



Global Environment Facility

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May 21, 2001

Dear Council Member:

Re: Proposed Restructuring of China: Renewable Energy Development Project

The World Bank has informed us that, in agreement with the Government of China, it plans to restructure the China Renewable Energy Development Project. This project was approved by Council in May 1998.

The restructuring would delete three wind farms, totaling 170 MW, from the project due to difficulties related to electricity purchase agreements and counterpart financing arising from the restructuring of the State Power Corporation of China. The off-grid PV market development component, associated technology improvement activities and wind farms in the coastal region are unaffected by this restructuring. The Bank's analysis suggests that the project can still achieve significant global environment benefits. The Bank has carried out detailed discussions with the Government of China and its agencies to restructure the project given the current institutional and policy constraints wind power faces in China. In our view, this justifies continuing GEF support for it, albeit on a smaller scale than originally planned.

The total GEF grant will be reduced from \$35 million to \$27 million and the total project cost from \$445 million to \$205 million. Because the World Bank is only financing the wind-power component of the project, which is being reduced from 190 MW to 20 MW, World Bank financing would drop from \$100 million to \$13 million. The recently-approved World Bank/GEF China Renewable Energy Scale-up Program (CRESP) is specifically intended to address the institutional and policy barriers that led to the need to restructure the Renewable Energy Development Project (REDP). These barriers could not be addressed within the scope of the REDP, but require a long-term policy-oriented approach that will occur under CRESP. Further details are provided in the attached memorandum from the World Bank.

Please provide any objections to this restructuring by June 12, 2001.

Sincerely,

Mohamed T. El-Ashry
CEO & Chairman

Attachment

OFFICE MEMORANDUM

DATE: May 1, 2001

TO: Lars Vidaeus, GEF Executive Coordinator, ENVGM

FROM: Yoshihiko Sumi, Sector Director, EASEG

TENSION: 82880

SUBJECT: **Restructuring the China Renewable Energy Development Project
(CN-PE-46829 and CN-GE-38121)**

This note seeks your assistance in obtaining formal approval from the Global Environment Facility to restructure the China Renewable Energy Development Project (REDP), as summarized in this memorandum and detailed in Attachment 1. Agreement was reached with the Government of China on the proposed changes during a Bank supervision mission in April 2001. The proposed changes were discussed with Messrs. Alan Miller and Eric Martinot (GEF), and with Mr. Robin Broadfield (EASES), and they expressed their support.

As you know, the Bank's Executive Directors approved a loan of \$100 million and a GEF grant of \$35 million for the REDP on June 8, 1999. The project as approved has three components: windfarms for on-grid electricity production; photovoltaic (PV) market development for off-grid electrification; and technology improvement for wind and solar technology (TI). The Bank loan was to help finance the windfarms. Of the GEF grant, \$22 million was for the PV component, \$10 million for the TI component and \$3 million for the windfarm component.

The deadline for signature of the project legal documents was extended to June 8, 2001 but they have not yet been signed. Signature of the agreements was delayed because events subsequent to and unforeseen at appraisal have created difficulties for the windfarms at Huitingxile, Zhangbei and Pingtan. They relate to the electricity purchase agreements, counterpart financing and environmental compliance. These difficulties arose mainly from the restructuring of State Power Corporation of China, which aims to break up large regional grids such as the North China grid into provincial grids. The break-up into smaller provincial grids meant that the impact of high windfarm prices was greater, as costs could not be spread over the regional grids. This created difficulties in concluding PPAs with the provinces, especially for the large windfarms in the REDP.

These difficulties highlight the need for a national policy framework to support the development of windpower and renewable electricity, and to spread incremental costs as broadly as possible, as power sector reform proceeds. The GOC is beginning to address this issue by proposing to introduce a mandated market share for renewable electricity and trading among provinces, in the energy 10th Five Year plan, and by developing windfarm concessions. The policy framework will be supported by the proposed World Bank/GEF China Renewable Energy Scale-up Program (CRESP), under the Strategic Partnership for Renewable Energy.

Nevertheless, the REDP rationale remains largely justified. There remain: (i) a need for access to electricity for rural households, in Qinghai, Gansu, Inner Mongolia, Xinjiang and Xizang; (ii) a need for a means by which China can start to reduce its reliance on coal; and (iii) inadequate financing of power infrastructure, especially private investment. Although some restructuring is necessary, the project can still contribute to these objectives.

The revised project development objective would be "development of a sustainable market for PV technologies and demonstration of the viability of commercial wind development in the coastal regions". It is proposed that the components be restructured as follows:

Windfarm Component. The Huitingxile, Zhangbei and Pingtan windfarms, totaling 170MW, would be deleted from the project and the associated IBRD loan amount of \$87 million would be canceled. The restructured component would consist of the windfarms at Chongming and Nanhui in Shanghai, totaling 20MW and utilizing an IBRD loan of \$13 million. It is proposed to reduce the GEF grant for this component to \$1.5 million, which would be used to support the Shanghai windfarm company and private sector development of windfarms in coastal regions. The implementing agency for the component, including TA, would be changed to the Shanghai Municipal Electric Power Corporation (SMEPC).

PV Market Development Component. This component, which addresses the need to provide modern energy to isolated rural households in Northwestern China, would remain unchanged with a GEF grant of \$22 million.

Technology Cost Reduction and Quality Improvement Component. The elements of the TI component related to PV would be retained, while those related to windfarms would be deleted from the project and the related amount of the GEF grant canceled. The GEF grant amount to be canceled is \$6.5 million, leaving a total of \$3.5 million to support PV related TI.

We believe that the restructured project would contribute to establishing a sustainable market for renewable energy in China and achieve significant global environment benefits. The Shanghai windfarms would demonstrate the viability of windpower in China's coastal regions, where wind resources are very good and costs of conventional alternatives high. The GEF supported TA on windfarms would contribute to China's efforts to develop new mechanisms to attract private investment, such as concession agreements, and prepare the way for the further joint efforts between the Bank, GEF and GOC under the proposed China Renewable Energy Scale-up Program. The PV and TI components would strengthen and accelerate growth in one of the largest and most dynamic markets for household scale systems in the world, centered in Northwestern China. GEF cost effectiveness and leverage for the project are set out in the table below. For comparison, the original project is included.

GEF Cost Effectiveness Data, Original and Restructured Project

	Original	Restructured
Total project cost (\$million)	444.1	205.4
GEF grant (\$million)	35.0	27.0
Leverage (total/GEF)	12.7	7.6
CO2 Abatement (Mt)	6.2	3.9
Cost effectiveness (\$/t CO2)	5.7	6.9

The proposed adjustments require modification of the Grant Agreement. We would appreciate your assistance in obtaining GEF approval for these changes before we agree them with the Government of China.

Messrs./Mmes. Berrah, Bogach, Cabraal (EASEG); Huang, Sun, Zhao (EACCF) Spencer (INFEG); Broadfield (EASES); Nguyen (LEGEA), Garstang, Heijndermans (Consultants)

Attachment 1
China: Renewable Energy Development Project
Restructuring of the Project
(CN-PE-46829 and CN-GE-38121)

A. SUMMARY

The Renewable Energy Development Project (REDP) is to be restructured. The revised project objective would be 'Development of a sustainable market for PV technologies and demonstration of the viability of commercial wind development in the coastal regions'.

The restructured project would consist of:

- A windfarm component consisting of two wind farms in Shanghai totaling 20 MW to be owned and operated by a wind farm company. Associated technical assistance, for the wind farm company and to support further wind development would also be included, for a total component cost of \$24.75 million;
- The photovoltaic (PV) market development component would remain as originally designed, with the objective of providing 10MWp of equipment along with technical assistance, with a total component cost of \$155.9 million;
- The technology cost reduction and quality improvement (TI) component would support only PV investments and related technical assistance for a total component size of \$24.8 million.

The implementing agency for the windfarm component would be changed from State Power Corporation of China (SPCC) to Shanghai Municipal Electric Power Corporation (SMEPC). The PV and TI components are ready for effectiveness. The wind component will be ready for effectiveness when the special purpose wind farm company is formed as a subsidiary of SMEPC.

Amendments to the Loan, Project and Grant agreements, to accommodate the restructured projects have been incorporated in a new set of draft agreements. The Bank is now seeking clearance for the restructured project from GEF and its Board.

B. INTRODUCTION

REDP is the first World Bank-GEF renewable energy project in China. The project has three components: wind farm development including both investment and technical assistance (TA); photovoltaic (PV) solar home systems for off-grid electrification; and quality improvement and cost reduction for wind and solar technology, or technology improvement (TI). Its total cost of \$444.2 million was to be financed by a \$100 million IBRD loan and a \$35 million GEF grant, with the balance coming from a combination of domestic banks, participating companies and end users. The Bank loan was to finance construction of five wind farms: 100MW at Huitingxile in Inner Mongolia; 50MW at Zhangbei in Hebei; 20MW at Pingtan in Fujian; and 20MW at two sites in Shanghai, Chongming and Nanhui. Of the GEF grant, \$22 million was to be for the PV component, \$10 million for the TI component and \$3 million for TA under the wind component. Implementation of the PV and TI components was to be by the State Economic and Trade Commission (SETC) while the wind farm component was to be implemented by State Power Corporation of China (SPCC) and various provincial power companies.

The PV and TI components have been substantially ready for implementation for over a year. For the PV component, 17 dealers with operations in the target provinces of Gansu, Inner Mongolia, Qinghai, Sichuan, Xinjiang and Xizang have been selected and have received capacity building assistance in readiness for the project. They remain interested and eager for the project startup. There is an adequate number and variety of certified PV components available to meet demand. The PV management information system (MIS) is completed with only field testing and implementation to be carried out. The TI component and its associated MIS is ready for implementation.

The Shanghai authorities remain committed to the development of the windfarms planned for the Municipality. The other wind farms have, however, run into difficulties. At Huitingxile and Zhangbei, it has emerged that SPCC planned to dissolve the North China Power Grid (NCPG) which was to have been the buyer of the output from the windfarms. So far it has proved impossible to get agreement on a division of the offtake among the provincial power companies that will succeed NCPG. It has not been possible to obtain local counterpart financing for the windfarms at Zhangbei and Pingtan, owing to uncertainties about the power purchase price. At Pingtan, the Chinese authorities have raised concerns about the environmental impact of the windfarm under new, more stringent regulations concerning the removal of trees.

The project was originally approved by the World Bank's Board on June 8, 1999. In December 2000 the GoC requested an extension to the deadline for signature of the project documents to which, after investigation, the Bank agreed. The deadline for signature of the project documents is now June 8, 2001. In a letter to the World Bank Country Director on March 26 2001, the Ministry of Finance (MoF) requested that the wind farms at Huitingxile, Zhangbei and Pingtan be deleted and the Shanghai wind farms, and the PV and TI components be retained¹. As these delays were holding up the remainder of the project, a pre-signing restructuring was requested.

The purpose of this note is to propose changes to the project design and implementation arrangements following a mission in April, 2001 undertaken by Bank staff.

C. PROJECT DESIGN

In considering the restructuring options, a balance was struck between on the one hand cutting back the project so that those components which are ready for effectiveness can proceed and on the other achieving as much as possible of the original project objectives. The restructured project would build on the considerable capacity building that has taken place during preparation and in the period up to the request for restructuring.

The development objective of the project would be amended to read: 'Development of a sustainable market for PV technologies and demonstration of the viability of commercial wind development in the coastal regions'. This retains the original objective for the PV market but is less ambitious for the wind market.

In terms of components, the restructured project would:

- Reduce the wind farm component to include only the two wind farms in Shanghai totaling 20 MW and provide technical assistance to support the management of the wind farms and

¹ The development of the other windfarms at Huitingxile, Zhangbei and Pingtan may be considered later, for example under CRESF

technical preparatory work for further development of large coastal sites. A Bank loan of \$13 million and a GEF grant of \$1.5 million would be matched by a contribution of \$5.2 million from power companies, \$5 million from local commercial banks for a total component cost of \$24.7 million;

- Retain the PV component in its entirety, with a \$22 million GEF grant to support investment, market development and institutional strengthening. Cofinancing, largely from private sources, would amount to \$133.9 million;
- Reduce the TI component. The GEF grant of \$3.5 million would support investment in technology improvement in the PV industry and provide support for managing the program. Additional funds amounting to \$21.3 million would come from private sources, including commercial banks and from the State Economic and Trade Commission (SETC).

The key performance indicators, monitoring and evaluation methods have been amended and incorporated in the Project Design Summary which is attached at Annex 1.

D. JUSTIFICATION FOR CHANGES

Wind Component

Wind power continues to be important for China, with the renewable energy 10th Five Year Plan targeting 10,000 MW installed capacity by 2010. Nevertheless, sector reform and associated restructuring of power companies has made it difficult to find buyers for electricity from windfarms, as the experience with the Huitingxile and Zhangbei has proved. The impact of high prices for windpower is greater on the smaller provincial grids than on the regional grids. The delays and subsequent cancellation of the windfarms are in large part due to the uncertainties surrounding the restructuring of the power sector and because of inadequate government policies.

The Shanghai windfarms offer an opportunity to develop further the wind industry in China at this time. Shanghai Municipal Electric Power Corporation (SMEPC) with the support of the Shanghai municipal government and State Power Corporation of China (SPCC), has expressed a clear and firm intention to proceed with the wind farm project. This willingness stems from three factors:

- A strong commitment to the environment, in particular to reducing air pollution;
- The desire to be seen as a modern, cosmopolitan and 'green' city;
- A realization that wind power offers new business and industrial opportunities.

Shanghai is firmly committed to developing the wind farms. They are intended as highly visible demonstration projects, to provide evidence of the municipality's environmental objectives and as a way to start developing a wind equipment supply industry. As with the original structure, no GEF funding is sought for the investments.

In preparing the restructuring the economic analysis has been revised to take account of the reductions in the cost of wind equipment on the international markets over the past three years. It has also taken into consideration the increases in the average tariff paid to generation plant on the Shanghai grid. The project has an economic internal rate of return (EIRR) of 11.8% when local and global externalities are valued, an improvement in its economic viability when compared with the original justification. Another method of estimating the project's economic viability is to use the willingness to pay method. This takes into account Shanghai's declared

intention to meet the full cost for the wind-generated electricity. On this basis, the project has an NPV of zero and an EIRR of 12% (if the opportunity cost of capital in China is taken to be 12%).

The project is further justified for its demonstration effects. These effects extend beyond the proposed windfarms. There are three main reasons:

- Wind is likely to become the least cost solution on the highly populated eastern seaboard of China sooner than elsewhere. This is for two main reasons. First, avoided electricity costs are higher in these areas than elsewhere. For example in Shanghai, the avoided cost of electricity is about 4.4 US¢/kWh whereas in Inner Mongolia it is about 2.4 US¢/kWh. Second, the costs of local damage are higher in the more heavily populated areas: about 1 US¢/kWh in Shanghai as opposed to about 0.1 US¢/kWh in Inner Mongolia. As populations and incomes rise this figure will increase;
- There is a huge resource in the coastal areas of Shanghai, Zhejiang, Fujian, and Guangdong the exploitation of which offers somewhat different challenges from the large inland sites in Inner Mongolia, northern Hebei and further west, because wind regimes tend to be somewhat different and the sites tend to require more civil works. Hence separate demonstration activities are needed to support the development of a market in the coastal areas. Linking a demonstration in Shanghai to efforts to find sites with good wind resources comparable to the best inland sites offers good replication opportunities;
- The Shanghai windfarms will provide useful data points on costs of windfarms in coastal areas, based on prices achieved under international competitive bidding, and with commercial operating practices. REDP, together with the ADB-GEF wind power project provides the first opportunity to collect this information.
- Shanghai can be considered an “early adopter” in the innovation process. As such, assisting Shanghai develop its wind potential will have high payoffs by helping to reduce the perceived risks. Other provinces would be then more inclined to follow suit.

The TA has been adjusted to assist the wind farm company achieve best international practice and to support Shanghai in establishing the commercial potential of large coastal wind farms. The TA will leverage the demonstration effect of the wind farms. As with the original project, GEF financing is required to meet the incremental costs of the TA. Experience gained as a result of the TA is also expected to be useful for design and preparation of China Renewable Energy Scale-up Program (CRESP), which will entail similar activities among the pilot provinces.

PV Component

The PV component is unchanged and the justification remains the same as presented in the PAD, namely provision of modern energy to households living in isolated areas of Western China that would otherwise not benefit from these services. The GEF objectives are served by supporting accelerated growth of sustainable PV markets, that are already among the most dynamic markets for small systems in the world.

TI Component

The TI component is still vital to the objectives of reducing cost and improving quality of PV systems. The part of the TI component devoted to PV remains unchanged either in scope or level of funding. Thus the revised total of \$24.8 million is justified based on the PV-related share of the original estimates in the PAD. Original estimates for the activities for technology

improvement allocated 30% of the \$78 million of total investments, or \$23.4 million, for the PV activities, of which the GEF grant was to be a total of \$3.0 million. A share of the program management costs of \$1.6 million was nominally allocated to the PV component and is now made explicit at \$0.8 million, of which \$0.5 million would be GEF. GEF funding of \$3.5 million is required for incremental cost relating to this component.

E. IMPLEMENTATION ARRANGEMENTS

Windfarm Component

The changes to implementation for the wind component reflect the reduced role of State Power Corporation of China (SPCC) and the capacity of Shanghai Municipal Electric Power Corporation (SMEPC) to undertake both the investment and the TA aspects of the wind component.

For the investment in the wind farms, SMEPC would form a special purpose wind farm company. The wind farm company would be owned 35% by SMEPC, 33% by SPCC and 32% by Shanghai Power Investment Corporation (SPIC, a subsidiary of SMEPC). The proceeds of the Bank loan would be lent by MoF to SMEPC and guaranteed by SPCC. It would be on-lent to the wind farm company. The GEF grant for the TA activities will be made to and implemented by SMEPC. As SMEPC is currently implementing the Waigaoqiao Thermal Power Project (4197-CHA) satisfactorily, there is no requirement for re-appraisal of the new implementing agency.

The wind farms would be implemented under the Bank's guidelines for international competitive bidding (ICB) using the supply and installation of plant and equipment method. Detailed procurement arrangements will be worked out at a later date. The approach has been chosen because (i) it will allow equipment suppliers to provide alternative designs which take account of the rapid advances in equipment thus allowing a wider range of equipment suppliers to compete; (ii) it will allow the equipment supplier to install and commission the equipment, thus ensuring that warranties are maintained intact; and (iii) it will permit the windfarm company to manage the overall construction process, providing a learning and demonstration opportunity while keeping costs at a minimum. Using this approach is a departure from the original implementation plan, in which the much larger program of farm development was seen as a means of rapid cost reduction.

The implementation arrangements for the wind technical assistance have also been changed. The technical assistance for management of the windfarms will be provided through SMEPC to the windfarm company management. The technical preparation work, including resource measurement, for large coastal wind farms will be implemented by SMEPC, supported by local and international consultants as required. The implementation plan will include the creation of a visitor information center, both physical and virtual, to ensure that the information gained through the activity becomes publicly available to all potential wind farm investors.

The implementing agency for the PV and TI components will remain SETC. A Project Management Office (PMO) has been created under SETC to execute the work. In recognition of the reduced size of the TI component, the proposed program management effort has been reduced and simplified.

The monitoring and evaluation plan will be substantially unchanged compared with the original PAD.

F. COSTS AND FINANCING

The revised project costs are summarized in Table 1 below. Further details are presented in Annex 2.

Table 1: Cost and Financing Summary

Component	IBRD Funding (\$ million)	GEF Funding (\$ million equivalent)	Other Sources (\$ million)	Total (\$ million)
Windfarm				
Investment	13.0	-	9.4	22.4
TA	-	1.5	0.8	2.3
Subtotal	13.0	1.5	10.2	24.7
PV Market Development				
Investment	-	15.0	129.9	144.9
TA	-	7.0	4.0	11.0
Subtotal	-	22.0	133.9	155.9
Technology Improvement				
Investment	-	2.7	20.7	23.4
TA	-	0.8	0.6	1.4
Subtotal	-	3.5	21.3	24.8
Total	13.0	27.0	165.4	205.4

The incremental cost matrix for the restructured project is presented in Annex 3.

GEF cost effectiveness and leverage for the project are set out in Table 2 below. For comparison, the original project is included.

Table 2: GEF Cost Effectiveness Data, Original and Restructured Project

	Original	Restructured
Total project cost (\$million)	444.1	205.4
GEF grant (\$million)	35.0	27.0
Leverage (total/GEF)	12.7x	7.61x
CO2 Abatement (Mt)	6.2	3.9
Cost effectiveness (\$/t CO2)	5.7	6.9

G. AGREEMENTS TO BE REACHED WITH GOC

Changes will be made to the Loan Agreement, GEF Grant Agreement and the Project Agreement. A detailed list of the changes is in Annex 4. Broadly, the following changes will be required:

- The loan amount will be reduced to \$13 million and the grant amount to \$27 million. Amounts under different components and procurement categories will be changed. Permitted procurement methods will be amended;

- The scope of the wind component will be reduced to cover just Shanghai and the implementing agency for the wind component will be changed to SMEPC and the formation of the subsidiary wind farm company will become a condition of effectiveness. Financial covenants will be amended to apply only to the remaining wind farm company;
- The scope of the wind farm TA will be reduced to remove promotion of investments to the private sector;
- The scope of the TI component will be reduced to cover PV and PV-hybrids only;
- The closing date will be amended to 2007 to allow five years for the project to be implemented from the new signing date of 2001.

PROJECT DESIGN SUMMARY

Narrative Summary	Key Performance Indicators	Monitoring and Evaluation	Critical Assumptions																																				
<p>a. Sector-related CAS Goal: 1. Electricity supply increased in an environmentally sustainable way and access of isolated rural population to electricity services improved.</p> <p>b. GEF Operational Program: Promotion of the adoption of renewable energy by removing barriers and reducing implementation costs.</p>	<p>1. Avoided emissions (million tons) over plant lifetimes</p> <table border="1" data-bbox="540 357 854 480"> <tr> <td></td> <td>2000</td> <td>2006</td> <td>2009</td> </tr> <tr> <td>a. CO₂,</td> <td>11.1</td> <td>23.2</td> <td>38.6</td> </tr> <tr> <td>b. SO₂,</td> <td>1.57</td> <td>2.65</td> <td>4.41</td> </tr> <tr> <td>c. TSP</td> <td>0.076</td> <td>0.128</td> <td>0.213</td> </tr> <tr> <td>d. NO_x</td> <td>0.035</td> <td>0.072</td> <td>0.119</td> </tr> </table> <p>2. Installed cost of windfarms (\$/kW)</p> <table border="1" data-bbox="540 531 854 582"> <tr> <td></td> <td>2000</td> <td>2006</td> <td>2009</td> </tr> <tr> <td></td> <td>1150</td> <td>950</td> <td>900</td> </tr> </table> <p>3. Installed cost of PV systems (\$/Wp)</p> <table border="1" data-bbox="540 623 854 674"> <tr> <td></td> <td>2000</td> <td>2006</td> <td>2009</td> </tr> <tr> <td></td> <td>15</td> <td>13</td> <td>11</td> </tr> </table>		2000	2006	2009	a. CO ₂ ,	11.1	23.2	38.6	b. SO ₂ ,	1.57	2.65	4.41	c. TSP	0.076	0.128	0.213	d. NO _x	0.035	0.072	0.119		2000	2006	2009		1150	950	900		2000	2006	2009		15	13	11	<p>1. Project implementation reports and sector statistics.</p> <p>1.2 As above</p> <p>1.3 As above</p>	<p>(Goal to Bank Mission)</p> <p>1. Improved environmental awareness.</p>
	2000	2006	2009																																				
a. CO ₂ ,	11.1	23.2	38.6																																				
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<p>Project Development Objective: 1. Development of a sustainable market for PV technologies and demonstration of the viability of commercial wind development in the coastal regions.</p>	<p>1. Generation of wind electricity (GWh/year)</p> <table border="1" data-bbox="540 756 854 807"> <tr> <td></td> <td>2000</td> <td>2006</td> <td>2009</td> </tr> <tr> <td></td> <td>526</td> <td>887</td> <td>1478</td> </tr> </table> <p>2. No. of PV systems sold (000s)</p> <table border="1" data-bbox="540 827 854 878"> <tr> <td></td> <td>2000</td> <td>2006</td> <td>2009</td> </tr> <tr> <td></td> <td>50</td> <td>400</td> <td>600</td> </tr> </table> <p>3. Installed Capacity (MW)</p> <table border="1" data-bbox="540 899 854 981"> <tr> <td></td> <td>2000</td> <td>2006</td> <td>2009</td> </tr> <tr> <td>Wind</td> <td>300</td> <td>450</td> <td>750</td> </tr> <tr> <td>PV</td> <td>1.0</td> <td>12</td> <td>20</td> </tr> </table> <p>4. Number of component manufacturers that reach quality standards.</p> <table border="1" data-bbox="540 1073 854 1124"> <tr> <td></td> <td>2000</td> <td>2006</td> <td>2009</td> </tr> <tr> <td>PV</td> <td>20</td> <td>25</td> <td>30</td> </tr> </table>		2000	2006	2009		526	887	1478		2000	2006	2009		50	400	600		2000	2006	2009	Wind	300	450	750	PV	1.0	12	20		2000	2006	2009	PV	20	25	30	<p>1.1 Sector statistics</p> <p>1.2 Sector statistics</p> <p>1.3 Project monitoring survey</p> <p>1.4 Project monitoring survey.</p> <p>1.5 Project monitoring survey.</p>	<p>(Objective to Goal)</p> <p>1. Capacity installed and maintained according to industry standard.</p> <p>2. Continued support from concerned agencies for wind and PV technologies.</p>
	2000	2006	2009																																				
	526	887	1478																																				
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Wind	300	450	750																																				
PV	1.0	12	20																																				
	2000	2006	2009																																				
PV	20	25	30																																				
<p>Outputs:</p> <p>1. 20 MW of windfarms in operation</p> <p>2. 10 MW of PV systems installed and providing electricity to rural households/ institutions (300-400,000 systems)</p> <p>3. Enabling environment for wind power development in place.</p>	<p>1.1 Installed windfarm capacity: 20 MW by end 2003</p> <p>2.1 Number of PV systems sold (under project) and operating</p> <p>a) 100,000 by 2004 b) 300,000 by 2006</p> <p>2.2 MW of PV systems sold (under project) and operating</p> <p>a) 2 MW by 2004 b) 10 MW by 2006</p> <p>3.1 30 staff trained in financial management systems; engineering, construction mgt. And O&M mgmt; and private sector development of windfarms by 2003.</p> <p>3.2 Undertaking technical preparatory work, including resource assessment, for the development of large coastal wind farms by 2005.</p>	<p>1. 1 Semiannual implementation reports and PSRs.</p> <p>2.1 As above.</p> <p>3.1 Project documentation and semiannual implementation reports, supervision/PSRs.</p>	<p>(Outputs to Objective)</p> <p>1. Construction carried out according to industry standards.</p> <p>2. Lower investment costs due to competition and economies of scale.</p> <p>3. SETC and other government agencies continue to support wind and PV development.</p> <p>4. Economic reforms would improve business orientation of state-owned (and quasi-state owned) PV enterprises and business climate for small/private enterprise.</p> <p>5. Policy incentives are implemented.</p> <p>6. High quality standards established and accepted.</p> <p>7. Marketing strategies improved.</p>																																				

Narrative Summary	Key Performance Indicators	Monitoring and Evaluation	Critical Assumptions
<p>4. Enabling environment for PV development in place.</p> <p>5. Enabling environment for technology improvement in place</p>	<p>4.1 Quality control mechanisms in place at PV sales companies by 2005.</p> <p>4.2 3 Capabilities of 3 accredited PV testing institutes strengthened to international standards by 2003.</p> <p>4.3 Modified project PV system standards adopted as National PV system standards by 2003.</p> <p>5.1 Number of cost-shared projects for technology improvement carried out.</p> <p>a) 100 by 2004</p> <p>b) 200 by 2006</p> <p>5.2 Contract targets met in 80% of contracts.</p> <p>5.3 \$15 million loans for technology improvement projects in place.</p>	<p>4.1 As above.</p> <p>5.1 As above</p>	<p>8. High upfront cost barrier addressed.</p> <p>9. Technology improvement component leads to awareness of an investment in technology innovation.</p>
<p>Project Components/ Subcomponents: (see Annex 3 for project description)</p> <p>A. Windfarm Component</p> <p>1. Investment</p> <p>2. Institutional Strengthening</p> <p>B. Solar PV System Component</p> <p>1. Investment</p> <p>2. Market Development Program</p> <p>3. Institutional Strengthening</p> <p>C. Technology Improvement Component</p> <p>1. Grant-assisted Investments</p> <p>2. Loan assisted Investments</p> <p>3. Institutional strengthening</p>	<p>Inputs: (budget for each component)</p> <p>\$24.7 million</p> <p>\$22.4 million</p> <p>\$2.3million</p> <p>\$155.9 million</p> <p>144.9 million</p> <p>\$7.0 million</p> <p>\$4.0 million</p> <p>\$24.8 million</p> <p>\$5.4 million</p> <p>\$18.0 million</p> <p>\$1.4 million</p>		<p>(Components to Outputs)</p> <p>1. Adequate wind resources.</p> <p>2. Power tariff high enough for cost recovery.</p> <p>3. Selected PV companies perform as expected, offer satisfactory products, sales and service.</p> <p>4. Consumers accept PV systems and services.</p> <p>5. PMO adequately managed.</p> <p>6. Local equipment companies present good cost-shared proposals for technology upgrading.</p> <p>7. Local equipment manufacturers have access to loans for TI investment.</p> <p>8. No significant change in foreign exchange rate.</p>

COSTS AND FINANCING TABLES

	Estimated Project Costs			S Million			Foreign % of total
	Local	Yuan Million Foreign	Total	Local	Foreign	Total	
A. Windfarm Component							
<u>Investments</u>							
Chongming and Nanhui windfarms	54.37	93.38		6.55	11.25	17.80	63%
<u>Institutional Strengthening</u>							
Capacity building for windfarm company	2.49	4.15	6.64	0.30	0.50	0.80	63%
Technical preparatory work	4.15	8.30	12.45	0.50	1.00	1.50	67%
Total Windfarm Component Base Cost	61.01	105.83	166.83	7.35	12.75	20.10	63%
Taxes and duties	12.63	-	12.63	1.52	-	1.52	0%
Physical contingencies	5.44	4.67	10.11	0.66	0.56	1.22	46%
Price contingencies	1.09	1.87	2.95	0.13	0.23	0.36	63%
Total Windfarm Component Project Cost	80.16	112.36	192.52	9.66	13.54	23.19	58%
Interest during construction	4.88	6.88	11.76	0.59	0.83	1.42	58%
IBRD loan service fee	-	1.08	1.08	-	0.13	0.13	100%
Total Windfarm Component Financing Required	85.04	120.32	205.36	10.25	14.50	24.74	59%
B. PV Component							
<u>Investments</u>							
10MW PV systems	693.88	190.90	884.78	83.60	23.00	106.60	22%
<u>Institutional Strengthening</u>							
Market development program	51.46	6.64	58.10	6.20	0.80	7.00	11%
Institutional strengthening	27.39	5.81	33.20	3.30	0.70	4.00	18%
Total PV Component Base Cost	772.73	203.35	976.08	93.10	24.50	117.60	21%
Taxes and duties	176.79	-	176.79	21.30	-	21.30	0%
Price contingencies	128.65	12.45	141.10	15.50	1.50	17.00	9%
Total PV Component Financing Required	1,078.17	215.80	1,293.97	129.90	26.00	155.90	17%
<u>Investments</u>							
Large grant program	25.73	14.11	39.84	3.10	1.70	4.80	35%
Small grant program	4.98	-	4.98	0.60	-	0.60	0%
Concessional loans program	59.76	89.64	149.40	7.20	10.80	18.00	60%
<u>Institutional Strengthening</u>							
Program management	5.81	1.66	7.47	0.70	0.20	0.90	22%
Institutional strengthening	2.49	1.66	4.15	0.30	0.20	0.50	40%
Total Technology Improvement Financing Required	98.77	107.07	205.84	11.90	12.90	24.80	52%

	Yuan Million			\$ Million			Foreign % of total
	Local	Foreign	Total	Local	Foreign	Total	
D. Whole Project							
Windfarm component base cost	61.01	105.83	166.83	7.35	12.75	20.10	63%
PV component base cost	772.73	203.35	976.08	93.10	24.50	117.60	21%
Technology Improvement component base cost	98.77	107.07	205.84	11.90	12.90	24.80	52%
Total Project Base Cost	932.51	416.25	1,348.75	112.35	50.15	162.50	31%
Taxes and duties	189.42	-	189.42	22.82	-	22.82	0%
Physical contingencies	5.44	4.67	10.11	0.66	0.56	1.22	46%
Price contingencies	129.74	14.32	144.05	15.63	1.73	17.36	10%
Total Project Cost	1,257.10	435.23	1,692.33	151.46	52.44	203.89	26%
Interest during construction	4.88	6.88	11.76	0.59	0.83	1.42	58%
IBRD loan service fee	-	1.08	1.08	-	0.13	0.13	100%
Total Project Financing Required	1,261.98	443.19	1,705.17	152.05	53.40	205.44	26%
Exchange rate: \$1=8.3 RMB Yuan							

Financing Plan

	\$ million		
	Local	Foreign	Total
A. Windfarm Component			
<u>Investments</u>			
IBRD	-	13.00	13.00
SP/SMEPC/SPIC	4.49		4.49
Domestic commercial banks	4.95		4.95
Subtotal	9.44	13.00	22.44
 <u>Institutional Strengthening</u>			
GEF	-	1.50	1.50
SMEPC	0.80		0.80
Subtotal	0.80	1.50	2.30
 B. PV Component			
<u>Investments</u>			
GEF		15.00	15.00
Participating companies and end users	120.40	9.50	129.90
Subtotal	120.40	24.50	144.90
 <u>Institutional Strengthening</u>			
GEF	5.50	1.50	7.00
Participating companies	2.20		2.20
GoC (SETC)	1.80		1.80
Subtotal	9.50	1.50	11.00
 C. Technology Improvement Component			
<u>Investments</u>			
GEF	1.00	1.70	2.70
Participating companies	2.70		2.70
Domestic commercial banks	7.20	10.80	18.00
Subtotal	10.90	12.50	23.40
 <u>Institutional Strengthening</u>			
GEF	0.40	0.40	0.80
Participating companies	0.20		0.20
GoC (SETC)	0.40		0.40
Subtotal	1.00	0.40	1.40
			24.80
 D. Whole Project			
IBRD	-	13.00	13.00
GEF	6.90	20.10	27.00
SP/SMEPC/SPIC	5.29	-	5.29
Domestic commercial banks	12.15	10.80	22.95
Participating companies and end users	125.50	9.50	135.00
GoC (SETC)	2.20	-	2.20
	152.04	53.40	205.44

INCREMENTAL COST MATRIX

	Baseline	Alternative	Increment
Domestic Benefits	<ul style="list-style-type: none"> • A given level of electricity is provided by windfarms and off-grid solar PV • Cost of electricity from windfarms remains above international levels. • Quality of solar PV systems is low, service is low, solar PV companies remain small and uncommercial. • Little indigenous development of windfarm and solar PV technologies. 	<ul style="list-style-type: none"> • Barriers to commercial development of windfarms and solar PV removed. A greater amount of electricity is generated by windfarms and solar PV. • Costs of electricity from windfarms fall; costs of high-quality solar PV systems fall. • Technology development in China proceeds lowering domestic costs for wind and solar PV • Institutional strengthening to support commercial development of wind and solar PV 	<ul style="list-style-type: none"> • Barriers to commercial development removed. • Additional 876GWh from wind and 214GWh from PV is generated over a 20-year period. • Technology transfer proceeds for windfarms and solar PV. • Institutional capacity for commercial windfarm and solar PV strengthened.
Global Environmental Benefits	No GHG emissions associated with the provision of above level of electricity from wind and solar PV.	No GHG emissions associated with the provision of above level of electricity from wind and solar PV. Higher level of renewable energy provided than under the Baseline.	<ul style="list-style-type: none"> • 3.89 Mt of CO₂ reduced (3.0 PV, 0.89 wind) • Costs of solar PV reduced.
Costs by Component (million US\$)			
Wind Investment	0	28.3	28.3
Solar PV Investment	110	155.9	45.9
Technology Improvement	2	24.8	22.8
Total Costs	112	208.4	96.4
GEF Incremental Costs			27.0

LIST OF CHANGES TO PROJECT AGREEMENTS

Loan Agreement

Signing date to 2001

Reference and define SMEPC instead of State Power

Reference smaller GEF grant—approx. SDR 21.3 million

Update General Conditions to most recent version

Delete references to all RAPs other than the RAP for Chongming Island/Nanhui

Including definition of Shanghai Municipality

Reference updated TI Implementation Manual (April 2001)

Defining only one Windfarm Company (assumes SMEPC will implement through a subsidiary company)

Reduce loan amount to \$13 million

Closing Date changed to June 30 2007

Delete event of suspension relating to project implementation entity's charter because this is covered in the updated General Conditions

The only remaining Windfarm company is now the effectiveness condition

Adding facsimile numbers for both MOF and IBRD

Schedule 1: reducing the loan amount and both the goods category and the fee

Adding reference to Macau in the definition of foreign expenditures

Deleting the disbursement condition for Windfarm company establishment, since the only windfarm company will be a condition of effectiveness

Schedule 2: Part A is now just one windfarm (with the 2 Shanghai sites)

Institutional strengthening now for SMEPC and the Windfarm Company and reducing scope of TA for private sector promotion

TI component focus on PV and PV hybrid, not wind power

Completion date December 31, 2006

Schedule 3: amounts in the amortization schedule reduced

Schedule 4: dated covenants shifted to dates post-effectiveness (end 2001 or mid 2002)

Delete requirement in PV component to establish escrow account

GEF Grant Agreement

Same changes as above, plus:

Schedule 1: combine former Goods category 2(a) with the consultants services category 1(a) [corresponding change in the eligible categories in the Special Account schedule relating to Part B of the Project]

Adding foreign and local expenditure definitions (dropped from earlier version in error)

Schedule 3 (Procurement): addition of Least Cost selection method and Single Source Selection method of consultant selection

Project Agreement

Change signing date to 2001

Change project implementation entity to SMEPC

Remove all but one Windfarm company

Change financial covenants to apply only to one windfarm company

Change references to loan and grant to the reduced amounts

Add facsimile numbers

Add least cost selection and single source selection methods of consultant selection

Change dated covenants to post-effectiveness dates

Remove dated covenant for windfarm company establishment, since the single windfarm company is now a condition of effectiveness

Cristina Hernandez

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May 1, 2001 11:00 AM