排放控制。基於以上各項措施及在1990年代中期引入天然氣和增加使用超低硫煤作燃料，雖然在1990至2005年間的總電力需求增加了約80%，但是由所有青電設施產生的氮氧化物、二氧化硫和粒狀物的排放分別減少了77%、44%及70%。

根據青電和中電已獲香港特區政府接納的2005年度財務計劃內有關青山B廠機組排放物控制設施改造工程的說明，建議爲青山B廠機組加裝以下的排放物控制設施：

- 減低氮氧化物排放的選擇性催化還原設施(SCR)；及
- 減低二氧化硫排放的石灰石煙氣脫硫設施(LS FGD)。

由於有其他的排放控制技術也可以用於減低氮氧化物的排放，最終的氮氧化物排放控制系統仍會作設計優化。就環境影響而言，對選擇性催化還原工序進行之研究是最爲周詳的。故此本環境影響評估（以下簡稱「環評」）研究選用了這種技術作爲基礎，原因爲選擇性催化還原系統已包含其他與氮氧化物排放控制技術有關的設施和元素。

上述設施預料可以顯著減少氮氧化物和二氧化硫的排放量。預料石灰石煙氣脫硫工序亦能進一步減少粒狀物的排放。

1.2 *環境影響評估的目標及研究範疇*

由於選擇性催化還原系統及烟氣脫硫裝置的運作會改變廢物、氣體排放和污水的類型和數量，因此根據《第499章：環境影響評估條例》（以下簡稱《環評條例》）第9(4) 條的規定，上述排放物控制工程（以下簡稱「工程項目」）令已獲豁免的指定工程項目（即青山發電廠）[《環評條例》附表2 – 第I部D類（能

源供應）項目D.1（公用事業電力廠）]產生了實質改變。本工程項目亦包括一些《環評條例》附表2列爲指定工程項目的個別元素。

本環評研究的目的是爲本工程項目在施工及運作階段所產生的潛在環境影響及益處作詳細的評估。根據環境影響評估概要（編號ESB-134/2005）中詳述的評估範疇包括空氣質素、噪音、水質、廢物管理、生態、土地污染和景觀及視覺影響。

1.3 研究的取向

本環評內的評估，乃根據和本工程項目有關的最壞估算的情況下，以經驗證可靠及國際認受的方法進行。

2 *工程項目說明*

擬議的工程項目將位於青山發電廠的現址內。工程項目的施工及運作簡述如下：

2.1 *工程項目的施工*

2.1.1 *拆卸及重置部分現有設施*

現有的發電機組將會留於原位，但是爲了騰出空間以裝設煙氣脫硫、選擇性催化還原及其他相關設施，需要把青山B廠發電機組南面的部分現有輔助及共用設施拆卸或在青山發電廠內重置。需要進行的拆卸或重置工程如下：

- 拆卸青山B廠機組的日用燃油庫；
- 拆卸危險品倉庫；
- 更改地下管道路線；
- 重置液化二氧化碳缸；
- 重置液化石油氣缸；及
- 重置天然氣中壓減壓站。

2.1.2 *裝設新排放物控制設施*

本工程項目將會裝設的新設施包括選擇性催化還原器及煙氣脫硫裝置、反應劑及與相關設施運作時的副產品處理及存放設施。工程項目亦需要額外的碇泊設施供裝卸反應劑和副產品。有關設施於下文闡述。

裝設選擇性催化還原器及煙氣脫硫裝置設施

選擇性催化還原器和煙氣脫硫裝置，會分別改裝在青山B廠發電機組上。最終的佔地面積，將取決於設計優化。

提供反應劑和副產品的處理及存放設施

煙氣脫硫裝置運作時所需的主要反應劑和副產品處理設施包括：石灰石儲存設施、石灰漿儲存缸、石膏脫水及儲存設施、及較低質石膏處理及儲存設施。至於選擇性催化還原系統方面，需要以尿素作爲提供氨的反應劑，所以將要設置尿素儲存設施、溶解器、尿素溶液儲存缸和尿素轉氨反應器。

提供額外的碇泊設施

選擇性催化還原系統每年所需尿素約40,000噸；而煙氣脫硫系統則需每年消耗約150,000噸石灰石，並年產約達257,000噸石膏副產品。反應劑用量和副產品產

量，將在工程設計階段才有定案。預計將需要新的碇泊設施供裝卸反應劑和副產品之用。

提供額外碇泊設施的方案，就是把現有的重負載碼頭加長，成爲一條直線狀的多用途碼頭，供不同載重量的船隻碇泊。預計上述擴建工程將需要爲碼頭地基和不同載重量船隻迴轉的空間進行小規模的挖泥工程。

擬建設施的初步的佈局圖如*圖2.1*所示。

2.2 *工程項目的運作*

有關青山B廠機組控制排放物的運作簡述如下：

2.2.1 *選擇性催化還原過程*

選擇性催化還原過程，就是將氨 (NH_3)這一種氮基化學反應劑在還原器的催化劑上游噴注入煙氣中，以減少氮氧化物排放物。由尿素轉氨反應器產生的氨會選擇性地與氮氧化物產生化學反應，形成氮氣 (N_2) 和水 (H_2O)。有關的化學反應基本上是將煙氣中的各種氮氧化物轉化成氮氣，而移走的氧會和氫結合成水。反應過程所產生的物質，即氮氣和水，都是大氣層中大量存在的無害物質。

2.2.2 *石灰石煙氣脫硫過程*

石灰石煙氣脫硫系統是把煙氣注入一個大容器(一般稱爲′吸收器′)中，並在吸收器內噴洒石灰漿或將煙氣緩緩注入吸收器內的石灰漿。石灰漿內的碳酸鈣($CaCO_3$)會與煙氣中的二氧化硫化合成亞硫酸鈣 ($CaSO_3$)。在吸收器中剛形成的亞硫酸鈣，會在另一個容器或原有容器內（按技術設計而定）被另外加入的空氣差不多完全氧化成石膏（硫酸鈣）。工序中產生的石膏可以商業形式再循環利用。

*圖2.2*爲排放物控制系統的示意圖。

2.3 *擬議工程項目計劃*

若能與香港特區政府按時達成長遠環保政策及繼任電力規管機制的協議，本工程項目預計的重要階段時間表如下：

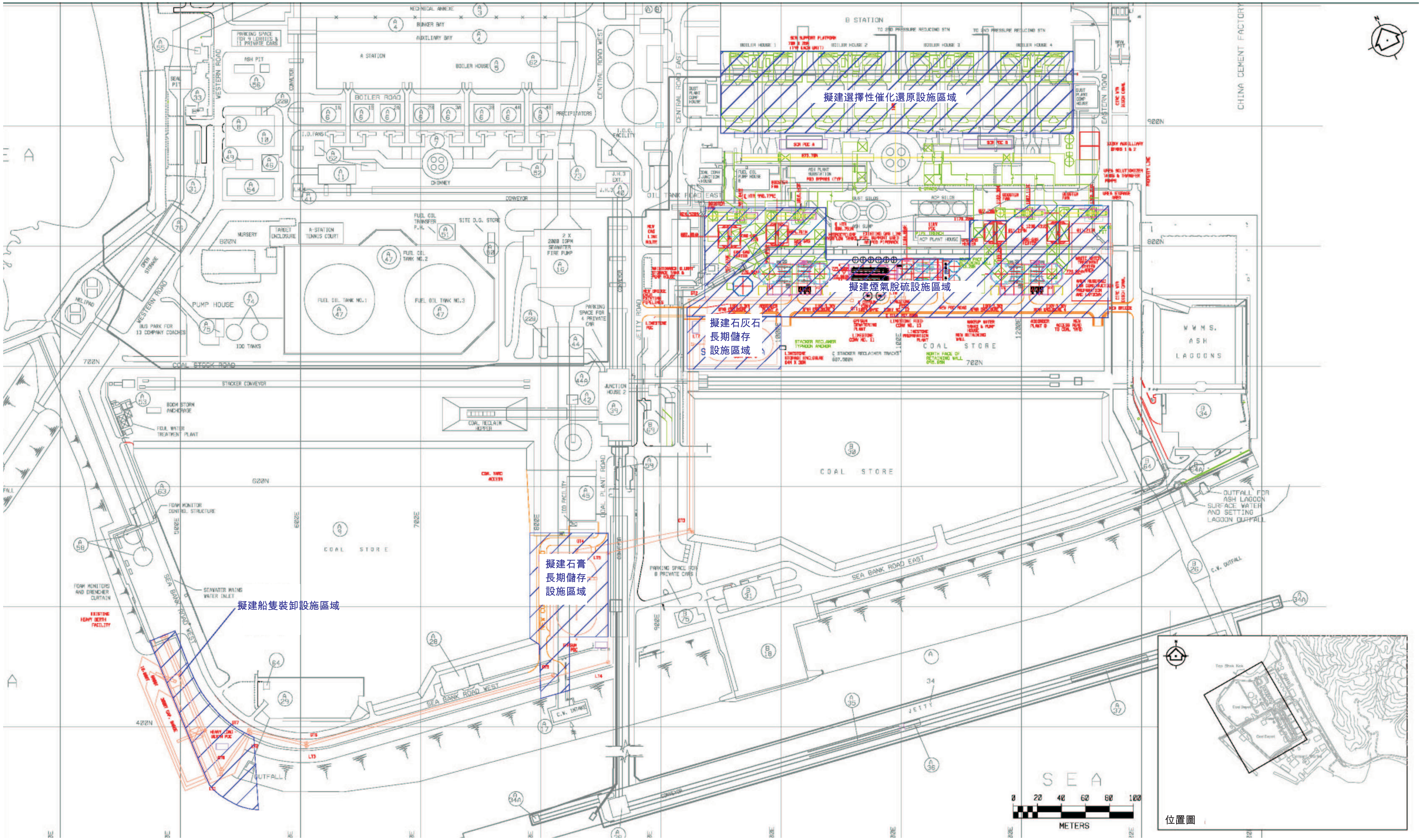

圖 2.1

擬建設施的初步佈局圖

FILE:002445x12
DATE:19/06/2006

Environmental
Resources
Management
ERM

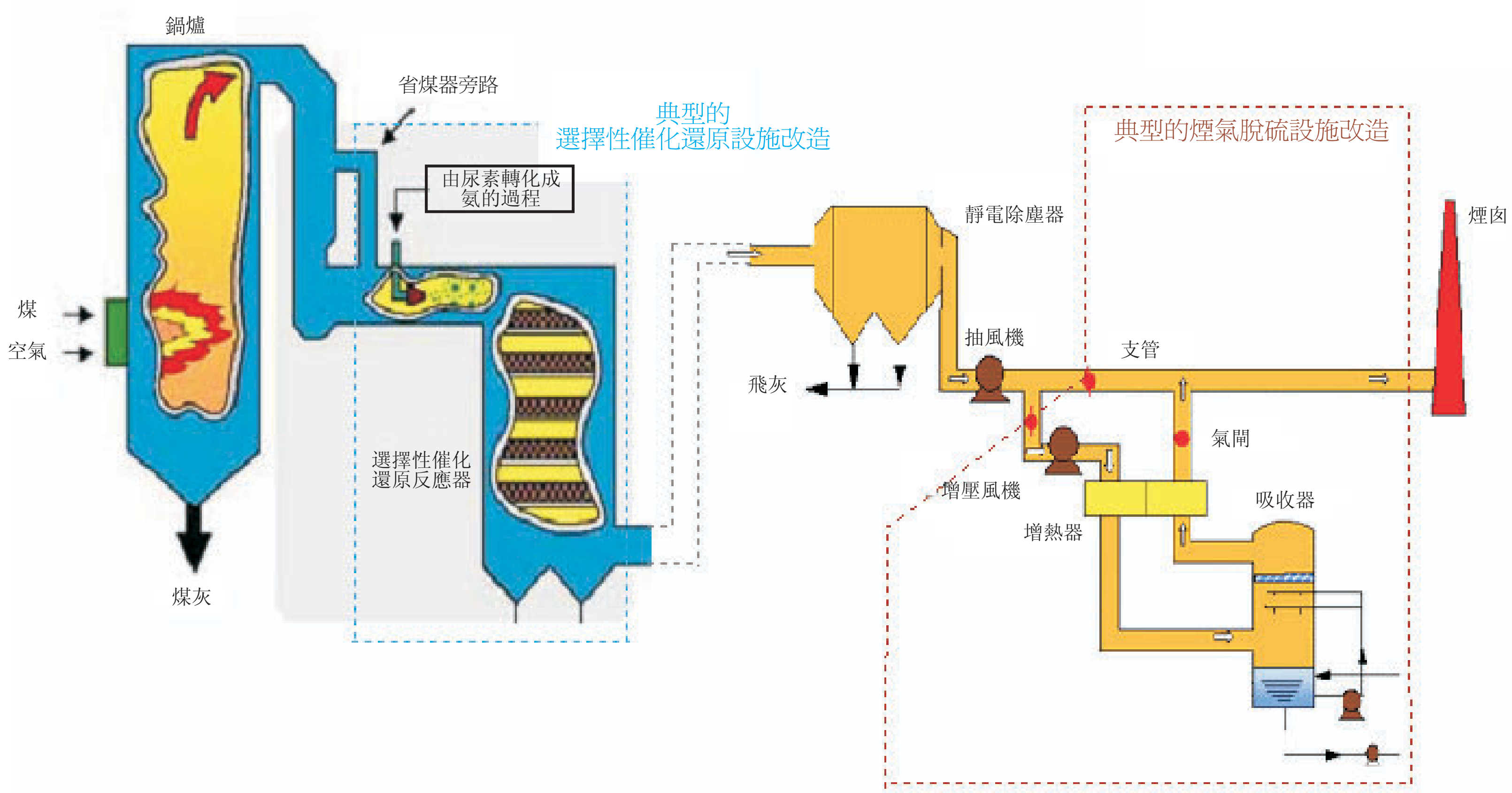

圖 2.2

排放物控制系統示意圖

FILE: 0024405x11
DATE:08/06/2006

Environmental
Resources
Management

ERM

工程項目的重要階段	**初擬日期**
完成其他主要許可的審批	2006年
完成初步工程設計	2007上半年
展開現有設施的重置	2007上半年
簽定主要合約	2007年
展開工地改造工程	2007年底
啓動發電機組的排放物控制設施	2009年底至2011年

3 *環境影響*

以下概述工程項目在建造及運作時對環境的相關影響：

3.1 *空氣質素*

3.1.1 *施工階段*

挖掘工程、工地平整及其他建造工程產生的塵埃是施工階段的主要空氣質素影響。由於本項目的土木工程規模小，並且與空氣敏感受體距離遠，因此預計不會產生不良的塵埃影響。此外，在工地內只有少數的柴油機械同時運作，因此建築機械對空氣質素的不良影響預計極爲輕微。若執行《空氣污染管制（建造工程塵埃）規例》內的塵埃管制措施，本工程項目的施工預料不會有不良影響。

3.1.2 *運作階段*

本工程項目將會大大減低二氧化硫及氮氧化物的排放。預料石灰石煙氣脫硫工序亦會進一步減低粒狀物的排放。

以下的減排效率爲本工程項目運作階段空氣質素評估的基本假設：

- 二氧化硫的排放減低90%；及
- 氮氧化物的排放減低80%。

本環評爲青電B廠機組進行了一項空氣質素比較研究，以比例模型在一個邊界層風洞中作測試，模擬排放物控制設施在安裝之前和之後的排放煙羽。

在進行加裝工程之後，在三十六個空氣敏感受體模擬所得的二氧化硫氮、氧化物和粒狀物濃度的下降百分比，與建議的排放物源頭減少程度相近。比較研究證明在加裝工程後，所有空氣敏感受體的空氣質素將會有改善。

3.2 *噪音*

3.2.1 *施工階段*

爲本工程項目進行的建築噪音評估顯示，在易受噪音影響受體的預測噪音水平爲43至51分貝，亦即符合有關噪音標準。以上結果主要是由於受體與工程地點之間相距頗遠，並有地勢及現有建築物阻擋。根據上述結果，施工階段所產生的噪音將不會造成負面影響，故此不必實施緩解措施。

3.2.2 *運作階段*

本工程項目運作時在易受噪音影響受體（沙埔崗村及位於小冷水的擬建渡假營）的噪音水平，已根據計劃於青山B廠機組加裝的新設備的最高聲壓水平作出

預測。結果顯示在易受噪音影響受體的噪音水平將符合日間及夜間的噪音標準。

新設備供應商應提供量度證明以保證符合規定的聲壓水平，並在測試及投產過程中，根據國際標準程序印證有關設備的聲壓水平。如有需要，供應商應提供緩減措施以達致保證的聲壓水平。若採用有關的噪音規格，本工程項目在運作期間將不需要採取進一步的緩解措施。

3.3 水質

3.3.1 施工階段

環評進行了水質模擬，評估施工期間的影響。模擬假設未有任何緩解措施，結果預測在挖泥工程期間，無論在旱季或雨季都不會超出水質指標或有關的評估準則。評估結果亦顯示只要有適當管制，陸上的其他工程預計將不會對周圍的水體及水質敏感受體引起不良的影響。

3.3.2 運作階段

由於氮氧化物排放控制系統的運作不會產生污水排放，因此預料不會引起水質影響。

在石灰石煙氣脫硫過程中，由吸收器產生的石膏漿會加以處理，產生脫水石膏及少量污水。過程所產生的污水可能會含有少量的化學需氧量及/或較低的溶解氧濃度。這些污水會加以處理，以符合《水污染管制條例技術備忘錄》的排放標準。已經處理的污水會加入冷卻水中，再經現有青山B廠位於海底的冷卻水出口排放，使這個冷卻水出口的總流量有些微上升（約0.02%）。已經處理的脫硫工序污水，預計不會對冷卻水排放的溫度或餘氯水平有任何不良影響。

由於在近岸一帶的水流混合程度較高，使發電廠的排放可快速稀釋至極低濃度，所以預料水中的溶解氧、溶解金屬、水溫、懸浮固體、鹽度及硫酸鹽都不會超出水質指標或有關的評估準則。因此，本環評認爲不需要採取進一步的緩解措施。

3.4 廢物管理

3.4.1 施工階段

在施工期間的主要潛在影響來自挖出的淤泥、清拆物料、開鑿物料及建築廢物的管理。若實施環評建議的緩解措施，廢物的儲存、處理、收集、運送及棄置預料將不會引起不良的環境影響。

3.4.2 運作階段

脫硫工序每年會產生約240,000噸的商用品質石膏，可於珠江三角洲及東亞區內以商業形式再循環利用。較低質的石膏（每年約17,000噸）亦可再用於水泥生產。脫硫工序污水處理每天會產生約180噸含30%固體的污泥。脫硫工序污水處

理系統正進行設計優化，而其他污泥棄置方案（例如由石灰石供應商及石膏收購商回收）亦正研究中，以進一步減少棄置於政府堆填區的污泥量。

若實施本環評建議的緩解措施，工程項目運作所產生的少量工業廢物及垃圾的儲存、處理、收集、運送及棄置預料將不會引起不良的環境影響。

3.5 *土地污染*

青電B廠機組現有的一些設施，包括日用燃料缸、危險品倉庫、天然氣中壓減壓站、液化石油氣缸及二氧化碳缸將被清拆以提供空間安裝排放物控制裝置。本環評已根據環保署審批的污染評估計劃書內列出的方法及程序進行了土地污染評估。有關土地污染評估包括土壤及地下水取樣、目標污染物化驗及撰寫污染評估報告及整治計劃書。

若採用在整治計劃書內建議的整治方法，與土地污染及處理受污染土壤和地下水相關的風險及環境影響將甚低。

3.6 *生態*

本工程項目的陸上建築工程及運作全部都會在青山發電廠的現有廠址內進行，因此預料對陸上生態不會有影響。

環評透過和研究範圍有關的海洋生態資源參考文獻，認定沙洲及龍鼓洲海岸公園和中華白海豚（*Sousa chinensis*）的生境為兩個主要生態敏感受體。有關施工及運作期的海洋生態資源影響評估顯示，建議中的建築工程不會引起重大的不良影響。預測影響的範圍主要限於生態敏感程度低的挖泥範圍及額外碇泊設施工地。

由於工程項目施工和運作而對水質的改變預期不會超出水質指標，因此預料對海洋生態資源及海洋哺乳動物不會有重大影響。

建築額外碇泊設施時進行的撞擊式打樁工程會依照本地施工手法採用氣泡幕/套，另外會實施船速限制等減低對中華白海豚的影響的緩解措施。此外，將水質影響減至可接受程度（即符合水質指標）的其他緩解措施，預料亦會緩解工程對海洋生態的影響。

3.7 *景觀及視覺考慮*

本環評確定工程項目有關擬建的構築物的高度將不會超越現行建築物香港基準上的83米的高度，亦不會因項目而需豎立新的煙囪。根據本工程項目的環境影響評估概要的要求，無需進行詳細的景觀及視覺評估。

由於本工程項目的新結構和排放物控制設施將位於青山發電廠的現有工業環境內，故此預料本工程項目不會對周圍的景觀造成負面影響。本工程項目將會採用與青山發電廠現有工業環境互相配合的色彩，所以亦會甚不顯眼。

4 總結

本工程項目將顯著減低二氧化硫和氮氧化物的排放。此外，預料石灰石脫硫工序亦會進一步減低粒狀物的排放。

詳細的影響評估總結本工程項目在施工和運作階段，將不會對空氣質素、水質、噪音、廢物管理、土地污染、生態和景觀造成不良的影響。