Report Number: ICRR0023282

1. Project Data

Project ID P127033	**Project Name** CN GEF CRESP Phase II
Country China	**Practice Area(Lead)** Energy & Extractives

L/C/TF Number(s)	Closing Date (Original)	Total Project Cost (USD)
TF-15769	30-Jun-2019	27,271,527.07
Bank Approval Date	**Closing Date (Actual)**	
29-Oct-2013	31-Dec-2021	

	IBRD/IDA (USD)	Grants (USD)
Original Commitment	27,280,000.00	27,280,000.00
Revised Commitment	27,271,527.07	27,271,527.07
Actual	27,271,527.07	27,271,527.07

Prepared by	Reviewed by	ICR Review Coordinator	Group
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2. Project Objectives and Components

a. Objectives

As mentioned in the GEF grant agreement (November 27, 2013, page 5), the project development objective (PDO) was to support the ambitious renewable energy scale-up program in China with a focus on efficiency improvement and reduction of incremental costs. The PDO was stated the same way in the Project Appraisal Document (PAD).

The PDO was not revised.

Note that the China Renewable Energy Scale-Up Program (CRESP)-II project was the second phase of a three-phase CRESP program. The Program's objective is to enable commercial renewable electricity suppliers to provide energy to the electricity market efficiently, cost-effectively and on a large scale.

For the purposes of this ICR review, the objective will be assessed as follows:

PDO1: Ambitious national renewable electricity scale-up program in China supported.

PDO2: Efficiency improved through enhanced planning, optimal designs and better integration of renewable electricity in the grid system.

PDO3: Incremental costs of key renewable electricity sources reduced.

b. Were the project objectives/key associated outcome targets revised during implementation?

No

c. Will a split evaluation be undertaken?

No

d. Components

1. Original components

Component 1 Policy Support (cost at appraisal: US$5 million; actual cost: US$ 6.09 million) financed the development and implementation of renewable energy (RE) legislation and policies to achieve cost reduction, efficiency improvement, and smooth grid integration through four sub-components that would achieve the following:

(i) improve design and implementation of the RE Quota Decree and design of the RE Certificates trading scheme;

(ii) develop grid access and financial incentive policies for distributed RE generation in Government's pilot New Energy Cities program;

(iii) support the preparation of the RE 13th five-year plan (FYP) and medium and long-term RE plan to 2030; and

(iv) work toward a consensus in power pricing reforms, including a two-part generation tariff, a transparent cost-recovery transmission tariff, internalization of environmental costs, and feed-in tariffs for off-shore wind and concentrated solar power (CSP).

Component 2 Grid Integration/Access and Technical Design (cost at appraisal: US$5 million; actual cost: US$ 3.16 million) funded targeted studies to support improved grid integration for large-scale grid-connected RE and grid access for distributed RE; and deployment of key RE technologies to enhance efficiency and reduce costs. The studies focused on: (i) optimization of RE site layout for wind generation to maximize output; (ii) wind penetration development study for improved grid integration; (iii) grid access and connection study for distributed generation in the New Energy Cities program; and (iv) grid codes study to

evaluate Chinese grid codes and recommend cost-effective solutions to meet grid requirements for wind farms to facilitate dialogue between wind developers and grid company.

Component 3 Technology Improvement (cost at appraisal: US$7.28 million; actual cost: US$ 8.67 million) financed innovations aimed at the following: (i) increased efficiency of existing wind farms; (ii) improved quality and reliability and reduced costs of off-shore wind turbine technologies; (iii) increased efficiency of existing large-scale grid-connected solar PV farms; and (iv) improved CSP domestic manufacturing capacity.

Component 4 Pilot Demonstration (cost at appraisal: US$5 million; actual cost: US$ 4.59 million) funded the following: (i) support to a scale-up of RE and to improved efficiency of on-shore and off-shore wind and CSP generation, through studies and pilot investments in innovative technology; and (ii) piloting RE distributed generation in two selected New Energy cities.

Component 5 Capacity Building, Investment Support, and Project Management (cost at appraisal: US$5 million; actual cost: US$4.76) financed technical assistance, specifically: (i) capacity building of government officials and staff at national level and at provincial/municipal levels to support RE development (including in energy pricing reform; RE promoting fiscal measures; and for support to small hydro, biomass, off-shore wind); (ii) operationalization of the China RE Training Center; and (iii) support to investors by building innovative RE investment pipelines. The component also covered project management costs.

2. Changes in components during implementation

The project components remained unchanged during implementation. As per original adaptive design, activities were progressively added/amended within the components, to reflect evolving sector needs.

Both project restructurings - the first one on February 22, 1019 (level 2), and the second one on August 19, 2020 (level 2) – involved changes to the results framework (RF). Specifically, the first restructuring made the target for one indicator (“reduced incremental costs of wind power over coal fired power plants”) more ambitious; and the second restructuring added one PDO indicator (“RE 13th FYP developed and adopted”) and two intermediate result indicators (“RE 14th FYP developed”, and “design of China’s first offshore wind turbine testing center aligned with international best practices”). The added indicators were to assess the results of key additional activities.

e. Comments on Project Cost, Financing, Borrower Contribution, and Dates

Project Cost: The actual project cost was US$27.27 million, compared to the appraisal estimate of US$27.28 million.

Project Financing: The project was financed by a Global Environment Facility (GEF) grant.

Borrower/Recipient contribution: The Borrower did not contribute to project financing.

Project Dates: The project was approved on October 29, 2013 and became effective on December 26, 2013. The mid-term review was held on May 12, 2017. The original closing date was June 30, 2019. The project was extended twice, as follows:

The first extension was on February 22, 2019, for 18 months, to December 31, 2020, through a level two restructuring; so that the project closure coincided with the completion of FYP13 (2016-2020). This was needed to implement new activities, including those critical for FYP13, and to develop the RE plan for FYP14 (2021-2025). It also reflected the fact that the project required coordination across the government and with other stakeholders, as well as improved local capacity in relation to the energy cities' pilots.

The second extension was on August 19, 2020, for 12 months to December 31, 2020, through a level 2 restructuring. This was needed to disburse the remaining funds, finalize implementation of activities affected by COVID-19, and accommodate personnel changes at the key implementing agencies. At the time of extension, all RF indicators had been met or exceeded.

3. Relevance of Objectives

Rationale

Country and Sector Context, Relevance to Government Strategies: During the 10-15 years prior to this Review, the scale-up of RE in China has proven to be a success, and the share of RE in power generation started increasing, reversing the previous trend. When the project was approved in 2013, it had reached 20.4 percent, as compared with 14.9 percent in 2007. By 2013, China was generating 21.9 percent of the global wind power and 11.5 percent of the global solar photovoltaic (PV) power. In the same year, China installed more new renewable energy capacity than both Europe and the rest of the Asia Pacific region. The new objectives were to reach 9.5 percent of RE in primary energy supply by 2015 and 20 percent by 2020. However, there were barriers, including: (i) regulatory, institutional, operational, and technological barriers to RE integration, including RE pricing which created disincentives to dispatch RE power; (ii) high cost of the renewable energy program; and (iii) poor coordination and overlapping jurisdictions of government agencies and levels of government supporting RE development. CRESP-II (2013-2021) was designed to address some of the key barriers to the RE scale-up. It was closely aligned with the RE goals of the FYP12 (2011-2015) at appraisal and FYP13 (2016-2020) and FYP14 (2021-2025) at closure. It has contributed to the formulation of the FYP14th RE objectives.

Relevance to the World Bank Group's (WBG's) Assistance Strategies: At appraisal, the project's objectives were aligned with the WBG's China Country Partnership Framework (CPF) FY2013-2016, supporting "greener growth, in particular, shifting to a sustainable energy path". At project closing, the PDO was aligned with the WBG's China CPF FY2020-2025, Engagement Area Two *Promoting Greener Development*, Objective 1 *Facilitating the Transition to a Lower Carbon Energy Path,* which aimed at supporting the energy sector's transitioning away from coal, RE scale-up, and at building the policy and institutional framework for RE integration and increased private sector involvement in market-based expansion of RE. In addition, the project's New Energy Cities' pilots were aligned with the CPF's Engagement Area Two, Objective 5 *Promoting Low-Carbon Transport and Cities*.

Global Relevance. Despite significant achievements with the RE scale-up and energy intensity reduction, at the time of the preparation of this Review, China's primary energy consumption was still 60 percent coal-based, and the country is responsible for a quarter of global CO2 emissions. To reduce its carbon footprint and achieve the announced objective of reaching net-zero emissions by 2060, China needed to remove the barriers to RE scale-up, which CRESP-II supported.

Previous sector experience. CRESP is a long-term three-phase program to scale-up the development of the RE-based electricity in China through: (i) policy dialog; (ii) addressing regulatory, institutional, and technological barriers; and (iii) bringing in international best practices. The program aims to develop a legal and policy framework; provide support to technology improvements, standards and certification; help prepare innovative RE investments; and enable private sector to invest in RE on a large scale. CRESP-I made a substantial contribution to the transformation of the China's RE sector by (i) creating a legal, regulatory, and institutional framework for RE development and (ii) financing demonstration pilot investments in wind, biomass, and small hydropower in four provinces, to be scaled up. The policy and institutional support from CRESP-I led to the improvement in quality and reduction of costs of RE, and the creation of a strong RE equipment manufacturing industry.

The relevance of objective is rated high.

Rating
High

4. Achievement of Objectives (Efficacy)

OBJECTIVE 1
Objective
Ambitious national renewable electricity scale-up program in China supported.

Rationale
The theory of change (ToC) for this objective showed a logical causal link from inputs to outputs and to expected PDO outcomes of this project. The inputs were: (i) policy support; (ii) grid integration/access and technical design; (iii) technology improvements; (iv) pilot/demonstration investments; (v) capacity building. The related outputs, described in detail, were expected to result in the following PDO outcomes: (i) national RE scale-up program supported; (ii) efficiency improved through enhanced planning, optimal designs, and better integration of RE in the grid system; (iii) incremental costs of key renewable electricity sources reduced.

The ToC, which was created for the ICR, clearly indicated inputs and outputs, as well as the underlying assumptions necessary for the ToC to work. It also reflected (both in the TOC chart and in the text) the complicated links across the outputs, as well as the interconnections across the PDO outcomes. However, the TOC has a weakness: the intermediate outcomes, which are described in the ICR's analysis (including in the efficacy section), are missing from the TOC: while the column containing the outputs is titled "Outputs (intermediate outcomes)", it actually contains the list of project outputs. In fact, the ToC outputs are supposed to describe the delivered products, processes, and plans; while the intermediate outcomes are expected to show how outputs are applied to solve the problem, what processes are employed to transform the outputs into project level outcomes. In the ICR's TOC, there is a gap between the list of outputs and the project level outcomes, making it hard to understand through which processes the multiple and varying outputs would result in the three aggregated (and significantly overlapping) PDO outcomes. As a result, the logical links from

the outputs to PDO outcomes are too general, making the TOC's description of the logic of project design very unclear. Instead of detailing the interlinks across the outputs, the TOC should have included intermediate outcomes and reflect, both in the TOC chart and in the text, the logical causal links from outputs to intermediate outcomes and from intermediate outcomes to PDO outcomes. Essential evaluative discussion of the ToC is really in the arrows from specific matters (outputs, intermediate outcomes, PDO outcomes, long-term outcomes) at one level to the matters at the next level. These comments relate to the presentation of the project's logic in the TOC and not to the ICR analysis of the project's outcomes, which is comprehensive and sufficient.

In addition, it could be useful when evaluating a complex and transformational project, such as CRESP-II, to raise the question of whether the project's strategically designed set of activities, as reflected in the TOC, were likely to lead to a critical mass of interventions and create synergy capable of bringing about transformational change. Again, this comment relates to the presentation of the project's value-added in the TOC and not in the ICR's analysis of the project's outcomes.

Outputs

- In the context of supporting the country's FYP13 and FYP14, the project delivered the RE development plans, which included RE technology targets and covered RE transmission integration and inter-provincial transfers of electricity. The plans were based (for the first time in China) on advanced innovative modeling.

- Two New Energy City pilots were implemented, facilitating the scale-up of distributed RE, grid integration, usage of RE trading platforms, and RE development planning.

Note: The ICR notes (ICR, page 20) that the assumption stated at appraisal regarding adding three more New Energy Cities by FY2019 did not materialize. This needs to be understood in the following context. At appraisal, the project team took responsibility for two New Energy City pilots, while noting in the PAD's RF (but not in the main text) that "…it is assumed that the pilots would lead to three additional New Energy Cities by 2019" (PAD, page 16). However, there were no associated budgeted activities or RF targets. Therefore, IEG will not interpret the quoted PAD statement as a commitment and will not use it for the purpose of project evaluation.

- The RE quota-based market mandate (Renewable Portfolio Standard) was designed and implemented, replacing the feed-in tariffs (FITs).

- RE certificate trading system for wind and solar PV power was designed and is functioning, supporting inter-provincial trade.

- RE auctions, designed by the project, were piloted, supporting the allocation of RE development rights based on competitive prices vs. the previously used FITs, thus eliminating the basis of RE subsidization.

Outcomes:

The main barriers to RE scale-up were addressed and a scale-up achieved, exceeding the government targets, specifically:

- Based on the studies financed by the project, strategic policies supporting RE development were approved and are being applied, including: the establishment of a renewable quota system (replacing the FIT); the allocation of RE development rights through renewable energy auctions that meet international good practices; and the formation of a renewable energy trading scheme.

- The project's pilots demonstrating innovative technologies are being scaled up.

- By convening a wide range of stakeholders and widely disseminating results of the project-financed studies, the project supported consensus for the development of the FYP13 renewable energy plan.

- The project supported the formulation of the China's RE development strategy for FYP14, based on the project-funded innovative studies and advanced modeling, providing a foundation for action toward achieving the new government goal of net-zero emissions by 2060.

- Avoided CO2 emissions from the project-financed initiatives exceeded the 3.9 Mton CO2/year targeted at appraisal, with an outcome of over 24.9 Mton CO2/year.

Under Objective 1, the project supported China's transformational objective of a national RE scale-up through removing critical policy, regulatory, institutional, technological, and knowledge barriers to RE scale-up, as well as by conducting successful demonstration pilots and convening a wide range of relevant stakeholders. A scale-up of the project-supported innovative technology started before project closure. The project also contributed to the development of the FYP14 (2021-2025) RE strategy. All related RF targets were achieved or exceeded. The government awarded the project first place for outstanding contribution to policy in the field of energy for preparing the FYP13 (2016-2020).

Rating
High

OBJECTIVE 2
Objective
Efficiency improved through enhanced planning, optimal designs and better integration of renewable electricity in the grid system.

Rationale
Please see the TOC discussion under Objective 1.

Outputs:

- Diagnostic studies to assess the issues with RE integration and offer approaches to address them were delivered. The proposed integrated planning of the transmission of the RE power in combination with non-RE power sources led to improved evacuation of RE electricity from points of generation to demand locations and to reduced RE power curtailment, especially in the North of the country.

- The project designed and implemented (as demonstration pilots) three wind generator turbine bases with optimized efficiency. It used project-developed high-precision software, which helped to minimize wake

effects by improving the position of turbines in wind bases. The project also provided technical assistance (TA) to four additional wind projects to optimize wind bases.

- A technical study supporting enhanced usage of wind power by heat and coal-fired co-generation (CHP) plants was delivered, and a related demonstration pilot was conducted.

- Solar PV-linked battery storage was piloted within the New Energy Cities program. The project helped to develop the control software and to test and verify operations.

- The project supported four competitively selected CSP companies in using best international practices in CSP development to improve efficiency in electricity production and use power storage.

- Based on internationally accepted standards, the project prepared three national standards for offshore wind and designed China's first offshore wind testing center, under construction at the time of the ICR preparation.

Outcomes:

- The project supported integrated planning of RE power transmission through several diagnostic studies, including those that specifically targeted RE power integration issues in the north of the country. Most of the proposed measures were implemented prior to project closure.

- The optimized wind farm design piloted in three wind bases with a total capacity of 13.25 MW resulted in an incremental generation increase of 1,078 GWh per year. This was replicated in additional 50 GW of wind power installations. Also, four other wind power plants (on-shore and off-shore) totaling 400 MW received project's TA support to improve wind base efficiency.

- The project's RE-integrated heat and power generation pilot was replicated, and CHP plants with a total 100 GW capacity were retrofitted. China expects to continue the program under FYP14.

- The successful demonstration of the battery storage pilots in the New Energy Cities led both cities to plan for an expanded use of battery storage, which will enable increased integration of RE.

Under Objective 2, the project designed and piloted several technologies to improve the efficiency of RE generation and utilization. The outcomes directly attributable to the project include the implementation of all project's recommendations regarding improvements to the RE-integrated transmission planning to reduce RE power curtailment; optimized design of wind farms leading to increased efficiency of power generation; reduced usage of coal and better RE-integration in the CHP power plants; and improved PV-linked battery storage. Most of the technological innovations were replicated, and there are plans to scale them up further. All targets were either fully achieved or exceeded.

Rating
High

OBJECTIVE 3

Objective

Incremental costs of key renewable electricity sources reduced.

Rationale

Please see the TOC discussion under Objective 1.

Outputs:

- RE auctions, designed and piloted by the project, led to a significant drop in the cost of power from solar PV and wind, as compared with the previously used FITs. The auctions supported market-based pricing of RE power and facilitated the scale-up of RE-based power, leading to economies of scale. (please see more details under Objective 1)

- The project introduced and piloted innovative technologies to improve the efficiency of RE power generation and utilization. This led to cost reduction due to more power produced by the same RE generation capacity and less RE power curtailment. (please see more details under Objective 2)

Outcomes:

- Project-supported RE auctions drove down power costs by promoting competitive market-based RE pricing, which replaced the previously used above-market subsidized FITs, originally designed to stimulate RE development. For the 11 GW of solar PV that were auctioned during the project-supported pilot, the weighted average cost reduction was 30 percent compared with the FIT, with some transaction prices reduced by nearly 60 percent. For wind power, the weighted average reduction was 5 percent lower than the FIT, with some costing as much as 10 percent less. In the future, the shift to auctions is expected to lead to a more significant RE cost reduction.

- The project contributed to RE cost reduction in the country, including the following: (i) the incremental costs of solar PV over coal-based generation reduced substantially from 11.3 US cents/kWh to 0.61 US cents/kWh, exceeding the project's RF target; (ii) the incremental costs of on-shore wind power over coal-based generation decreased from 2.17 US cents/kWh to 0.16 US cents/kWh, exceeding the RF target; and (iii) there is evidence that the significant cost reduction in China combined with its high share of solar PV and wind power globally has influenced global prices.

Under Objective 3, the project had an impact on RE cost reduction through implementing policies that supported market-based RE pricing and led to economies of scale and by introducing and piloting innovative technologies with higher efficiency of RE power production.

Rating

Substantial

OVERALL EFFICACY

Rationale

For Objective 1, the efficacy is High. The project achieved all its targets under this objective and provided policy, strategy, and innovative technology support to China, all of which were included in the government plans and/or scaled up. The scale-up of the promoted by the project technologies has started before project closure. Through its interventions, the project succeeded in addressing major policy, regulatory, institutional, technological, and knowledge obstacles to scaling up RE development. Importantly, the project succeeded in convening a wide range of RE stakeholders. The project's contributions to RE strategy were integrated in the FYP13 and FYP14. The government awarded the project first place for outstanding contribution to policy in the field of energy for preparing the FYP13.

For Objective 2, the efficacy is High. The project introduced and piloted several innovative technologies. The results are decreased RE power curtailment, improved RE-integrated transmission planning, increased efficiency of wind farm and CHP power generation, and improved PV-linked battery storage. Most of the technological innovations have been replicated prior to project closure, and a further scale-up was assessed as likely.

For Objective 3, the efficacy is Substantial. The project had an impact on RE cost reduction mainly through two types of activities: (i) designing and piloting policies that promoted market-based RE pricing and led to economies of scale (under Objective 1) and (ii) introducing and piloting innovative and operationally efficient RE technologies, leading to increased productivity of RE generation and lowering the loss of the produced RE power (under Objective 2). While there is no doubt that the project significantly contributed to the RE cost reduction, quantifying the attribution would be more challenging than with the first two objectives because Objective 3 was achieved through specific activities under Objectives 1 and 2.

The overall efficacy is High.

Overall Efficacy Rating

High

5. Efficiency

I. Economic justification. Considering that the project financed mainly technical assistance activities (technical studies and demonstration pilots), traditional economic analysis was conducted neither at appraisal, nor at closure. However, an economic justification of project interventions was provided both in the PAD and in the ICR.

1. At appraisal. The project's PAD describes "the economic rationale for the CRESP program" (PAD, page 12) and concludes that the project was economically justifiable. It states that at the time of appraisal of CRESP-I in 2005, a simulation model was used to calculate the economically optimal RE targets for 2010, justified by their economic competitiveness in comparison with coal-fired power generation. Different local and global environmental externalities were applied. The analysis was re-conducted later to reflect current costs of RE and

increased environmental externalities. The PAD mentions that in the Base Case scenario, where the local environmental externalities were derived from a joint study by the China's State Environmental Protection

Agency and the World Bank in 2005 and the carbon pricing of US$30/ton CO2e based on a recent World Bank study, the optimal RE target was estimated at 1,092 TWh, higher than the government's RE target by 2020 (a total of 892 TWh), which leads to the conclusions that the government's RE target is economically justified (PAD, page 12-13). While it is clear that the discussed modeling was useful for the justification of the government's 2020 RE target, it is not evident from the description in the PAD how it relates to the project.

1. At closure. The ICR compares "economic returns of direct benefits to project costs" (ICR, page 30) and confirms the ex-ante conclusion that the project was economically feasible. It makes the following points:

- While replicating the appraisal level modeling was not feasible at closure due to its costs, the ICR notes that the actual generation of non-hydro renewables in China by 2020 was 860 TWh, which is within the bounds of the previously conducted optimization modeling results and therefore confirms that CRESP-II interventions were economically justified (ICR, page 30).

- The total (direct and indirect) benefits of the project are the reduced CO2 emissions resulting from the scale-up of RE, incentivized by the project. However, the share of the overall RE scale-up in the country to be attributed to the project cannot be calculated precisely enough for economic analysis. Instead of attempting to approximate the total benefits, the ICR provides an illustrative example showing that even direct benefits from a small part of the project's investments (optimization of the wind generation bases pilots) exceeded the project total cost of US$27, making the project economically justifiable. These pilot investments lead to the additional generation of 1,078 GWh per year and avoided emission of 0.84 Mton CO2 per year. Based on the lower end of the shadow price of carbon from the World Bank guidance for 2020 (US$40-80 per ton of CO2), the annual benefits would be US$33.7 million. Clearly, adding avoided emissions from other project's interventions would result in a much higher net direct benefit from the project. (ICR, page 30) Adding indirect benefits would have a multiplication effect.

II. Administrative efficiency. Operationally, the project was able to implement its activities within the original funding envelope and without any significant adjustment of its design. Project inefficiency was limited to the two extensions of its closing, with the total of 30 months, mostly due to the need to implement additional activities in support of the FYP13 and FYP14, to adjust to the changes in the implementing agencies, and to adapt to the disruptions caused by the COVID-19 pandemic. However, as the ICR mentions, "the pace of the reforms could have been accelerated if not for initial implementation delays from having to successfully manage a large volume of contracts, which NEA [the National Energy Administration, the project's implementation agency - IEG] the was able to eventually overcome and deliver results". This is considered a minor shortcoming.

The project efficiency is rated substantial.

Efficiency Rating

Substantial

a. If available, enter the Economic Rate of Return (ERR) and/or Financial Rate of Return (FRR) at appraisal and the re-estimated value at evaluation:

	Rate Available?	Point value (%)	*Coverage/Scope (%)
Appraisal		0	0 ☐ Not Applicable
ICR Estimate		0	0 ☐ Not Applicable

* Refers to percent of total project cost for which ERR/FRR was calculated.

6. Outcome

Based on the high relevance of objectives, high efficacy, and substantial efficiency, the overall outcome rating is Highly Satisfactory.

a. Outcome Rating

Highly Satisfactory

7. Risk to Development Outcome

Political. This risk could arise if the political commitment to scale-up renewable energy wanes. However, there is a strong evidence of the continuity of energy transition is China: the ratification of the Paris Agreement on climate change in 2016, the commitment at the 2021 COP26 in Glasgow, and the roadmap for achieving these goals that were formally adopted by the government in 2022 when it issued the FYP14 for renewable energy and the corresponding Long-Term Renewable Energy Plan 2030, both prepared with the support from CRESP-II. This risk is assessed as low.

Economic. This risk could arise if there were market barriers to RE development or disincentives for the private sector to invest in RE development. However, the project ~~has~~ addressed multiple policy, a~~nd~~ institutional and market barriers to RE expansion (i.e., integration of VRE, cost reduction of solar PV and wind power), and globally, the costs of RE continue to decrease (China's RE scale-up is one of the factors of such trend). This strongly supports the economic rationale for a continued energy transition in the country. This risk is assessed as negligible.

Government ownership. This risk could arise if RE development loses its priority position in the government agenda. However, there is a high degree of confidence that the commitment to the renewable energy transition will continue at the national level as China would want to maintain its globally leading position and as the major policy changes supported by CRESP-II are being mainstreamed under the FYP14 RE program. At the policy level, the key reforms - transitioning to quotas, auctioning development rights to secure lower costs, and inter-provincial trade of renewables - have already resulted in the achievement of the FYP13 goals. The project's contribution to developing FYP14 itself is a statement of continuity. The risk is assessed as negligible.

Technological. This risk would arise if the country did not continue to invest in innovative RE technology. However, there is evidence that the design and technology improvements in wind and solar CSP are already being replicated and expanded, exceeding the government FYP13 targets. This risk is assessed as low.

8. Assessment of Bank Performance

a. Quality-at-Entry

The project was built on the basis CRESP-I, which was rated highly satisfactory by IEG, and was its natural continuation. At the same time, CRESP-II was specifically designed to address two key obstacles that had arisen – the need to more efficiently integrate renewables and to lower the RE program's costs – while maintaining the overarching ambition of scaling-up. While the strategic goals of the project were clear up-front and remained throughout the project, CRESP-II was also designed to be adaptable and evolve to meet the needs of a changing market and the government's RE objectives. Specifically, the PAD emphasized "the need for a flexible approach to adapt to the fast-changing environment and the [government] priorities as they emerge during implementation" (PAD, page 4) because, as lessons from the CRESP-I implementation showed, "RE policies required frequent adjustments as RE technologies evolve, and the policy environment changed quite fast in China" (PAD, page 8). Therefore, decisions on the specifics of the policy support (Component 1) and on the selection of grid integration studies to finance (Component 2 and Component 4) were made during implementation; while Component 3 was designed to involve adaptation and further development of the technology used (PAD, page 23) and Component 4 was expected to be adapting the software tools it financed (PAD, page 25). This design feature placed greater responsibility on the project team. To support the adaptable project design, the team included highly qualified global RE experts who were able to oversee project implementation, as well as to maintain cooperation with the technical experts in the counterpart team. To ensure the widest impact from project activities, the disclosure and dissemination of project reports were made mandatory. The overall design of CRESP-II was fit for purpose to support China to overcome key barriers and scale-up renewable energy, directly serving for the achievement of the PDO.

Quality-at-Entry Rating

Satisfactory

b. Quality of supervision

The supervision of the project was mostly carried out by the same World Bank TTL that led project design and preparation, which provided continuity. Furthermore, the project was managed from the World Bank China office, which enabled more frequent engagement with clients and an efficient oversight of project activities. The team included seasoned RE experts who supported the project throughout its implementation. The missions were regular and conducted frequently, twice a year. They were highly detailed, documenting extensive substantive discussions with a focus on the quality of deliverables, their timely production, the disbursement progress, and – importantly - detailed technical reviews of the analytical work and related guidance produced by the CRESP-II. Such reviews were essential because of the adaptable project design: decisions on which studies were most beneficial were made during

implementation, based on the country's evolving RE development architecture. Regular field trips were made to sub-grant project sites to verify the implementation status, ensure deliverable quality, and validate project results. In some cases, a third-party validation/verification were arranged to independently ensure the quality of the deliverables. Project implementation progress and guidance provided by the World Bank team were detailed in the ISRs and aide memoires. However, some initial implementation delays from processing a large volume of contracts up-front reduced the pace of the reforms at the start of project implementation. The NEA was able to eventually overcome this minor shortcoming.

Quality of Supervision Rating
Satisfactory

Overall Bank Performance Rating
Satisfactory

9. M&E Design, Implementation, & Utilization

a. M&E Design
The project's RF adequately reflected the logic of project interventions and was sufficiently linked to the PDO. Most of the indicators were quantitative (with the exception of one – "Design of China's first off-shore wind testing center aligned with international best practices" – which, as expected, had a Yes-No options for results), and all of them were time-bound and had baselines and targets. There were no gender-disaggregated indicators, which was appropriate considering the nature of project interventions (policy and technology support). The RF in the PDO sufficiently reflected project outputs and outcomes and was balanced in its consideration of the two types of expected project results: (i) policy-related and (ii) innovative technology-related. Most of the RF indicators, including the PDO-level ones, were attributable to the project. This constitutes one of the best characteristics of the RF design: despite the project's transformational ambition to incentivize a scale-up of RE development in the country, there was no attempt to include indicators measuring the actual RE scale-up, which would not be fully attributable to the project.

However, four indicators are still not fully attributable to the project: "Reduced incremental costs of wind power over coal-fired power plants (cent/kWh USD)", "Reduced incremental costs of solar PV over coal-fired power plants (cent/kWh USD)", "RE 13th developed and adopted" and "RE 14Th FYP developed". With regards to the first two of these indicators, the design of the targets involved the cost assumption that were too imprecise and proved to be incorrect (too high) over time, and in relation to the latter two indicators, the project was responsible for the preparation of the RE development plans to be incorporated in the FYPs and certainly not for the Government of China's FYPs. IEG agrees with the assessment of the ICR that the project RF could include additional indicators to provide a more comprehensive coverage of the multiple results expected at appraisal (ICR, page 35) and deems it a minor shortcoming.

Considering the evaluative assessment above, IEG disagrees with the ICR's assessment that the RF should have captured the national level implications of project results (was "insufficient for evaluating the performance of a comprehensive, complex and multi-level project" and that "there were scant indicators to capture the national level implications of project results (objective 1)") and another statement that the RF did not cover many of the project outcomes ("no outcome level formal indicators to monitor the

considerable efforts to improve efficiency and integrate more VRE"). Including both national level results and RE integration would involve attribution issues and a commitment to achieving results that are not fully under projects' or World Bank's control. While the discussion of a national level impact of the project in the ICR (and in this Review) was appropriate when evaluating efficacy, despite the difficulty of quantifying the attribution, it is less adequate in relation to the RF, considering the related commitment. Further, improved efficiency is, in fact, measured by the first two PDO-level indicators: "Additional RE-based power generation from improved design of the large wind bases (GWh)" and "Additional RE consumption from increased RE penetration in New Energy Cities (Mtce)".

The project's RF is assessed by the IEG as Substantial, largely because most of the indicators are attributable to the project and due to a balanced selection of the indicators across main areas of the project's value-added.

b. M&E Implementation

The ICR reports that the M&E data were adequately collected and analyzed and that the formalized indicators were monitored throughout project life. Progress reports were submitted to the World Bank in a timely manner and were all of high quality. Project level data (e.g., efficiency of wind bases, technology improvements) were often independently verified by third parties to validate results, while high-level indicators were often monitored by the government as a part of national and sector level statistics. (ICR, page 35)

c. M&E Utilization

The M&E framework was well utilized during the project's lifetime to inform the progress made towards achieving the set targets. The ICR reports that monitoring was very thorough and involved many indicators outside of the RF (ICR, page 36), which was useful considering the multifaceted nature of the project.

M&E Quality Rating

Substantial

10. Other Issues

a. Safeguards

Environmental Safeguards. The project was assigned a Category C, and Environmental Assessment (OP 4.01) was triggered and complied with. The ICR reports (ICR, page 37) that the environmental safeguards management was considered satisfactory and complied with domestic regulations and OP 4.01 requirements, with no reported cases on environmental pollution, health or safety incidents, or complaints from the public.

Social Safeguards. The project did not trigger OP 4.10 or OP4.12. The project invested in technical assistance, which does not trigger social safeguards, and in demonstration pilots, which did not involve land

acquisition, resettlement, or indigenous people. The ICR notes that no complaints or grievances related to project's impacts were reported during project implementation and that the project's social performance was deemed satisfactory.

b. Fiduciary Compliance

Financial Management (FM) and procurement. According to the ICR (ICR, page 36-37), the project had adequate project financial management and provided accurate and timely information. Project accounting and financial reporting were in line with the country's regulations and the grant agreement. No significant FM issues were noted, and the minor issues raised were resolved on time. The project audit reports complied with the requirements, and the withdrawal procedure and funds flow arrangement were appropriate. The grant proceeds were disbursed to the project in a timely manner. The procurement was assessed by the ICR as satisfactory.

c. Unintended impacts (Positive or Negative)

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d. Other

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11. Ratings

Ratings	ICR	IEG	Reason for Disagreements/Comment
Outcome	Highly Satisfactory	Highly Satisfactory	
Bank Performance	Satisfactory	Satisfactory	
Quality of M&E	Modest	Substantial	IEG disagrees with the ICR's statement that the RF should have captured the national level implications of project results and another statement that the RF did not cover many of the project outcomes. IEG states that including national level results in the RF would involve attribution issues and a commitment to achieving results that are not fully under projects' or World Bank's control. The project's RF is assessed by the IEG as Substantial, largely

			because most of the indicators are attributable to the project, and also because of the balanced selection of the indicators across main areas of the project's value-added.
Quality of ICR	---	Substantial	

12. Lessons

The following lessons were derived from the ICR with some modifications by IEG (ICR, pages 39-41):

1. Technical assistance projects can have transformational national-level impacts when they use a framework designed to comprehensively address the issues, support strategic interventions to leverage maximum impact, apply a sufficiently flexible design to be able to adapt to evolving circumstances, and obtain a high-level client commitment. CRESP II is a good example of a project which successfully lowered major barriers to a national scale-up of RE; applied a flexible design which evolved with the shifts in markets and client's needs; and secured critical government reforms by providing relevant analytical justification for the necessary interventions and aligning them with the country's development objectives. Designing and supervising the implementation of such complex, transformational, and evolving operations require a high-capacity institution, such as the World Bank, as well as counterpart teams that are equipped to provide both continuous high-level support and adequate management of the day-to-day operations. The project's experience provides lessons about the design and efficacy of TA operations that could be applied to other WB projects.

2. RE integration is a major emerging challenge to RE development and scale-up, and the project offers lessons on how power systems can be made more flexible for integrating variable RE technologies (such as wind and solar). The project, with the benefit of its adaptable design, undertook important studies that identified solutions, which led to key decisions and generated buy-in for committed subsequent implementation of reforms. RE integration is an area where the World Bank's applied experience has been limited. Solutions to RE integration challenges will become increasingly relevant for other developing countries as the share of variable RE in their electricity supply grows, and the project's experience in this area will be more and more useful for new operations.

3. Projects with adaptable design (such as CRESP-II) also need to have adaptable ToCs and adaptable RE frameworks (with indicators and targets that can be adjusted during implementation if specific circumstances, defined at design, change), which was not the CRESP-II case. At the time of CRESP-II appraisal, the World Bank operational policy did not require a ToC, but now is an integral part of project design. Having an adaptable ToC and an adaptable RF – the ones that can be progressively adjusted during implementation to reflect the modifications in the project design – would support the documentation of the logical links from project activities to intermediate and PDO-level outcomes and the achievement of project objectives.

4. Many impacts of policy reform may only be felt after a number of years, as was the case with CRESP-I. Many aspects of CRESP-II are likely to be the same. Therefore, it is important to not only

ascertain short-term results (i.e., by project closing), but consider proxy indicators that substantiate the likelihood of reforms taking hold and having a long-term impact (e.g., the renewable energy pilots leading to approach being adopted country-wide; standards for offshore wind). Long-term impacts can be proxied during the project implementation period based on evidence of expansion, replication, and measures of continuity.

13. Assessment Recommended?

No

14. Comments on Quality of ICR

The ICR provides a detailed history of the project; a good justification of the PDO relevance; comprehensive and robust evidence; a clear linking of evidence to findings; and a wealth of both general information and technical details to understand the value-added of the activities and the outcomes. The ICR has internal consistency. The lessons learned are linked to the narrative and the ratings and are useful for future lending operations. The sections on efficacy, risks to development outcome; environmental, social, and fiduciary compliance; and Bank performance are informative and contain useful analysis. At the same time, the ICR has the following weaknesses:

1. The description of the project outcomes (efficacy) in the ICR makes the logic of the interventions overcomplicated, with significant overlaps among the objectives and multiple details that obscure the main outcomes. In fact, project design in the PAD is clear, and following its logic (while possibly merging some of the components) would have helped to understand the outcomes better.

2. The TOC, which was designed for the ICR, has a significant deficiency: the intermediate outcomes are missing, obscuring how - through which processes - the PDO outcomes were achieved.

3. The ICR's discussion of the M&E includes a statement that the RF would benefit from the inclusion of indicators that would capture the national level implications of project results and another statement that the RF did not cover many of the project outcomes. This is one of the main reasons for the ICR's rating of the project's M&E as Modest. As noted in section 9 "M&E Design, Implementation, & Utilization", including national level results in the RF would involve attribution issues and a commitment to achieving results that are not fully under projects' or World Bank's control. The project's RF is assessed by the IEG as Substantial, largely because most of the indicators are attributable to the project, and also because of the balanced selection of the indicators across main areas of the project's value-added.

4. The ICR significantly exceeds the required length, and shortening some of the sections could increase the clarity of the main messages.

a. Quality of ICR Rating

Substantial