

ADB Guangdong Energy Efficiency and Environment Improvement Investment Program

A Prototype Efficiency Power Plant

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ADB in Brief

- Founded in 1966
- Goal is an Asia Pacific free of poverty
- 67 member countries – 48 regional, 19 non-regional
- HQ in Manila, 29 resident missions, 3 rep offices
- Provides loans, grants, TA, equity, policy dialogue
- In 2017 ADB provided ~ \$20 B of assistance with own funds, total with co-financing > \$30 B
- Targeting \$3 Billion in clean energy / climate change mitigation financing in year 2020

2017 Operational Highlights

Energy Sector Lending

In \$ million		CWRD	EARD	PARD	PSOD	SARD	SERD	Total
Total		1,054.76	499.00	67.90	1,409.95	1,191.00	1,000.00	5,222.61
Climate Financing	Mitigation	63.96	199.00	67.04	844.45	559.20	302.35	2,036.00
	Adaption	10.80	0.00	0.00	0.00	2.00	0.00	12.80
	Total	74.76	199.00	67.04	844.45	561.20	302.35	2,048.80

- Total approvals in the Energy Sector in 2017 amounted to **\$5.22 billion** including **\$1.41 billion** from PSOD (27% of total energy sector lending)
- Total climate mitigation finance approved in the sector in 2017 amounted **\$2.04 billion** including **\$0.84 billion** from PSOD (or 41% of the total climate investments)

Energy Sector Achievements

Clean Energy Program - Implementation progress

Indicator	Unit	2010	2011	2012	2013	2014	2015	2016	2017
Investment amount	\$ billion	1.58	2.10	2.06	2.05	1.91	2.31	2.11	2.04
Additional installed capacity using RE	GW	1.46	0.87	2.46	1.39	2.06	0.62	2.06	1.56
CO2 emission reduction	million tons/year	13.17	13.68	15.98	7.06	9.00	21.85	13.49	11.78
Electricity savings	TWh/year	33.79	3.29	0.87	1.99	0.070	4.48	4.69	0.74
Renewable electricity generation	TWh/year	4.78	3.30	4.91	5.22	5.93	1.48	4.62	4.80

Guangdong EE Investment Program

- 2008 ADB Board Approval
- \$100 Million Loan from ADB Ordinary Capital Resources
- \$142 Million total investment targeted
- Efficiency powerplant (EPP):
 - Multiple end-use and mid-use efficiency subprojects
 - 107 MW → \$132 Million / MW
 - 532 GWh per year → \$18 / MWh (\$0.018/kWh)
- 1st of a kind investment in Guangdong and for ADB
- Pilot / prototype for replication in Guangdong and other provinces

Rationale

- Guangdong 2007 power generation capacity 59.3 GW
 - +75% from coal
 - 100% of coal imported
 - 20% of total electricity supply imported
- Improve energy security
- Reduce pollutant emissions including CO₂
- Energy intensity low vs. other provinces, but high vs. international benchmarks
- *New business model*: Nega-watts vs. megawatts

Policy Approaches / Options

- (i) Fully integrate EPP into power reforms, EPP-related costs included in electricity prices, in parallel with other reforms to encourage energy efficiency.
- (ii) Partially integrate EPP into power reform, EPP-related costs paid with public benefit funds collected through a small uniform system benefits charge applied to electricity prices.
- (iii) EPP is government function with a government agency or a public company designated for implementing energy efficiency subprojects that are bundled into an EPP.
- (iv) EE subprojects, investments, and loan repayments are aggregated with a government agency assuming the responsibility to implement the EPP, but participating consumers are responsible for their pro rata share of costs.

Both options involve resetting electricity tariffs, which were not within the control of the provincial governments.

Requires considerable budget resources although benefits will mostly accrue to the participating consumers.

Preferred option plus a complementary program to attract consumers to participate in the EPP.

Barriers / Challenges

- Retrofits involve numerous relatively small investments (subprojects) with short implementation periods of a few months
- End users do not expand production or develop new products, i.e., no additional revenue (only savings)
- Commercial banks lack the understanding of energy efficiency technologies and benefits (e.g., savings are not revenue)
- Payback period of subprojects is short - generally less than 5 years.

Financial intermediation needed to service a large number of relatively small transactions

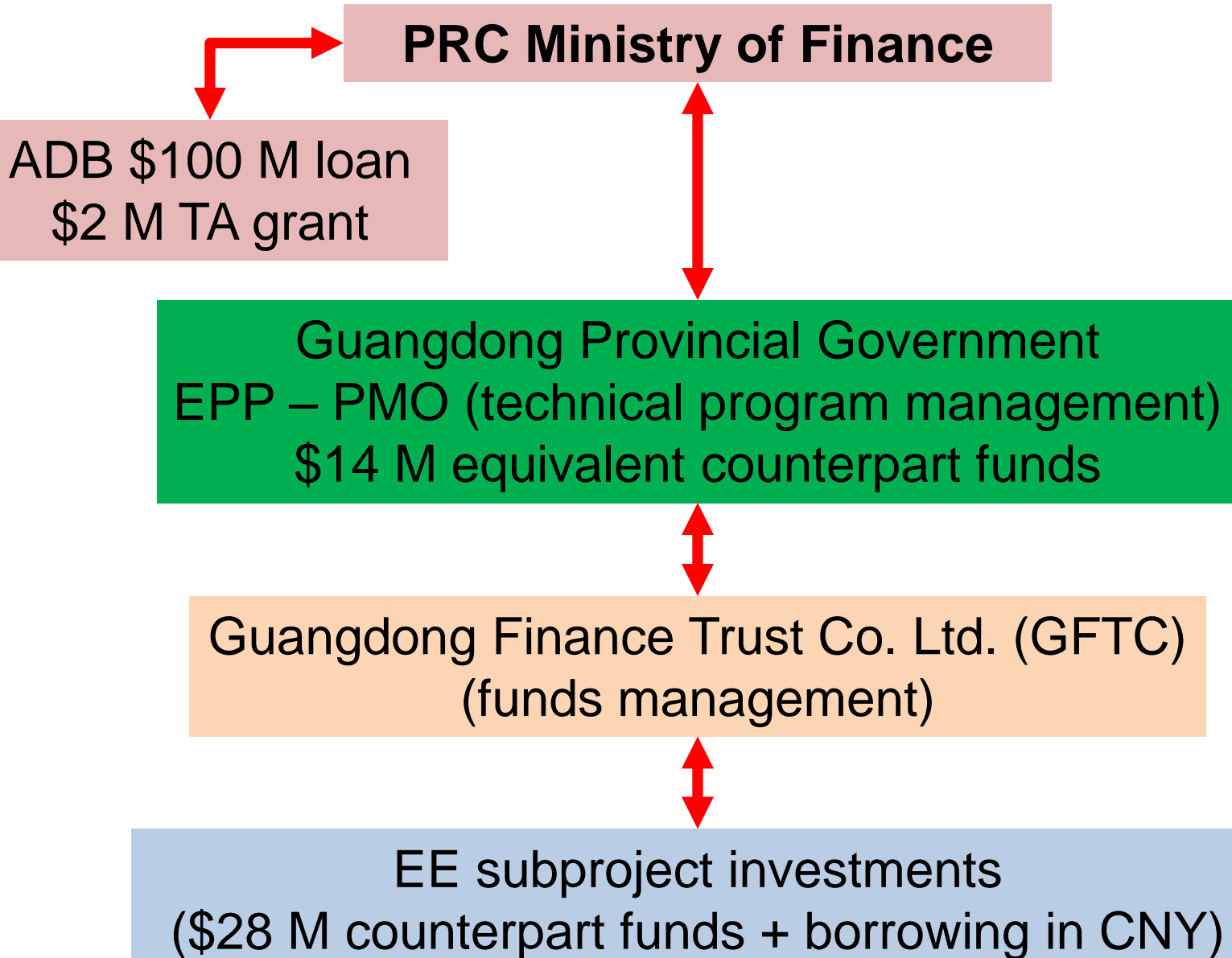
Technical Scope

Limited to retrofits of proven EE technologies in 7 technology areas:

- motors and motor-drive systems
- transformers and reactive power compensators
- lighting
- heating, ventilation, and air conditioning
- air compressors and pumping systems
- recovery of waste energy from industry
- industrial boilers and industrial cogeneration

Other related energy efficiency improvement projects could be considered

Program Organization and Funds Flow (simplified)



Guangdong Efficiency Power Plant Onlending Model

Fund Flow

Asian Development Bank

Repayment ↑ ↓ Lend

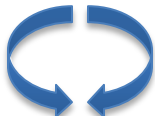
Ministry of Finance

Repayment ↑ ↓ Relend

Guangdong Prov'l Finance Bureau

Trust distribution ↑ ↓ Establish a trust

Guangdong Finance Trust Co. Ltd.

Repayment  Subloans from trust

Subborrowers
(direct borrowing end users and middle users)

Repayment ↑ ↓ Suppliers' credit

End-users through borrowing middle users

Project Management

Efficiency Power Plant Steering Committee
(Reps from Prov'l Economic and Trade Commission, Dev't and Reform Commission, Finance Bureau, and State Asset Supervision and Administration Commission)

Policy directions and decisions


Guangdong Efficiency Power Plant PMO

Subloan information and decisions
Technical parameters for energy savings

Third Party Savings

Guangdong Energy Efficiency Funds

Incentives

→ Fund flow - - -> Information flow  Fund being recycled

Note: Energy efficiency savings will be based on actual electricity savings measured

Project Outputs and Outcomes

Parameter	Target	Achieved
EPP capacity	107 MW	242 MW
Annual energy savings	533 GWh	1212 GWh
Energy cost savings	\$42.6 M/y	\$117 M/y
Total investment	\$142 M	\$215 M

Source: Project Completion Reports, 2013, 2014, 2015

Expected vs. Actual Coal and Pollutant Reductions (tons/year)

Parameter	Target	Achieved
Coal	175,813	399,891
Carbon dioxide (CO ₂)	415,560	945,196
Sulfur dioxide (SO ₂)	4,795	10,906
Nitrogen oxides (NO _x)	1,066	2,424
Total Suspended Particulates (TSP)	1,785	4,241

Source: "Targets" from RRP; "Achieved" Project Completion Reports, 2013, 2014, 2015

Project Outputs and Outcomes

Development of energy service company sector in Guangdong Province.

- Extended direct financing support to two ESCO subborrowers and two other subborrowers established own ESCO arms

Promotion and assessment of energy efficiency projects.

- Seminars, workshops on EPP project modalities, CDM, and financing opportunities for energy efficiency projects

Replication of the EPP model.

- Successful experience provided demonstration effect

Example Follow-on Investments

- ADB. 2011. *Report and Recommendation of the President to the Board of Directors: Proposed Loan for the People's Republic of China for Shandong Energy Efficiency and Emission Reduction Project*. Manila (Loan 2771-PRC, \$100.0 million, approved on 18 August)
- ADB. 2011. *Report and Recommendation of the President to the Board of Directors: Proposed Loan for the People's Republic of China for Hebei Energy Efficiency Improvement and Emission Reduction Project*. Manila (Loan 2835-PRC, \$100.0 million, approved on 14 December)
- ADB. 2015. *Report and Recommendation of the President to the Board of Directors: Proposed Loan for the People's Republic of China: Chemical Industry Energy Efficiency and Emission Reduction Project*. Manila (Loan 3308-PRC, \$100.0 million, approved on 30 October)

Example Follow-on Investments

- ADB. 2016. *Report and Recommendation of the President to the Board of Directors: Proposed Loan for the People's Republic of China for Shaanxi Accelerated Energy Efficiency and Environment Improvement Financing Project* (Loan 3474-PRC, \$150.0 million, approved on 28 November)
- Beijing-Tianjin-Hebei Air Quality Management program, FI loans approved in 2016 (\$500 M) and 2017 (\$500 M)

Success Factors

- Government ownership and willingness to implement first-of-a-kind investment operation with ADB
- Learning by doing: technical assistance / capacity building “wrapped around” investments
- Application of international best practices with limited technology scope → good potential for large energy savings and quick return on investment
- Learning effects: quick results in early implementation carried over to later stages
- Revolving loan arrangement allowed for more subprojects than originally expected → more megawatts

THANK YOU!

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