



广东省亚行贷款节能减排促进（能效电厂试点）项目  
Guangdong Energy Efficiency and Environment  
Improvement Investment Program

创新推动节能减排  
ENERGY EFFICIENCY BY INNOVATION



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# 项目简介

## INTRODUCTION

### 关于“能效电厂”

“能效电厂”（EPP）是一种虚拟电厂，属于广义需求侧管理的一项具体措施，即采用投资项目的形式，形成某个地区、行业或企业电力需求节约的一揽子行动方案，对用电设备进行节电改造，鼓励用户采用节电新设备、新技术，从而降低用电负荷、提高电能的使用效率，最终达到与新建电厂和扩建电力系统异曲同工的效果。

与传统的分散管理的一般节能措施相比，能效电厂在政府引导下采用市场化模式较大规模进行投资和运营，可减少运行成本，降低风险。投资回收和盈利主要来源于电费及其他能源成本的节省。与常规电厂相比，能效电厂具有建设周期短，运营成本低、零污染等显著特征。

### ABOUT EFFICIENCY POWER PLANT

Efficiency Power Plant(“EPP”) is a virtual power plant which is one of measures of demand side management in a broad sense, namely, a package deal of investment on power conservation at demand side in certain areas, industry sectors or enterprises, to reduce electricity load, and improve power efficiency by power saving retrofit to electrical equipments and encouraging customers to use new power saving equipments and technologies. As a result, the effect of EPP achieves the same goal as building or expanding a new power plant.

Compared with traditional individual energy efficiency measures, EPP is operated under market facility with large scale investment and government support, which can save cost and reduce risks. Investment recovery and gains mainly come from saved electricity bill or other energy cost. Compared with traditional power plant, EPP boasts the advantages of short construction period, low operating cost, and zero pollution.



### 项目必要性

“十一五”初期，中国政府就开始与亚行共同探讨如何在中国尝试建设第一个能效电厂项目，以推动全国的节能减排工作。鉴于广东省在中国经济发展和能源消耗的重要角色以及敢为人先的开创精神，2006年3月，国家有关部门和亚行同意广东省作为能效电厂项目试点省份，并希望广东能够探索可以在其他省份和地区复制的节能项目融资和管理模式，以推动全国的节能减排工作。

在各方努力下，广东省如期完成了“十一五”单位GDP能耗下降16%的节能目标，其能耗水平在全国处于领先地位。国家要求广东省在“十二五”期间单位GDP能耗在2010年基础上再下降18%，任务十分艰巨。广东省必须继续积极采取各种措施，以确保“十二五”目标的完成。广东省能效电厂项目是在“十一五”的开局之年提出的，顺应了当前的节能形势的要求，并将跨越“十二五”和“十三五”。该项目以鼓励和引导节能主体不断开展节能减排项目并扶持能源服务公司的发展为主要推进方向，与广东省中长期节能规划、“十二五”节能规划以及更长远的发展方向保持一致。该项目在今后很长一段时间内仍将成为广东省节能工作的重要内容之一。

广东省经济指标连续在全国排名首位，能源消耗约占全国的十分之一，其节能工作对全国节能工作的成效有着举足轻重的作用。能效电厂项目的成功推进，将对广东省乃至全国的节能减排工作起到应有的促进作用。

### NECESSITY OF EPP PROGRAM

At the beginning of 11<sup>th</sup> Five Year Plan (“FYP”), Chinese government had been discussing with Asian Development Bank (“ADB”) about carrying out a pilot EPP Program in China. Considering Guangdong's large economy, energy consumption volume, and innovative spirit and courage to be the first, ADB and Chinese government approved Guangdong government's application for a pilot EPP program in March 2006, with an expectation that Guangdong would find out a financing and management model for energy efficiency projects which could later be duplicated and learned by other provinces and areas so as to improve energy efficiency and environment in the whole nation.

With concerted efforts, Guangdong successfully reached the target of reducing energy consumption per Unit GDP by 16% during 11<sup>th</sup> FYP, making Guangdong's energy efficiency the best among national level. For the 12<sup>th</sup> FYP, national government required Guangdong to reduce energy consumption per 10,000 RMB GDP by 18% from the baseline of 2010 levels. This energy conservation task is very demanding and challenging. Guangdong must adopt various measures to make sure

that energy conservation target of 12<sup>th</sup> FYP can be reached. Guangdong Energy Efficiency and Environment Improvement Investment Program (“Guangdong EPP Program”) was proposed at the beginning year of 11<sup>th</sup> FYP, in conformity with energy conservation requirements. The Program would span 12<sup>th</sup> and later 13<sup>th</sup> FYP. The main objectives of the Guangdong EPP Program are to encourage and direct energy conservations by energy intensive entities, and support development of ESCOs. This objective is in line with Guangdong medium and long term energy conservation plan, 12<sup>th</sup> FYP, and with even longer period of strategic development. Therefore, Guangdong EPP Program will still be an important energy efficiency program in Guangdong for a long time.

Guangdong's economic indicators have ranked the first for several consecutive years, and its energy consumption takes up about one tenth of national energy consumption. Therefore, energy conservation activities in Guangdong are essential to the energy conservation effect of the whole nation. A successful EPP Program will also be conducive to improving energy efficiency in Guangdong and even in China as a whole.





## 关于广东能效电厂项目

广东能效电厂项目扩充了“能效电厂”的概念，不仅仅针对节电，而是拓宽到广义的节能，通过采用各种提高能效及新能源开发技术来达到节能减排的目的。

根据中国政府与亚行签订的融资框架协议，亚行提供1亿美元的贷款分批次用于广东能效电厂项目的实施。广东方面将贷款统一结汇成人民币后再转贷给各子项目实施单位，转贷期限为3-5年，利率为中国人民银行公布的6个月商业贷款利率下浮10%，即比国内三年期贷款利率约低20%，比五年期贷款利率约低24%。随着国内商业贷款利率的提高，能效电厂项目贷款利率的优惠将更加明显。广东省还拟制定《广东省亚行贷款节能减排促进（能效电厂试点）项目奖

励机制》，对达到预期节能量且按时足额还本付息的子项目借款人予以奖励。

## ABOUT GUANGDONG EPP PROGRAM

GD EPP Program extends the concept of EPP to energy saving, not only electricity saving solutions, to achieve energy efficiency and emission reduction through energy efficiency and renewable energy technologies.

The Framework Financing Agreement ("FFA") between People's Republic of China ("PRC") and ADB sets out that ADB would provide multi-tranche loans amounted to 100 million USD to finance GD EPP Program. The loan will be converted to RMB and

onlend to sub-borrowers with a term of 3-5 years. The interest rate is the benchmark rate of 6 months for commercial loan announced by People's Bank of China less 10%, that is, about 20% and 24% lower than the benchmark interest rate of 3-year and 5-year commercial loan respectively. As the gradual increase of domestic commercial loan interest rate, benefits of low interest rate of GD EPP Program would be more obvious. Besides, Guangdong plans to make incentives rule for GD EPP Program. Those sub-borrowers who have achieved assumed energy savings and repaid loan principal and interest on time would be given the reward.

## 项目特点

- 在节能减排领域首次采用多批次融资的模式，1亿美元的亚行贷款可分多批次用于项目的开展，且在15年的贷款期内可供循环使用。
- 建立了完善的项目管理架构，为项目专门成立了项目协调小组，由广东省经信委、广东省发改委、广东省财政厅和广东省国资委组成，负责项目总体运作的指导、研究制定项目政策。项目协调小组下设广东省亚行贷款能效电厂项目执行中心，与广东省节能中心合署办公，负责具体实施管理、技术审核、提款审核、项目总体监控及组织验收等工作。
- 省内制定了《广东省亚行贷款节能减排促进（能效电厂试点）项目暂行管理办法》，以规范项目管理。
- 引入了粤财信托作为财务管理服务机构（受省财政厅委托）对项目进行财务评估，遵照国家和亚行有关规定及为本项目所制定的《财务管理手册》进行资金管理。
- 以公开招标方式选取采购管理服务机构，受项目执行中心委托，按照亚行采购手册、国内招投标有关法律及省内为本项目所制定的《采购管理手册》和《财务管理手册》的有关规定协助项目招标采购，并对招标采购及提款报账资料的合理性进行审核。
- 以公开招标方式选取第三方测评机构

（受项目执行中心委托），按照国家测量有关标准及省内为项目所制定的《节能量测量和确认手册》对所开展的子项目进行节能测评。

## CHARACTERISTICS

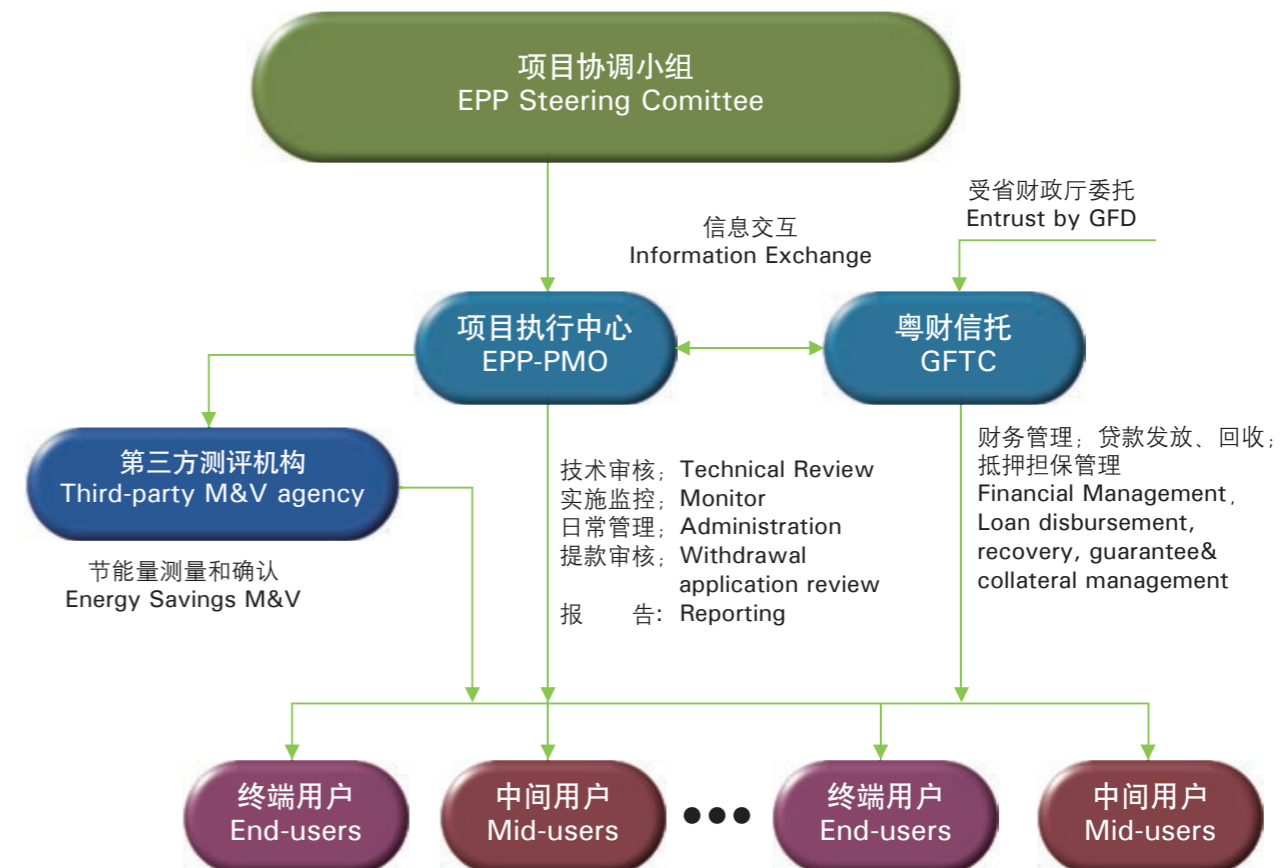
- Multi-tranche financing facility is innovatively adopted in energy efficiency field. The total loan amount of \$100 million is provided to GD EPP Program tranche by tranche, and can be rolled over during the term of the loan (15 years a tranche).
- EPP Steering Committee is established. It consists of Guangdong Economic and Information Technology Commission ("GEITC"), Guangdong Development and Reform Commission ("GDRC"), Guangdong Finance Department ("GFD") and Guangdong State Assets Supervision and Administration Commission ("GDSASAC"), responsible for directing the operating and making regulations and rules of EPP Program. EPP-Project Management Office (EPP-PMO) is set up and affiliated to Guangdong Energy Conservation Center, responsible for implementation management, technical review and withdrawal application review, project supervision and completion acceptance.

- Guangdong has launched Interim Management Method of Guangdong Energy Efficiency and Environment Improvement Program to regulate Project management.

Guangdong Finance Trust Corporation Limited ("GFTC") is introduced into EPP Program. Entrusted by GFD, GFTC is to conduct financial assessment, and capital management according to national and ADB requirements and Financial Management Handbook of EPP Program.

- A procurement service company is selected through public bidding and tendering. The company is required, by EPP-PMO, to assist procurement and tendering of EPP Program, review the eligibility of the procurement, and withdrawal applications according to national, provincial requirements and Procurement Management Handbook and Financial Management Handbook of the EPP Program.

- Independent measurement and verification (M&V) agencies are selected through public bidding process. The agencies are entrusted by EPP-PMO to conduct energy savings M&V according to national and provincial requirements for measurement and Energy Savings M&V Handbook of the EPP Program.





## 子项目筛选基准

### 技术范围

- 电机及电机拖动系统的优化控制
- 电力输配和调度的优化,如变压器及无功补偿
- 绿色照明
- 暖通空调系统等能源系统优化工程
- 空气压缩系统及泵系统节能
- 工业废弃能源回收利用
- 工业锅炉和热电(冷) 联供
- 其他相关的符合国家和广东省节能规划的项目

### 环保方面

- 不涉及征地或非自愿移民或对本地居民有不良影响
- 地点不能位于任何特定的环境保护区内
- 按照国家及省级社会及环保的相关法规设计和实施

### 项目实施单位财务指标

- 无不良信用记录
- 总负债股权比率低于75%
- 债务偿付率高于1.2
- 流动比率不低于1.2
- 可提供抵押或担保, 有足够资产抵押(质押)者优先考虑

### 其他方面

- 经营期在三年以上并连续两年盈利, 有一定的经营规模和经济实力, 有较强的自筹资金能力
- 良好的经营及财务管理机制, 资产状况良好, 信誉好。法定代表人具有良好的诚信, 知识结构、能力等满足经营管理的需要

## 项目申报方式

需要申请纳入能效电厂项目的企业或单位, 可登录项目网站<http://www.gdepp.cn>, 点击“项目申报平台”进行网上申报。网上申报完成后导出申报表, 一式五份打印盖章后送至项目执行中心。

## SUBPROJECT SELECTION CRITERIA AND PRINCIPLES

### TECHNICAL CRITERIA:

- Motors and motor drive systems
- Optimal power transmission, distribution and dispatch
- Green lighting
- Air conditioning, ventilation, refrigeration and heating
- Air compressors and pumping systems
- Recovery of waste energy from industry
- Industrial boilers and industrial cogeneration
- Other related energy efficiency improvement projects

### SOCIAL AND ENVIRONMENTAL CRITERIA:

- Do not involve land acquisition, or involuntary resettlement, or have adverse impacts on ethnic minorities
- Not be located in any designated environmental protection zone
- Must be designed, constructed and operated in accordance with relevant national and provincial social and environmental laws and regulations

### FINANCIAL CRITERIA:

- Does not have a bad credit record, based on the People's Bank of China credit history database
- Total debt/equity ratio: lower than 75%
- Debt service ratio: greater than 1.2
- Current ratio: at least 1.2
- Acceptable collateral and/or guarantees will be given priority

### OTHER CRITERIA::

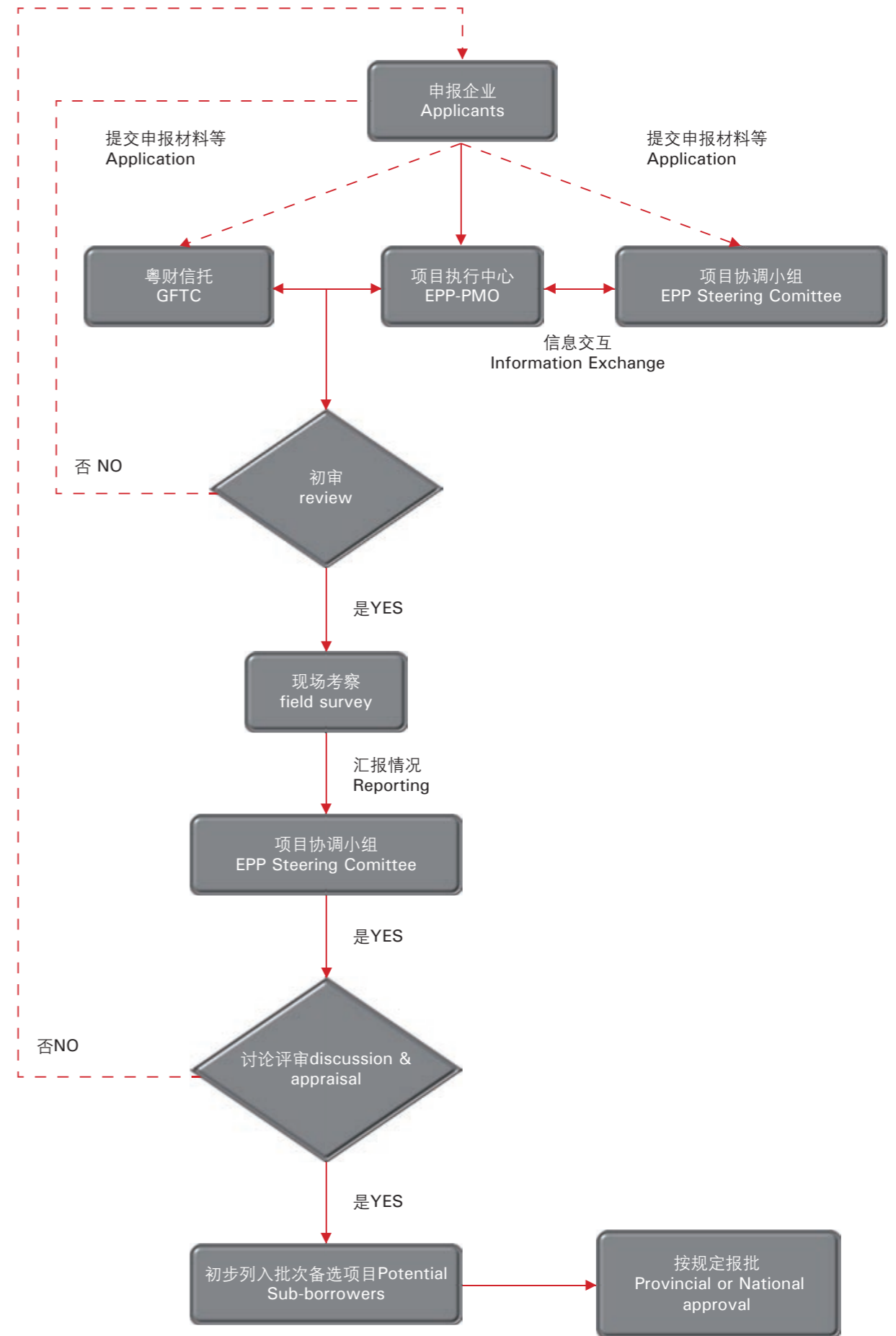
- Operating for at least three years and making profits by two consecutive years, relatively large scale, strong economic strength, and strong competence of raising counterpart fund



- Relatively good operating and financing management, good asset and credit rating
- Legal representative shall be honest, knowledgably and competent enough to meet the need of management

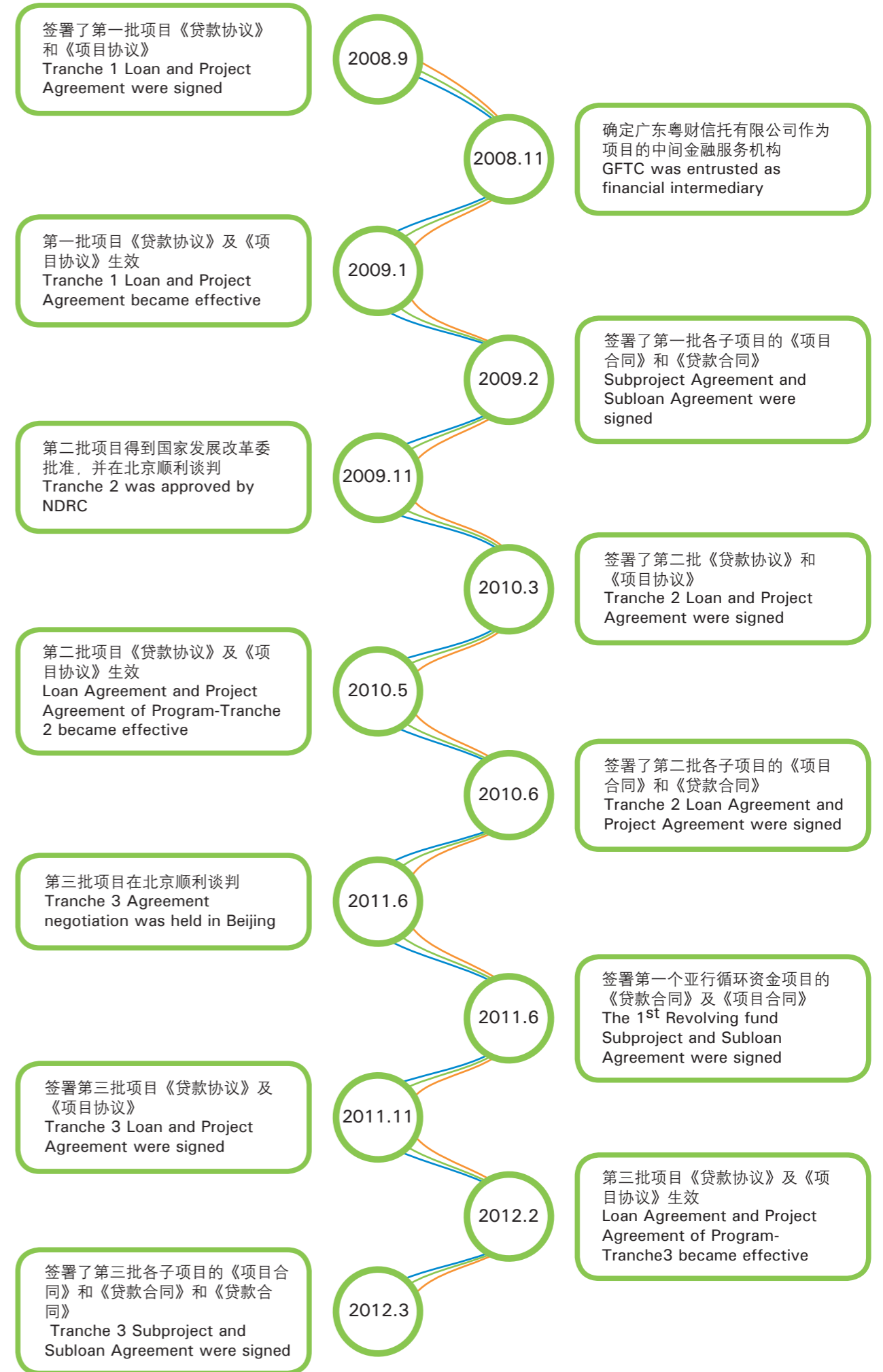
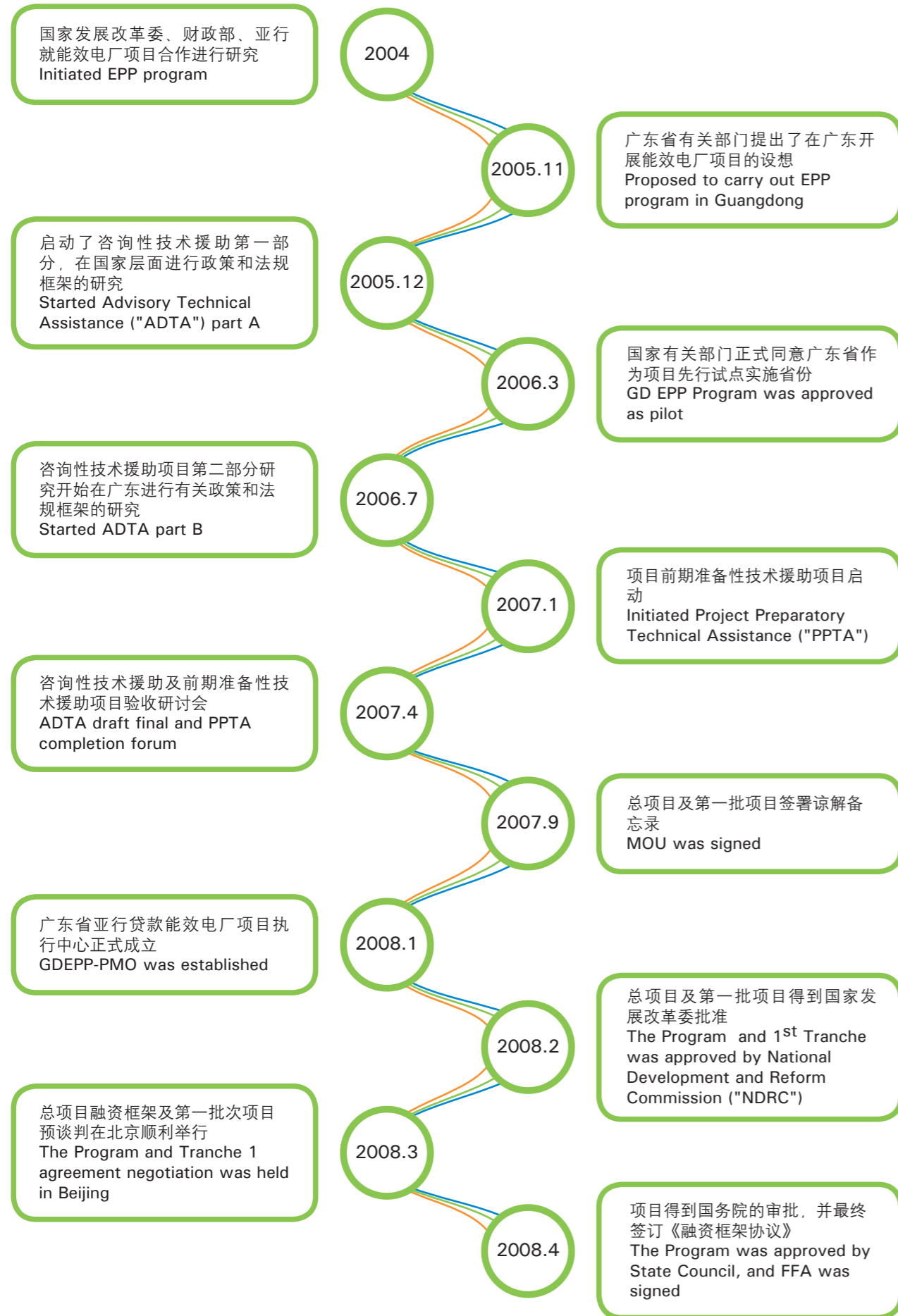
## SUBPROJECT APPLICATION

For those who want to apply for Guangdong EPP Program, you may go to the website <http://www.gdepp.cn> for online application. Then export the completed forms and submit to EPP-PMO in 5 copies, the application form can be downloaded from [www.gdepp.cn](http://www.gdepp.cn).



筛选流程/SUBPROJECTS SELECTION FLOW

项目历程  
PROCEEDING MILESTONE





# 前期研究

## PRELIMINARY STUDY

### 前期研讨

早在2004年，中国首次引入“能效电厂”的全新概念，开始与亚洲开发银行合作研究能效电厂项目。广东成为能效电厂的试点省份，为此，亚行为中国的能效电厂试点项目提供了两个技术援助，并多次召开会议。

### PRELIMINARY STUDY

As early as 2004, the concept of EPP was introduced in China, and China together with ADB started cooperation on EPP study. Guangdong became pilot province to carry out EPP program, and ADB provided

two technical assistances for the program. During those periods, relevant forum, workshop were held, on-site inspections on applicants of subprojects were also carried out.



图2



图1



图3

图1/ 召开ADTA及PPTA项目研讨会>> 广州, 2007.4 ADTA & PPTA forum >> Guangzhou, Apr, 2007

图2/ 召开项目工作会议>> 广州, 2007.9 Program workshop >> Guangzhou, Sep, 2007

图3/ 召开项目转贷研讨会>> 广州, 2007.10 Onelending workshop >> Guangzhou, Oct, 2007

### 实地考察

为了筛选出合适的子项目，在收到企业的申报材料后，项目执行机构、亚行官员及专家对企业进行现场考察。



### FIELD SURVEY

In order to select suitable and relevant subprojects, officials of Executing Agency ("EA") and ADB, as well as experts would carry out field survey after receiving application documents from enterprises.



亚行官员、专家、项目执行机构考察海鸿公司  
Field survey by experts, ADB and EA officials in Haihong Co. Ltd.



国家发改委官员、项目执行机构考察海鸿公司产品  
Field survey by NDRC and EA officials in Haihong Co., Ltd.



广东韶钢松山股份有限公司现场考察  
Field survey by ADB officials in SGIS Songshan Co., Ltd.



广州智光电气有限公司现场考察  
Field survey in Zhiguang Electric Co. Ltd.



亚行专家及项目执行机构赴广东肇庆考察项目  
Field survey in Zhaoqing



## 确立管理框架

经过两年多的前期研究，细致的实地考察及多次会议讨论，广东能效电厂项目的管理框架基本成型，并在2007年9月18日签署的总项目及第一批项目谅解备忘录上予以明确。2008年，通过公开招标正式确定广东粤财信托有限公司为本项目的中间金融服务机构。

## MANAGEMENT STRUCTURE ESTABLISHMENT

After two years' preliminary study, painstaking field surveys and plenty rounds of discussion, GD EPP Program management structure was established. The structure was later set forth in the Memorandum of Understanding between ADB and

Guangdong on 18 September 2007. GFTC was selected as the financial intermediary through competitive bidding in 2008.



签署项目谅解备忘录 >> 广州, 2007.9  
Signed EPP Program MOU >> Guangzhou, Sep, 2007



签署信托协议 >> 广州, 2008.11  
Signed Trust Agreement >> Guangzhou, Nov, 2008

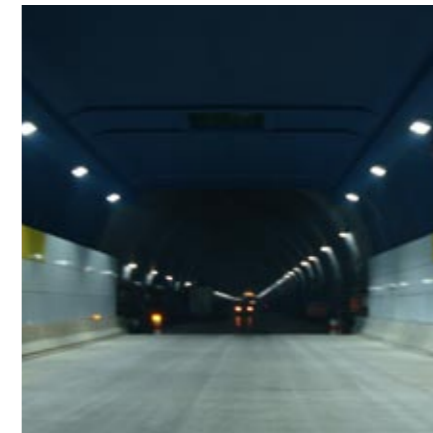
# 子项目 SUBPROJECTS

## 第一批项目

能效电厂第一批项目包含8个子项目，总投资为34,944万元（折合5,139万美元），其中亚行贷款3,500万美元（折合人民币23,800万元）。项目预计年节电2.56亿千瓦时，相当于减少燃烧84,547吨标准煤，年减排199,840吨二氧化碳，2,306吨二氧化硫，512吨氮氧化物，及858吨总悬浮颗粒物。

## EPP PROGRAM – TRANCHE 1

EPP Program-Tranche 1 includes 8 subprojects, with a total investment of 51.39 million USD, of which 35 million USD was borrowed from ADB. It is estimated that implementation of EPP Project-tranche 1 will save 256GWh equivalent power annually, avoid consumption of 84,547 tons/year (t/y) of standard coal, resulting in emission reductions of 199,840t/y of CO<sub>2</sub>, 2,306 t/y of SO<sub>2</sub>, 512 t/y of NO<sub>x</sub> and 858 t/y of total suspended particulates (TSP).





第一批项目表  
Subprojects of Tranche 1

序号 No.	子项目借款人 Sub-borrower	子项目内容 Retrofit projects	融资计划Financing Plan		
			总投资 (千元) Total Investment (CNY ' 000)	亚行贷款ADB loan	
				千元 (CNY ' 000)	折合 (千美元) Equivalent (\$ ' 000)
1	广州智光电气股份有限公司/ Guangzhou Zhiguang Electric Co.,Ltd.	高压变频器的推广使用 / Promotion of variable frequency speed control system	94,000	67,007	9,854
2	广州金关节能科技发展有限公司/ Guangzhou G.K. Energy Services Co.,Ltd.	楼宇智能化节电改造/ Energy efficiency retrofit for commercial building HVAC	25,000	20,000	2,941
3	珠海南方华力通特种变压器有限公司/ Zhuhai Secpower Transformer Co.,Ltd.	推广高效节能变压器 / Promotion of Efficient transformers	12,500	10,000	1,471
4	珠海查理科技节能环保有限公司/ Zhuhai Charlie Technology Energy Saving Co.,Ltd.	蒸汽回收利用/工业锅炉节能改造/ Steam recovery and Industrial boiler retrofit	12,500	10,000	1,471
5	广东中钰科技有限公司 / Guangdong Zhongyu Technology Co.,Ltd.	优化配变监测管理系统 / Digitalized monitoring system of converting station	51,600	20,000	2,941
6	广东韶钢松山股份有限公司/ Guangdong SGIS Songshan Co.,Ltd.	环冷机烟气余热回收利用改造工程/ Waste heat recovery from the annular cooler	87,600	70,080	10,306
7	开平市富莱电气设备有限公司/ Kaiping Fulai Electric Co.,Ltd.	推广无功补偿装置/ Promotion of reactive power compensation devices	3,741	2,993	440
8	广东海鸿变压器有限公司/ Guangdong Haihong Co.,Ltd.	推广三维立体卷铁心高效节能变压器/ Promotion of 3D iron core transformers	62,500	37,920	5,576
合计 / Total			349,441	238,000	35,000

汇率: 1美元=6.8元人民币 Exchange rate of RMB to US dollar is at 6.8



举行第一批项目北京谈判, 并签署《贷款协议》及《项目协议》谈判草案 >> 北京, 2008.3  
Hosted loan negotiation of EPP Program-Tranche 1 and signed draft Loan Agreement and Project Agreement >> Beijing, Mar, 2008



举行能效电厂第一批子项目签约仪式 >> 广州, 2009.2  
Hosted signing ceremony of Subloan and Subproject Agreement of Tranche 1 >> Guangzhou, Feb, 2009



## 第二批项目

第二批项目包含6个子项目，总投资为41,580万元（折合美元6,115万美元），其中使用亚行贷款2,206万美元（折合人民币15,000万元）。第二批项目预计年节电0.87亿千瓦时，相当于减少燃烧28,842吨标准煤，年减排68,171吨二氧化碳，787吨二氧化硫，175吨氮氧化物，及293吨总悬浮颗粒物。

## EPP PROGRAM – TRANCHE 2

EPP Program-Tranche 2 involves 6 subprojects with a total investment of \$61.15 million, of which \$22.06 million is from ADB loan. It is estimated that implementation of EPP Project-tranche 2 will save 87GWh equivalent power annually, avoid consumption of 28,842tons/year (t/y)

of standard coal, resulting in emission reductions of 68,171 t/y of CO<sub>2</sub>, 787 t/y of SO<sub>2</sub>, 175 t/y of NO<sub>x</sub> and 293 t/y of TSP.

### 第二批项目表

#### Subprojects of Tranche 2

序号 No.	子项目借款人 Sub-borrower	子项目内容 Retrofit projects	融资计划Financing Plan		
			总投资 (千元) Total Investment (CNY ' 000)	亚行贷款ADB loan	
				千元 (CNY ' 000)	折合 (千美元) Equivalent (\$ ' 000)
1	珠海兴业绿色建筑科技有限公司/ Zhuhai Singyes Green Building Tech. Co.,Ltd.	建设太阳能光伏发电系统的推广/ Building integrated photovoltaic system	68,000	35,000	5,147
2	江门市大光明变压器有限公司/ Jiangmen Daguangming Transformer Co.,Ltd.	推广节能变压器/ Promotion of high efficiency transformer	30,000	10,000	1,471
3	佛山市扬戈炉业有限公司/ Foshan Younger Furnace Co.,Ltd.	推广蓄热式高效节能熔铝炉/ Promotion of high efficiency furnace in aluminum industry	40,000	20,000	2,941
4	广东中钰科技有限公司/ Guangdong Zhongyu Technology Co.,Ltd.	数字化变电站改造工程&配变监测管理系统/ Digitalized converting station retrofit, and Digitalized monitoring system of converting station	127,800	20,000	2,941
5	广东昭信灯具有限公司/ Guangdong Real Faith Lighting Co.,Ltd.	LED路灯的推广/ Promotion of LED street lighting system	100,000	50,000	7,353
6	博创机械股份有限公司 Borch Machinery Co.,Ltd.	高速节能全自动塑料成型机技术的推广 Promote energy efficient BS series injection molding machines	50,000	15,000	2,207
合计 / Total			415,800	150,000	22,060

汇率：1美元=6.8元人民币 Exchange rate of RMB to US dollar is at 6.8



举行第二批项目北京谈判，并签署《贷款协议》及《项目协议》谈判草案 >> 北京，2009.11

Hosted loan negotiation of EPP Program-tranche 2 and signed draft Loan Agreement and Program Agreement >> Beijing, Nov, 2009



举行第二批子项目《借款合同》及《项目合同》签约仪式 >> 广州，2010.6

Hosted signing ceremony of Subloan and Subproject Agreement of EPP Program-Tranche 2 >> Guangzhou, June, 2010



### 第三批项目

第三批项目包含5个子项目，总投资52,287万元（折合7,689万美元），其中使用亚行贷款4,294万美元，其《贷款协议》及《项目协议》已于2011年11月14日正式签署。至此，1亿美元的贷款额度将可全部提取完毕。若成功实施，第三批项目年节电2.82亿千瓦时，相当于减少燃烧93,101吨标准煤，年减排220,057吨二氧化碳，2,539吨二氧化硫，564吨氮氧化物，及945吨总悬浮颗粒物。

### EPP PROGRAM – TRANCHE 3

EPP Program-Tranche 3 includes 5 subprojects, with a total investment of 76.89 million USD, of which 42.94 million USD from ADB, and its Loan and Project Agreement were signed on 14 November 2011, thus making the loans of three tranches altogether amount to 100 million USD. It is estimated that implementation of EPP

Project-tranche 3 will save 282GWh equivalent power annually, avoid consumption of 93,101 tons/year (t/y) of standard coal, resulting in emission reductions of 220,057 t/y of CO<sub>2</sub>, 2,539 t/y of SO<sub>2</sub>, 564 t/y of NO<sub>x</sub> and 945 t/y of TSP.

#### 第三批项目表

#### Subprojects of Tranche 3

序号 No.	子项目借款人 Sub-borrower	子项目内容 Retrofit projects	融资计划 Financing Plan		
			总投资 (千元) Total Investment (CNY '000)	亚行贷款 ADB loan	
				千元 (CNY '000)	折合 (千美元) Equivalent (\$ '000)
1	广东韶钢松山股份有限公司 Guangdong SGIS Songshan Co., Ltd.	低压饱和蒸汽回收利用技术改造 Low-Pressure Saturated-Steam Recovery	130,870	75,000	11,029
2	广东日昭新技术应用有限公司 Guangdong Rizhao New Tech Application Co., Ltd.	推广绝缘薄壁铜管母线 Promote insulating copper bus-bar	45,000	30,000	4,411
3	广东诚亚节能科技有限公司 Guangdong Chenya Energy Efficiency Science & Technology Co., Ltd.	数字化电厂及移动通讯基站空调节能改造 Energy Efficiency Retrofits of Digitalized Technology in Power Plant and AC system in Mobile Base Station	170,000	100,000	14,706
4	广州智光节能有限公司 Guangzhou Zhiguang Energy Conservation Co., Ltd.	大功率变频调速系统在高压电动机上的节能应用 Promote variable speed controllers of large power on HV motors	75,000	50,000	7,352
5	博创机械股份有限公司 Borch Machinery Co., Ltd.	高速节能全自动塑料成型机技术的推广 Promote energy efficient BS series injection molding machines	102,000	37,000	5,441
合计 / Total			522,870	292,000	42,940

汇率：1美元=6.8元人民币 Exchange rate of RMB to US dollar is at 6.8

2011年6月13-14日，第三批项目北京谈判在亚行驻北京代表处举行，并签署《贷款协议》及《项目协议》谈判草案

On 13th -14th June 2011, Loan negotiation of EPP Program-Tranche 3 was held in ADB PRC Resident Mansion, Beijing, later draft Loan Agreement and Project Agreement were signed.



图1



图2



图3

图1/ 第三批项目谈判代表合影留念 Officials in the Tranche 3 loan negotiation

图2/ 签订第三批《贷款协议》及《项目协议》草案 Tranche 3 Draft Loan and Project Agreements were signed

图3/ 举行第三批子项目《贷款合同》及《项目合同》签约仪式 >> 广州，2012.3 Hosted signing ceremony of Subloan and Subproject Agreement of EPP Program-Tranche 3 >> Guangzhou, March, 2012



图4

图4/ 首个利用亚行贷款循环资金的子项目——广东嘉和微特电机与项目执行中心、粤财信托签约  
The first Sub-borrower using revolving fund of EPP Program—Guangdong Jiaye Micromotor Co., Ltd signed Sub-agreements with EPP-PMO and GFTC respectively.

### 循环资金项目

第一批子项目于2010年8月偿还第一笔本金，可作为循环资金继续使用。2011年6月23日，举行了首个循环资金子项目签约仪式，标志着亚行贷款资金正式进入循环使用阶段。今后随着前三批项目不断按期偿还本金，循环资金项目将在整个贷款期内不断循环开展。

### REVOLVING LOAN PROCEEDS SUBPROJECTS

In August 2010, the first principal payments from sub-borrowers of Tranche 1 were recovered, and the

repaid proceeds would be further lent to other applicants as the revolving fund. On 23<sup>rd</sup> June 2011, signing ceremony of the first subproject using revolving fund was held, marking the beginning of using revolving fund to support more EPP subprojects. As the principal of the three tranches loan will be repaid subsequently, more funds will be revolved during the terms of EPP Program loan.



# 项目实施

## IMPLEMENTATION

亚行1亿美元的贷款资金支持了3批共19个子项目，各批项目实施顺利。在项目执行中心的监督下，每个子项目均由独立第三方测评机构根据《广东能效电厂项目节能量测量及确认手册》对其节能效果进行测量及确认。三批项目在实施后，陆续偿还贷款并形成亚行贷款的循环资金，在15年贷款期内不断支持更多的节能减排项目的开展。

Total ADB loan of 100 million USD altogether has supported 19 subprojects of three tranches. Each tranche is implemented smoothly. Supervised by EPP-PMO, energy savings of each subproject would be measured and verified by the third party M&V agencies in accordance with GD EPP Program Energy Savings

M&V Handbook. The principal and interest subsequently repaid by the sub-borrowers will be revolved and relented to other new energy efficiency subprojects within the loan term of 15 years.

第一批项目的8个子项目涵盖变频改造、余热回收、锅炉改造、变压器改造、无功补偿和电网节能等内容。

Tranche 1 of EPP Program involves eight subprojects, covering variable speed control retrofit on motors, waste heat recovery, industrial boiler retrofit, transformer retrofit, reactive power compensation, and power grid efficiency.

### 实例介绍

#### SUBPROJECT CASES

广州智光电气股份有限公司对广东顺德五沙热电有限公司的两台300MW亚临界火力发电机组的一次风机、引风机、凝结水泵、脱硫增压风机进行了高压变频改造。

Sub-borrower Guangzhou Zhiguang Electric Co. Ltd. carried out HV variable speed control retrofit on primary fan, induced fan, condensate pump, desulfurization booster fan of two 300MW subcritical thermal power generating unites in Guangdong Shunde Wusha Thermal Power Station.



▲五沙热电外景 Wusha Thermal Power Station

◀智光生产的高压变频器  
HV Variable Speed Controller manufactured by Zhiguang Electric Co. Ltd.



广东海鸿变压器有限公司为广东电网及用电大户更换节能型变压器

Guangdong Haihong Transformer Co. Ltd. conducted transformer retrofits for Guangdong power grid and many other energy intensive users.

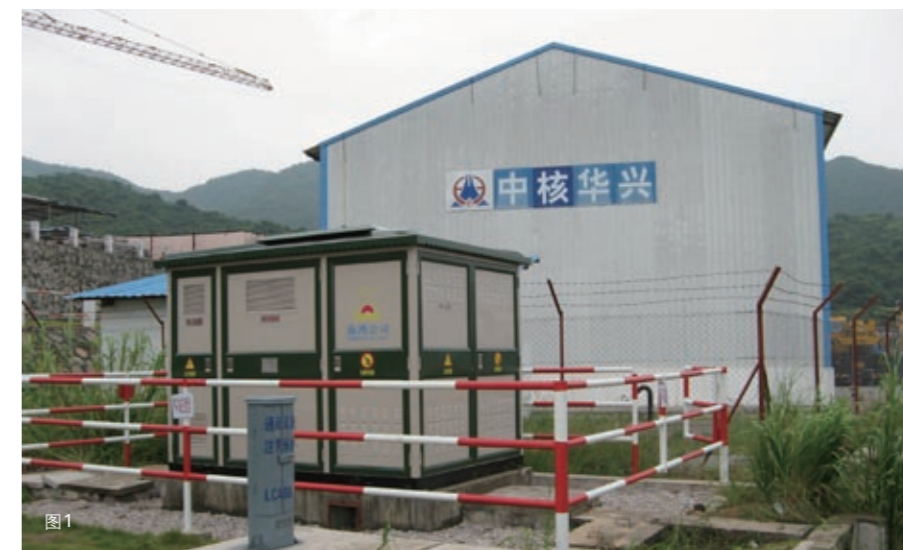


图1

图1/ 广东海鸿变压器有限公司在大亚湾核电站的变压器改造项目  
Guangdong Haihong Co. Ltd. conducted transformer retrofit in Daya Bay Nuclear Power Plant

图2/ 海鸿变压器安装现场  
Installing a transformer



图2

图3/ 现场维护  
Maintaining the equipments



图3



图4

广东中钰科技有限公司对清远、惠州等地区电网系统安装了负荷控制配变监控设备，对变电站进行数字化改造

Sub-borrower Guangdong Zhongyu Technology Co. Ltd. has successfully installed load control distribution transformer monitoring terminals on the power grid system in Qingyuan and Huizhou to improve energy efficiency of the network system.

图4/ 广东中钰科技有限公司生产的配变监控设备  
Distribution Transformer Monitoring Terminal of Guangdong Zhongyu Technology Co. Ltd.



图5

图5/ 广东中钰科技有限公司开展的茂名文冲口数字化变电站项目  
Digital Transformer Station Project in WenChongKou, Maoming of Guangdong Zhongyu Technology Co. Ltd.





珠海查理科技节能环保有限公司对广东美芝精密制造有限公司等企业的锅炉进行了升级改造。

Sub-borrower Zhuhai Charlie Technology Energy Saving Co. Ltd. carried out industrial boiler retrofit for Guangdong GMCC Precision Manufacturing Co. Ltd.



广东韶钢松山股份有限公司烧结厂环冷机余热回收利用技术改造工程的已于2011年3月完工。

Sub-borrower Guangdong SGIS Songshan Co. Ltd carried out waste heat recovery project from annular cooler in its sintering factory. The Project was completed in March, 2011.



图1/ 已完工的烧结余热回收利用技术改造项目  
Waste Heat Recovery Project was completed

图2/ 韶钢烧结余热回收利用技术改造项目中控室  
Control Center of Waste Heat Recovery Project



珠海华力通特种变压器有限公司的生产车间及产品  
Workplace and products of Zhuhai Secpower Transformer Co., Ltd.



广州金关公司开展的台泥（英德）有限公司的水泥熟料生产线大型风机变频节能技术改造工程  
Guangzhou G.K. Energy Services Co., Ltd installed variable frequency drives on a large fan system in the Cement Clinker Production Line of TCC (Yingde) Co., Ltd.



第二批项目的6个子项目涵盖电网改造、熔铝炉改造、太阳能光伏发电、LED路灯改造、变压器改造等方面。

Tranche 2 of EPP Program includes 6 subprojects, covering retrofit in fields of power grid, aluminum melting furnace industry, transformers upgrade, as well as photovoltaic power plant, and LED road lamp.



珠海兴业绿色建筑科技有限公司：东澳岛1MW风光柴蓄智能微电网项目  
Zhuhai Singyes Green Building Tech. Co. Ltd.: Dongao Island Smart Micro-Grid Project with a capacity of 1MW



图1/ 珠海兴业绿色建筑科技有限公司：深圳万科中心太阳能光伏一体化项目  
Zhuhai Singyes Green Building Tech. Co. Ltd.: Shenzhen Vanke Building Photovoltaic Roofing



图2/ 广东昭信灯具有限公司：大功率LED路灯照明工程佛山魁奇路段  
Guangdong Real Faith Lighting Co. Ltd. LED Street Lamp Project in Kuiqi Road, Foshan



图3/ 佛山扬戈炉业有限公司在亚洲铝业有限公司开展的蓄热式熔铝炉改造项目  
Foshan Younger Furnace Co., Ltd. Installed Heat Storage Aluminum Melting Furnace for Asia Aluminum Co., Ltd.



图4/ 江门大光明变压器有限公司生产车间：真空干燥注油工艺  
Workplace of Jiangmen Daguangming Transformer Co. Ltd.: Vacuum Oiling Process

# 能力建设

## CAPACITY BUILDING

为扩大宣传，并不断从技术、财务、管理等方面加强项目管理机构及子项目单位的能力建设，项目执行管理部门不定期组织了多次免费培训及研讨会。

In order to regulate subprojects management, as well as publicize EPP Program, executing agency has organized various free of charge

workshops and trainings in terms of technical, financial and policy management.



图1



图2



图3

图1/ 举办第一批子项目管理培训>> 广州, 2008.6 Tranche-1 Sub-borrower Training>> Guangzhou, June 2008

图2/ 举办能效电厂融资研讨会>> 广州, 2009.1 Financing for Energy Efficient Projects Forum>> Guangzhou, Jan.2009

图3/ 举办子项目管理培训会>> 清远, 2009.12 Sub-borrower Training>> Qingyuan, Dec. 2009





图1/ 2010年7月举办财务管理培训会 >> 广州, 2010.7  
Sub-borrower Financial Management Training >> Guangzhou, Jul, 2010



图2/ 2010年12月在广州举办节能技术及测评培训会 >> 广州, 2010.12  
Sub-borrower Training on Energy Efficiency Technologies and Measurement & Verification >> Guangzhou, Dec. 2010

图3/ 举办项目经济与财务评价及采购、法律专题培训暨研讨会 >> 广州, 2011.4  
Training on Energy Project Economic and Financial Analysis, Procurement and Legal Requirements >> Guangzhou, Apr. 2011



图3  
在项目实施期间，能效电厂各有关部门不定期召开工作会议，讨论项目执行中出现的问题，并研究制定解决方案。

EPP Steering Committee and EPP-PMO hold workshops and meetings from time to time to discuss the problems existed and search for corresponding solutions during the implementation.



图4/ 2010年8月在广州召开工作会议  
Aug. 2010, Steering Committee Workshop in Guangzhou



图5/ 2010年10月在佛山召开工作会议  
Oct. 2010, Steering Committee Workshop in Foshan

# 效益及展望

## BENEFITS AND PROSPECTS

### 项目效益

#### 节能减排效益

经可行性研究分析的保守估计，1亿美元的贷款仅使用一次（不考虑资金循环使用的效益），则年节电量可达6.26亿千瓦时，相当于新建一个装机容量为12.5万千瓦的火力发电机组的年发电量。其节电量相当于节省标煤20.6万吨/年，同时每年可减少排放二氧化碳48.8万吨、二氧化硫5632吨、氮氧化物1251吨、总悬浮颗粒物2096吨。由于亚行贷款可在15年内供广东省循环使用，预计资金至少可循环使用3次，其节能减排效益将倍增。

截至2011年底，经独立第三方测评机构对已经实施的前两批项目的实际节能进行测评，已经获得的年节能减排能力已经超出三批项目的节能减排能力的预期值总和。

#### 宏观效益

- 有利于加强能源安全、提高能效、改善环境
- 引进国外成功经验和成熟模式，结合国情，创造了可以持续的可复制的节能减排项目推广模式。目前其他省份和地区已经开始借鉴广东省能效电厂的模式开展节能减排项目。
- 推动了合同能源管理的发展，巩固了一批能源服务企业的发展方向，也培养了一批新型能源服务公司。
- 促进经济发展、扩大就业、有利于减贫，有助于全省经济又好又快发展
- 提高了政府部门以及企业在节能减排项目方面的能力建设
- 有利于促进节能新技术的推广和应用
- 有助于更好地宣传推广节能减排项目，有利于提高社会各界节能减排

- 意识。
- 有利于更多促进节能减排政策的出台
- 有利于开辟节能减排项目新的融资渠道

### BENEFITS

#### ENERGY EFFICIENCY AND EMISSION REDUCTION BENEFITS

Feasibility study conservatively estimates that if the \$100 million of EPP Program is used only once (without considering revolving funds), the energy savings will reach 626GWh, equivalent to annual electricity generated by a coal-fired power generating unit with an installed capacity of 125MW. The implementation of EPP Program will avoid consumption of 206,490 tons of equivalent coal per year, and bring emission reduction of CO<sub>2</sub> 488,068 t/y, SO<sub>2</sub> 5,632 t/y, NO<sub>x</sub> 1,251 t/y, Total Suspended Particles 2,096 t/y. If the total loan proceeds revolved by three times, there will be even more benefits of energy savings and emission reductions will be even more.

By end of 2011, energy savings and emission reduction capacity of the first two implemented tranches, which was measured and verified by the third-party M&V agency, has exceeded the originally estimated total capacity of the three tranches combined.

#### MACRO BENEFITS

- Conducive to improvement of energy security, energy efficiency and environmental conditions
- Brought in matured international experiences and models, associate with state conditions, created a sustainable and replicable model to promote energy efficient project. EPP Program model is now learned by other provinces in China.
- Promoted development of EMC, strengthened and developed ESCO in China
- Employment expanded and poverty reduced, conducive to a sustainable economic growth
- Improved both government and companies capacity to carry out energy efficiency project
- Conducive to promote energy efficiency technologies
- Conducive to promote energy efficient projects, waken up energy efficiency awareness of people from all walks of life
- Conducive to make policies beneficial to energy efficiency
- Conducive to develop financing channels for energy efficient projects



## 广东亚行贷款能效电厂项目的减排效益表 Benefits of EPP Program

预期效益 Anticipated Benefits	第一批项目 1 <sup>st</sup> Tranche	第二批项目 2 <sup>nd</sup> Tranche	第三批项目 3 <sup>rd</sup> Tranche	全部贷款仅使用 一次 (1亿美元) \$100million used once
贷款金额(百万美元) ADB Loan (\$million)	35	22.06	42.94	100
节省标煤 (吨/年) Standard Coal Savings(t/y)	84,547	28,842	93,101	206,490
<b>减排量 (吨/年)</b>				
二氧化碳 (CO <sub>2</sub> )	199,840	68,171	220,057	488,068
二氧化硫 (SO <sub>2</sub> )	2,306	787	2,539	5,632
氮氧化物 (NO <sub>x</sub> )	512	175	564	1,251
总悬浮颗粒物 (TSP)	858	293	945	2,096
年节电量 Electricity Savings (MWh/year)	256,205	87,399	282,124	625,728
相当于装机容量 Equivalent Installed Capacity(MW)	51.2	17.5	57	125

### 前景展望

当前，能源紧缺、气候变化已经成为全球共同关注的问题，也直接影响到经济的可持续性发展。中国已对国际社会做出了“到2020年，单位GDP二氧化碳排放比2005年下降40%-45%”的承诺。根据我国的能源结构，在今后很长一段时间内，节约能源都将是实现二氧化碳减排目标最重要的手段。

面对“十二五”严峻的节能形势，广东省将认真贯彻节约资源的基本国策，继续加大产业结构调整力度，进一步推动技术节能及管理节能。能效电厂项目将继续鼓励工商企业及公共机构开展节能改造工作，以扶持能源服务公司的发展、促进节能新工艺新技术新产品的大力推广应用、完善节能项目管理为主要方向，为促进我省“十二五”乃至“十三五”节能减排工作的开展尽最大力量。

随着中国及广东省在节能减排方面政策法规及限额标准的不断完善、各种扶持政策及细则的出台、节能奖惩力度的不断加大，都将有力推动能效电厂项目的持续开展。该项目将为推进全省及全国节能减排工作起到良好的示范作用。

### PROSPECTS

Energy shortage and climate change have become a globe issue, which also directly affect economic sustainable development. China has committed to the world community to reduce CO<sub>2</sub> emission per Unit GDP by 40%-45% of 2005 levels by 2020. Considering energy consumption structure of our country, energy conservation will still be essential for reaching the goal of CO<sub>2</sub> emission reduction for a long time.

Confronted by the challenging energy conservation task of 12<sup>th</sup> FYP, Guangdong will duly carry forward the national policy of resource conservation, further enhance industry structure upgrading, and promote technical and management energy conservation. GD EPP Program will continue to encourage energy efficiency retrofits in industrial and commercial sectors, with main directions to support development of ESCOs, promot new energy efficiency

crafts, technologies and products, and improve energy efficiency project management, for the purpose to devote our best efforts to improving energy efficiency during 12<sup>th</sup> and 13<sup>th</sup> FYP.

China and Guangdong continuously improve energy efficiency policies and consumption standard, issue various supporting regulations and rules, and enhance incentives and penalties. Those policies and measures will effectively promote the implementation of EPP Program, which in turn will contribute to piloting national and provincial energy efficient projects.



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