New Development Bank

INDEPENDENT EVALUATION OFFICE

People's Republic of China

PUTIAN PINGHAI BAY OFFSHORE WIND POWER PROJECT

PROJECT PERFORMANCE EVALUATION

FULL DOCUMENT | AUGUST 2024

Cover photo by © Fujian Zhongmin Offshore Wind Power Co., Ltd. (FZOWP)

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PREFACE

This report presents the findings of the Independent Evaluation Office (IEO) project performance evaluation (PPE) of the Putian Pinghai Bay Offshore Wind Power Project in the People's Republic of China. The project is the first clean energy and energy efficiency project to be evaluated by IEO in China.

Putian Pinghai Bay is located in Fujian Province, which is a national leader in clean energy: since 2019, 50% of its power supply has been generated from non-coal energy sources with the aim of increasing its clean energy supply even further. And Pinghai Bay itself, at the centre of the west coast of Taiwan Strait, enjoys the "valley effect", which brings high wind speeds, making it an ideal location for an offshore windfarm.

The Project represents a milestone as it is the first commercial-scale offshore wind farm in Fujian Province and is also China's largest offshore wind farm project. The experience and lessons learnt from this successful project also benefited the project design of the NDB-financed Guangdong Yudean Offshore Wind Power Project.

The NDB Board of Directors approved the loan for the project in November 2016 for NDB financing of RMB 2 billion in local currency, representing 40% of the estimated total project cost. The project's objective was to increase offshore wind power capacity in Putian Pinghai Bay by providing an adequate electricity supply to the province and catalyse offshore wind energy development with technological advances.

Overall, the project has been successful and contributed greatly to generating offshore wind power electricity and renewable energy in the Fujian Province and China. The project was significant to the sector priorities of the Government of China and the Province of Fujian. It enhanced both the country's and the province's renewable energy capacity even further than conceptualised at the appraisal stage of the project. The project showcased the Bank's dedication in delivering sustainable projects that are of high quality and value for money. Also, innovative technology patents were developed through the project and brought a positive impact on offshore wind development in China and the world.

Nevertheless, some aspects of the project could have been improved, such as: more performance indicators should have been developed to reflect the comprehensive nature of the project, an explicit theory of change in design would have been useful, and deeper attention should have been devoted to knowledge management including sharing of lessons and good practices. Furthermore, funds earmarked in project design for capacity-building were not used for the intended purpose, which would have been useful to build the skills and know-how of implementing authorities and others involved in execution.

I appreciate the constructive NDB Management Response to this evaluation, included in the report. I trust this report will help readers understand the lessons learnt from this successful offshore wind project and bring insights to future NDB-financed projects in clean energy and energy efficiency in China and beyond.

Ashwani K. Muthoo
Director General
Independent Evaluation Office

ACKNOWLEDGEMENTS

The Independent Evaluation Office (IEO) of the NDB would like to express its gratitude to all those who have contributed to this evaluation. Specifically, IEO is grateful to the Ministry of Finance of the People's Republic of China, the National Development and Reform Commission (NDRC), the Fujian Provincial Government, the Fujian Investment and Development Group Co., Ltd (FIDG), the Fujian Zhongmin Offshore Wind Power Co., Ltd. (FZOWP), the Fujian Development and Reform Commission, the Bureau of Statistics of Fujian, among other important stakeholders and partners. IEO is also grateful to beneficiaries who agreed to be interviewed by IEO during the evaluation process.

IEO would like to thank the NDB Board of Directors for their support and broader guidance to ensure the evaluation is appropriately customised to NDB's specific context. A special thanks is due to the NDB Management and Operations staff and other colleagues for their openness in sharing critical reports, data, and insights.

Moreover, IEO would like to express appreciation to the Asia-Pacific Finance and Development Institute for being the peer reviewer of the report. Their comments are included in the final report.

This evaluation has been conducted under the overall supervision and direction of Mr. Ashwani K. Muthoo, Director General of IEO. He was ably supported by Ms. Jin Zhao (IEO Evaluation Specialist), Mr. Igor Andre Bastos Carneiro (Senior Evaluation Expert), Mr. Yiyang Shen (Energy Expert) and Mr. Jinghong Zhang (IEO Evaluation Research Analyst). Ms. Jaqueline Rabelo Souza and Mr. John Laird, from IEO, were responsible for editorial quality assurance, proof reading, design and layout, and outreach of the publication.

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ABBREVIATIONS AND ACRONYMS

DMF	Design and Monitoring Framework
ESG	Environmental, Social and Governance
FBA	Finance, Budget and Accounting
FIDG	Fujian Investment and Development Group Co., Ltd.
FIRR	Financial Internal Rate of Return
FYP	Five-Year Plan
FZOWP	Fujian Zhongmin Offshore Wind Power Co., Ltd.
MDB	Multilateral Development Bank
M&E	Monitoring and Evaluation
O&M	Operations and Maintenance
PCR	Project Completion Report
PDB	Project Document to the Board
PIA	Project Implementation Agency
PIU	Project Implementation Unit
PPF	Project Preparation Fund
PPR	Project Progress Report
PTL	Project Team Leader
RE	Renewable Energy
SDG	Sustainable Development Goal
TA	Technical Assistance
ToC	Theory of Change

CURRENCY UNITS AND EQUIVALENTS

Chinese yuan = RMB
United States dollar = USD
USD 1 = RMB 6.78 | RMB 1 = USD 0.152
(As per Project Appraisal on November 07, 2016)

USD 1 = RMB 6.37 | RMB 1 = USD 0.157
(As per the Project Completion on December 21, 2021)

MEASURES

GW	Gigawatt (1,000 Megawatts)
GWh	Gigawatt-hour (1,000 Megawatt-hours)
kV	Kilovolt (1,000 volts)
KWh	Kilowatt-hour (1,000 watt-hours)
MW	Megawatt
MWh	Megawatt-hours

EXECUTIVE SUMMARY

Project background and design

With China's development path towards green and sustainable development, the objectives of the Putian Pinghai Bay Offshore Wind Power Project are two-fold:

(i) to increase offshore wind power capacity in Putian Pinghai Bay to provide adequate electricity supply to Fujian province; and

(ii) to catalyse offshore wind energy development with technological advances, supporting the reduction of carbon dioxide (CO_2) emissions in the province and country.

The project envisioned the development of a utility scale wind power plant with a rated capacity of up to 246 megawatts (MW) and associated interconnection facilities at Pinghai Bay of Putian City, a nearshore wind hotspot lying on the west coast of the Taiwan Strait in Fujian Province. The project is the first commercial-scale offshore wind farm in Fujian that has demonstrated the viability of advanced construction methods for complex seabed conditions and nurtured local supply chains for turbine manufacturing.

The NDB-financed project – phase II of a previously implemented wind turbine scheme in the Putian Bay (see footnote 2 for more information) – was designed to generate 873 million kWh of electricity in the first year (with full capacity installed) and avoid an average of 869,900 tonnes of CO_2 emissions annually. The NDB Board of Directors approved the loan for the project on November 2016 for an NDB financing of RMB 2 billion in local currency, 40% of the estimated cost at RMB 4,960 million. The borrower is The People's Republic of China, The People's Government of Fujian Province is the project entity, and the project implementation agency (PIA) is the Fujian Investment and Development Group Co., Ltd. (FIDG).

Evaluation methodology and process

This evaluation used the internationally recognised evaluation criteria adopted by the Evaluation Cooperation Group of the Multilateral Development Banks. The following criteria therefore provided the framework for assessing project performance: relevance, effectiveness, efficiency, impact and sustainability. Additionally, IEO evaluated NDB and borrower performance, respectively.

The evaluation used mix methods for data collection and analysis, including a review of secondary data, site visits, interviews with key implementing agencies, especially FIDG and the Fujian Zhongmin Offshore Wind Power Co., Ltd (FZOWP) which is the project implementation unit (PIU), as well as project beneficiaries, collaborating institutions, NDB staff, and others. More than 150 people were convened from the various stakeholders, implementing partners at various tiers of government, the private sector, and research and academic institutions.

The evaluation team also visited all the main project sites such as the wind turbines at sea and substations. This gave the IEO team the opportunity to assess first-hand the infrastructure put in place and the impact it generated.

Project performance

Overall project achievement: Successful. Overall, the project has been rated as successful because: it was completed with fewer resources than originally planned, it exceeded the proposed indicators in the design and monitoring framework (DMF), it incorporated innovative and energy efficient aspects – 11 technological patents were generated; and it was implemented with due consideration of social and environmental safeguards. The project was highly relevant to the development strategies of China and Fujian, as well as NDB's general strategies throughout preparation and implementation; generated substantial development impacts; achieved its proposed outcomes quite effectively; and was assessed to be financially sustainable. The project exceeded the aforementioned outcome target by generating 1,043 million kWh electricity in the first year after completion, and has achieved significant reductions in greenhouse gas emissions since grid connection: projected calculations estimate that 1.02 million tonnes of CO_2 will be eliminated annually. The project does, however, have some areas which require improvement, such as the need for a more explicit and documented theory of change (ToC), provision of deeper technical assistance (TA) in design and implementation support during execution, and the non-use of funds earmarked for capacity-building which were reallocated for other purposes.

Relevance: Successful. The project is fully aligned with the policies and strategies of the Government of China, especially in the expansion of renewable energy and offshore wind power. The project is also in alignment with and contributes to multiple Sustainable Development Goals (SDGs). The project design is in line with NDB's General Strategy for 2017-2021 which underlined renewable energy and energy efficiency as an NDB's priority. The DMF indicator of the project involved the production of electricity, and the reduction of CO_2 emissions. Other aspects could have been captured in the DMF, such as innovation, social benefits and impact to the industry. An explicit ToC could have benefitted the project design.

Effectiveness: Highly successful. The project has successfully delivered all its planned outputs and outcomes. As per the DMF, projected outputs included the installation of 250 MW offshore wind capacity, assuming fifty units of 5 MW wind turbines similar to those used in phase I. By December 2021, the project had commissioned 246 MW capacity with 41 units of 6 MW wind turbines. The slight change from the original target was a result of efficiency gains accomplished from technology improvements that augmented the size and capacity of an individual turbine. Besides this, the project provided good demonstration of the importance of green financing supporting offshore wind power sector development in its early stages and has generated valuable experience in project management and safety manuals for offshore wind development in China.

Efficiency: Successful. The project was completed in December 2021, two years behind the planned commission schedule. Difficulties in rough seabed construction, the change of turbines from 5 MW to 6 MW, change of feed-in tariff policy and COVID-19 contributed to this delay. The project is financially efficient with its ability to generate profits, and the direct payment method and zero-error loan disbursement guaranteed the financial success of the project. The NDB loan in local currency is highly appraised by the borrower and PIA.

Impact: Highly successful. Overall, the project impact is considered as positive based on the results achieved within a brief period after completion. The project has generated a positive impact on the region's social-economic development, benefiting the local population with the opportunity of building offshore power industry as one of its development pillars, translating into more employment opportunities and creating revenue for local government. The project made very good demonstration of offshore wind power technology localisation, the success of the project has strong catalytic and replicable effects for expanding offshore wind power operations in China and other emerging market and developing economies.

Sustainability: Successful. There are several factors to consider in the sustainability of the project, including technical operations, institutional and financial sustainability. The project is sustainable in terms of the technical staff capacity and the compliance with technical standards of safety and environmental safeguards. The project can already sustain itself financially through the revenues it generates, especially since it benefitted from the feed-in tariff subsidy before that offer expired. The project is also environmentally sustainable and has led to a high decrease in CO_2 emissions, lower than expected noise pollution due to innovative technologies in the turbine blades, and no additional air pollution. Despite encouraging sustainability prospects, the inclusion of an explicit exit strategy and resources allocated to it could have been improved in design.

NDB's performance: Successful. This project served as a flagship project in the realms of renewable energy and sustainable development, contributing to climate change mitigation and adaptation, including energy transition. NDB has some major assets compared to other MDBs that clients appreciate, such as its high confidence in country systems and lending in the local currency. In the case of this project in China, the project implementation progressed due to mature country systems and robust regulatory systems in place. It also counted on the strong technical capacity and implementation ability of the PIA/PIU. The NDB operations, loan disbursement and procurement staff offered flexibility and appropriate support in processing loan withdrawals and reimbursement applications to support the success of the project.

It is important to mention that this was one of the first projects ever approved by NDB, and with small staff capacity (numbers) at the time, project design and supervision limitations to some extent hindered better project results. The high turnover of the NDB staff assigned to the project limited the Bank's oversight and contribution during its execution. The mid-term review (MTR) appraisal was not in place for monitoring and evaluation (M&E). More extensive DMF indicators and an explicit ToC could have benefited the rationale for project interventions and presented its role into a larger scale intervention that would play, as well as its role in other sustainable development interventions, such as the SDGs.

NDB provided financial additionality towards the project yet with limited capacity-building and technical assistance. A systematic knowledge management strategy and products, including a visibility plan was not in place, which could have benefited not only this project but also other similar projects in the Bank.

Borrower performance: Successful. The borrower's performance was a key factor for the successful delivery of the project. The borrower displayed effective commitment and complete policy support to encourage clean energy development and green growth. This engagement was stimulated via the provision of a feed-in tariff and a sound business enabling environment, essential to enable the financial feasibility of the project. This included assisting the signing of on-lending agreements, supporting the resolution of concerns, withdrawal requests, monitoring procurement and use of loan proceeds, causing PIA and PIU to provide regular reporting, M&E, and other implementation issues. One of the main drivers for the successful project accomplishments was the elevated levels of communication and engagement established by all implementing stakeholders and the dynamic management of activities through players. PIA/PIU also have strong financial performance and have the capacity to guarantee the success of the project.

Conclusions

Overall, the Putian Pinghai Bay Offshore Wind Power Project has been successful and contributed greatly to generating offshore wind power electricity and renewable energy in the Fujian Province and China. The project was significant to the sector priorities of the Government of China and the Province of Fujian. It enhanced both the country's and the province's renewable energy capacity even further than conceptualised at the appraisal stage of the project. As a milestone project in NDB history, it has showcased the Bank's dedication in delivering sustainable projects with high quality and value for money.

The project has accomplished and surpassed its indicated goals and indicators as presented at the DMF in terms of electricity generation and reduction in CO_2 emissions. The success of the project showcases the significance of high-level and strong commitment and coordination between a range of public and private agencies with the capacity for planning, designing, financing, implementing and managing the project. Also, the effective institutional and communication arrangements at the project site were fundamental for the planning and implementation of the project, even with the "rushing" of connecting to the grid before preferential tariff policy ends.

Nevertheless, some aspects of the project could have been improved. Although the project team made great efforts in mobilising resources to obtain useful advice in project design, operations and maintenance (O&M), sector policy and standards – especially given that at the time, offshore wind power was in a relatively early development phase in China – more attention could have been given to the DMF structure, such as more indicators to reflect the comprehensive nature of the project, as well as a ToC to better articulate project activities and impact. Recognising the project team's effort in providing advice at early stage, more strategically designed technical assistance provided by the Bank could benefit the project and maximise impact. The evaluation team also recognised the project team's effort in organising an expert panel to provide guidance and assistance in O&M. However, given the lack of experience in implementing large offshore wind power projects in the country, an exit strategy could have been better designed, as well as an O&M arrangement and decommissioning plan. M&E, knowledge management and visibility could also have also been elevated. The evaluation team noted that there was also a lack of staff continuity in the project, which affected supervision and limited evaluation efforts. It is noteworthy to mention that even with these small gaps mentioned above, the experience and lessons learnt from this project also benefited the project design and capacity-building of the NDB-financed Guangdong Yudean Offshore Wind Power Project.

Recommendations

Recommendation 1: Further consolidate technical assistance at the initial stage of the project and better use the Project Preparation Fund (PPF) for future projects. TA, in early stage of project development cycle supported by the NDB, could help better address enhancements to offshore wind related technologies/policies, strengthen domestic capacity, reduce costs, and mitigate risks to facilitate financing. This early involvement allows for the development of mitigation strategies, reducing the likelihood of issues arising during the project lifecycle and guarantee the quality of an NDB financed project with international technical resources.

Recommendation 2: Design a well-adjusted ToC at appraisal and gradually fine-tune it during project implementation. Project design should be flexible enough to adjust to evolving conditions so that objectives can be effectively reached, with suitable team capacities to lead implementation and supervise operational characteristics of a flexible designed project.

Recommendation 3: Improve project implementation support and supervision. With several areas to consider – environmental, social, and governance, finance, budget and accounting, strategy, procurement, and others – NDB needs to improve project implementation support and supervision, this being a crucial factor for ensuring the success and effectiveness of projects. In the beginning of every project, a delivery team must be assigned, and frequent meetings should take place with the team leader to ensure that information is always updated to all members.

Recommendation 4: Enhance the design of monitoring and evaluation frameworks. M&E frameworks from NDB should capture project results and provide the necessary intelligence and guidance for the PIA to visualise possible financial gains from project activities. Indicators could have been captured with a better M&E framework. A strong M&E framework is also the result of an efficient ToC and results matrix.

Recommendation 5: Strengthen project exit strategies. IEO recommends that future NDB projects should focus not only on strengthening project design and implementation, but also on exit strategies. Exit strategies for development projects are crucial for ensuring sustainability and lasting impact after the project ends. Long-term impacts can be proxied during the project implementation period based on evidence of expansion, replication and measures of continuity.

Recommendation 6: Improve project knowledge management. Improving the knowledge management of NDB projects is essential for facilitating scaling up and ensuring the sustainability and replicability of successful initiatives. IEO strongly recommends that NDB systematically document both successes and failures throughout the project lifecycle with a knowledge management and visibility plan.

摘要

项目背景和设计

在践行国家绿色可持续发展理念的大背景下，莆田平海湾海上风电项目有两大目标：一是提高莆田平海湾海上风电场的产能，为福建省提供充足的电力供应；二是通过技术进步带动海上风能开发，为全省和全国实现二氧化碳减排贡献力量。

该项目选址于莆田平海湾，是福建省台湾海峡西海岸一处近岸风能资源区，计划在此建设246兆瓦装机容量的大型海上风电场，包括相关的并网设施。该项目是福建首个商业规模的海上风电场，也证明了在复杂海底地质条件应用先进施工方法的可行性，培育发展了本土风机制造供应链。

该项目（莆田平海湾海上风电项目二期，详见注释2）得益于新开发银行贷款支持，预计第一年可实现年发电量8.73亿千瓦时（全部装机容量），平均每年可减少二氧化碳排放86.99万吨。新开发银行董事会于2016年11月批准由新开发银行为该项目提供20亿元人民币本币贷款，占该项目预估成本（49.60亿元人民币）的40%。借款方为中华人民共和国，项目方为福建省人民政府，项目执行机构为福建省投资开发集团有限责任公司。

评价方法和流程

本次评价采用了Evaluation Cooperation Group（由多边开发银行评价机构组成的联合组织）认可的国际公认评价标准。在构建评价框架以评价项目成效时，考虑了以下几个维度：相关性、有效性、效率、影响力和可持续性。此外，独立评价局还分别就新开发银行和借款方的表现进行了评价。

本次评价采用了混合方法进行数据收集和分析，包括审查二手资料、进行实地考察，走访和访谈主要执行机构，特别是福建省投资开发集团有限责任公司和项目实施单位福建中闽海上风电有限公司，以及项目受益人、合作机构、新开发银行工作人员等。来自各利益相关方、各级政府执行合作单位、私营部门和学术研究机构的150多人参与了访谈。

评价小组还走访了所有主要的项目现场，如海上风电场地和变电站。这有利于独立评价局评价小组对已建成的基础设施及其影响进行第一手评价。

项目成效

项目总体成果：成功。总体上，该项目取得了圆满成功，用低于原计划的资源完工，完工指标优于设计和监测框架中确定的水平，在创新和节能方面成效显著——产生了11项技术专利，并且在实际落实中合理保障了社会和环境需求。该项目在整个筹备和实施过程中，始终保持与中国和福建省的发展战略以及新开发银行的总体战略高度一致，具有重大发展影响力，有效地实现了项目的预定目标，并具备经济上的可持续性。该项目竣工后第一年的发电量达10.43亿千瓦时，高于原定目标，在并网后显著降低了温室气体排放量：预计每年可减少二氧化碳排放102万吨。该项目也存在有待改进之处，例如，应有明确的变革理论，在设计和执行阶段应分别提供更深层次的技术支持和实施支持，以及未使用能力建设专项资金。

相关性：成功。该项目完全符合中国政府的政策与战略方向，尤其是在加强对可再生能源和海上风电的开发利用方面。同时，该项目与多个可持续发展目标保持一致，并有助于实现这些目标。该项目的设计符合新开发银行2017-2021年总体战略，该战略强调了可再生能源和能源效率是新开发银行的优先发展事项。该项目的设计和监测框架指标涵盖了电力生产和二氧化碳减排。设计和监测框架中本还可以纳入其他维度，如创新、社会效益和对行业的影响。如果有明确的变革理论，可能会有益于项目设计。

有效性：非常成功。该项目按计划成功实现了所有的产出和成果目标。根据设计和监测框架，假设安装50台类似于一期工程中所用的5兆瓦风力涡轮机，预计产出为250兆瓦海上风电装机容量。截至2021年12月，该项目已安装41台6兆瓦风力涡轮机，装机容量达到了246兆瓦。与原定目标略有不同是由于技术进步，单个风机的尺寸和产能都有所提升，从而提高了发电效率。此外，该项目还很好地证明了在海上风电行业发展初期通过绿色融资提供支持的重要性，并为中国海上风电的开发积累了宝贵的项目管理经验和安全手册范本。

效率：成功。该项目于2021年12月竣工，比计划投运时间晚两年。工期延误有多方面的原因，包括恶劣的海底施工环境、风机型号由5兆瓦变为6兆瓦、电价政策发生变化，以及新冠疫情的爆发。该项目具备盈利能力，财务效率高，且直接支付方式和零误差贷款发放确保了该项目在财务上取得成功。新开发银行使用本地货币提供贷款的做法获得了借款方和项目执行机构的高度评价。

影响力：非常成功。总体而言，从该项目竣工后短期内取得的成果上来看，项目产生了积极影响。该项目有力推动了当地的社会经济发展，通过将海上风电产业发展为当地的支柱产业之一，使当地居民受益，为当地提供更多的就业机会并增加了当地政府的财政收入。该项目为海上风电技术本土化提供了绝佳示范，且该项目的成功具有很强的催化和复制效应，能够带动中国和其他新兴市场和发展中经济体海上风电的发展。

可持续性：成功。评价该项目是否具有可持续性需要考虑多个因素，包括技术运营、机构和财务的可持续性。该项目规划和施工人员均具备专业知识和技能，项目生产施工过程中严格遵守安全和环境标准，充分体现了可持续性。该项目创造了足够的收益，实现了财务上的自给自足，特别得益于在电价补贴政策到期前享受该政策带来的红利。此外，该项目还注重环境的可持续发展，实现了二氧化碳排放量的大幅减少，同时由于风机叶片技术创新，所产生的噪音污染低于预期，也没有造成其他的空气污染。该项目可持续性前景较好，但在明确的退出战略的设计以及相应资源的匹配方面仍可以提升。

新开发银行表现：成功。作为可再生能源和可持续发展领域的旗舰项目，该项目有助于减缓和适应气候变化，包括能源转型。与其他多边开发银行相比，新开发银行有其独特之处并受到借款方认可，如对国家制度的高度信赖以及以本地货币提供贷款。就该项目而言，正是由于中国拥有成熟的国家制度和健全的监管制度，项目才得以在中国顺利实施。项目执行机构/单位强大的技术能力和执行能力也为项目提供有力保障。新开发银行的项目团队、贷款发放和采购人员在处理贷款提款及还款申请方面极具灵活性，能够提供恰当的支持，确保了项目的成功。

值得一提的是，莆田平海湾项目是新开发银行批准的首批项目之一，并且由于当时银行员工体量（数量）较小，在项目设计和监督方面存在局限性，这在一定程度上妨碍了项目取得更好的成果。新开发银行该项目的工作人员更换频繁，限制了银行在项目执行期间充分发挥监督作用。该项目并未进行中期审查评估。如果在设计和监测框架中纳入更多的指标并提供明确的变革理论，可能有助于为项目干预提供依据，并在更大规模的范围中发挥应有的作用，以及在其他可持续发展方面（如可持续发展目标）中发挥作用。

新开发银行为项目提供了资金支持，但在能力建设和技术方面提供的支持有限。此外，新开发银行未提供系统性的知识管理战略和产品，包括提升项目关注度计划等，如果提供了这类战略和产品，受益的不仅是莆田平海湾项目，还包括银行的其他类似项目。

借款方表现：成功。借款方的表现是影响项目成功交付的关键因素。借款方为推动清洁能源开发和绿色增长提供了切实的承诺和全面的政策支持。借款方保障上网电价和良好的营商环境，对项目的财务可行性至关重要。具体措施包括协助签署贷款转贷协议、支持解决关切问题、提款申请、监督采购和贷款的使用、要求项目执行机构和单位定期提供报告、监测和评价以及与其他项目实施问题有关的信息。项目取得成功的主要因素之一是所有参与项目实施的利益相关方建立起良好的沟通和高水平的参与模式，并通过各参与方对各类活动进行动态管理。项目执行机构/单位的财务表现强劲，有能力保证项目的成功。

结论

总体上，莆田平海湾海上风电项目取得了圆满成功，为福建省和中国的海上风力发电和可再生能源做出了突出贡献。该项目也对中国政府和福建省行业优先发展领域至关重要。该项目提高了中国和福建省的可再生能源产能，甚至超出了项目评估阶段的构想。作为新开发银行历史上的里程碑项目，它展现银行发展高质量可持续项目和有效投资。

就发电量和二氧化碳减排而言，该项目不仅完成并且超出了设计和监测框架中设定的目标和指标。该项目的成功表明，非常重要的一点是，各个公共机构和私营机构提供高水平的坚定承诺并协调合作，且具备进行项目规划、设计、融资、实施和管理的能力。此外，在项目现场实施有效的制度和沟通安排对项目的规划和实施同样至关重要，甚至包括在优惠电价政策到期前的“抢装潮”火速并网。

尽管如此，项目在某些方面仍有待改进。我们十分认可项目团队在资源调配方面付出的巨大努力，特别在项目设计、运营和维护、行业政策和标准方面提供必要的建议；尤其是考虑到当时中国海上风电处于相对早期的发展阶段在设计阶段，需要通过战略设计，在关键路径上提供技术支持，使其发挥最大的作用。基于项目团队在早期的努力，银行更加战略性的技术援助可以使项目受益并最大限度发挥其影响力。评价团队十分认可项目团队通过组织专家小组为项目提供运维指导和帮助方面所做的努力。然而，鉴于当时中国缺乏实施大型海上风电项目的经验，本可以更好地设计退出策略，以及运维安排和风机退役计划。项目的监测与评价、知识管理和关注度计划还可以得到进一步提升。项目工作人员不稳定可能会影响对项目的评价，并给评价带来局限性。值得一提的是，即使存在上述这些微小的提升空间，该项目的经验有利于新开发银行贷款支持的广东粤电海上风电项目的设计和能力建设。

建议

建议 1：在项目初期阶段整合技术支持，更合理地使用项目筹备资金建设未来的项目。在新开发银行的支持下，于项目开发周期的初期提供技术支持，有利于实现海上风电相关技术/政策的改进，加强国内产能，降低成本，减少风险，从而促进融资。这种早期参与模式有助于制定缓解策略，降低在项目生命周期内出现问题的可能性，并利用国际技术资源保证新开发银行投资项目的质量。

建议 2：在评估阶段设计具有良好适应性的变革理论，并在项目实施过程中逐步对其进行微调。项目设计应足够灵活，以便根据不断变化的情况做出调整，从而有效达成目标，并且项目团队应具备适当的能力，以成功实施采用灵活设计的项目，并监督项目的运行特性。

建议 3：优化项目实施支持和监督。项目需要考虑环境、社会责任和公司治理，财务、预算和会计，以及战略、采购等多个因素，新开发银行需改进项目的实施支持和监督，这是确保项目成功和有效的关键因素。在每个项目启动时，须指定一个交付团队，并经常与团队负责人进行会议沟通，以确保所有项目成员能随时了解最新信息。

建议 4：改进监测和评价框架的设计。新开发银行的监测和评价框架应能反映项目成果，并为项目执行机构提供必要的信息和指引，使其能够直观地了解项目活动可能带来的财务收益。一个更好的监测和评价框架有助于引入各类指标。而良好的监测和评价框架则源自于有效的变革理论和成果矩阵。

建议 5：重视项目退出战略。独立评价局建议，在未来的新开发银行项目中，不仅应重视加强项目的设计和实施，还应注重退出战略。为开发项目制定退出战略，对于确保项目结束后的可持续性和持续影响至关重要。在项目实施期间，可以基于扩张、复制和连续性措施来预测项目的长期影响。

建议 6：改善项目知识管理。改善新开发银行项目的知识管理，对于扩大规模、确保成功举措的可持续性和可复制性至关重要。独立评价局强烈建议新开发银行系统地记录整个项目生命周期中取得的成功经验和教训，重视知识管理和关注度提升计划。

MANAGEMENT RESPONSE

General Comments

The Management appreciates IEO's comprehensive evaluation of the Putian Pinghai Bay Offshore Wind Power Project.

The Project represents NDB's first endeavor in promoting offshore wind power – a promising clean energy technology that had not been used earlier in scale in NDB member countries due to technological complexities. The Bank's involvement not only effectively lowered the financing cost and crowded in public and private funds, but also mitigated technical risks by leveraging international best practices through capacity building and knowledge-sharing events facilitated by the experts mobilized by NDB, such as China Renewable Energy Engineering Institute (CREEI), DNV GL, and ITPEnergised Group. With the support of NDB, CREEI released the Handbook for Developing Offshore Wind Power Projects in China in 2017, to guide the application of offshore wind power technologies. Multiple workshops were organized subsequently for knowledge dissemination among design institutes, developers, investors, and equipment manufacturers. Specifically, the NDB helped the client:

(i) familiarize with the development trend of offshore wind technology, including details and specifications of equipment that has a proven track record, and principle foundation types used globally;

(ii) identify challenges and mitigation measures during development and operation based on global experiences, such as seabed conditions, scour, grid connection, weather windows, coordination of vessels, turbine reliability, O&M, etc; and

(iii) improve project design, including advice provided on the selection of wind turbines, prediction on energy yield based on different designs, and a preliminary O&M plan. All these led to a highly successful project which exceeded the planned targets and had broader development impact on the offshore wind power industry in China.

The Management's responses on the recommendations of IEO are presented below:

Recommendation 1: Consolidate technical assistance at the initial stage of the project and better use the Project Preparation Fund (PPF) for future projects. TA in early stage of project development cycle supported by the NDB could better help address enhancements to offshore wind related technologies/policies, strengthen domestic capacity, reduce costs, and mitigate risks to facilitate financing. This early involvement allows for the development of mitigation strategies, reducing the likelihood of issues arising during the project lifecycle and guarantee the quality of an NDB financed project with international technical resources.

Management Response

The Management agrees with this comment, however, needs to correct that this project in fact is a good example and case in point for providing technical assistance even in absence of project preparation fund. Because the PPF was only established after the approval of this project. The project experience paves way and provides lessons and experience for recognizing the need to establish the PPF. The Management continues to support and encourages use of NDB PPF to improve the design, enhance the quality and generally contribute to the preparation of projects. To this end, a number of measures to increase efficiency of NDB PPF has been undertaken. For instance, upon proposal of NDB the donors have expanded PPF eligibility criteria by including sub-nationals governments as recipients. The approvals process for TA transactions has been streamlined with delegation of TA approval from the Board of Directors (BoD) to the Credit and Investment Committee (CIC). In line with BoD approved organizational structure NDB regional offices and centers have been tasked to carry out TA in coordination with HQ. As a result of these measure the first TA transaction was signed (for preparation of Kohima Town Water Supply Augmentation Project in India) and NDB regional offices are proactively looking for similar opportunities in other NDB member countries.

Recommendation 2: Design a well-adjusted ToC at appraisal and gradually fine-tune it during project implementation. Project design should be flexible enough to adjust to evolving conditions so that objectives can be effectively reached, with suitable team capacities to lead implementation results and supervise operational characteristics of a flexible designed project.

Management Response

The Management acknowledges the importance of Theory of Change (ToC) at the various phases of project and has already put in place necessary tools both at the appraisal and implementation stages. Every project document to the Board (PDB) includes a dedicated Design and Monitoring Framework (DMF) section outlining project objectives and their indicators based on the theory of change approach, in line with the practice of other MDBs. During project implementation stage project teams undertake continuous tracking of achievement of DMF indicators to assess the progress and address any potential challenges faced by the project.

In addition, economic evaluation, analyzing and quantifying the environmental, social, and economic benefits is rigorously carried out for each project. Economic evaluation serves as one of the most effective and relevant tools MDB uses to translate the project's designed objectives to concrete benefits and size them in both qualitative and quantitative ways. It clearly identifies the beneficiaries of the project and explains the impact logic from each project component NDB finances to the project's impacts on people's life, the environment, the nation and NDB's value addition to the beneficiaries. This assessment also links closely with the DMF's output, outcome, and the development impacts.

Recommendation 3: Improve project implementation support and supervision. With several areas to consider – environmental, social, and governance (ESG), finance, budget and accounting (FBA), strategy, procurement, and others - NDB needs to improve project implementation support and supervision, this being a crucial factor for ensuring the success and effectiveness of projects. In the beginning of every project, a delivery team must be assigned, and frequent meetings should take place with the team leader to ensure that information is always updated to all members.

Management Response

The Management agrees that project implementation and supervision plays a key role in ensuring the achievement of project objectives and pays significant attention to constantly improving the quality of project implementation and fostering collaboration amongst various NDB functions. For each project a multidisciplinary project team consisting of experts from Operations, ESG, Procurement, FBA and other functions is created. And this team continues to support the client after the loan approval, during the project implementation stage. For example, the NDB procurement team ensures project readiness, conducts risk-based reviews, and monitors mitigation measures, strengthening client capacity and project effectiveness through regular evaluations at review missions and progress report stages.

To further increase efficiency of this work and enhance responsiveness to developments in project implementation, it has been decided that the project team at the implementation stage be led by staff from the respective NDB regional office.

Recommendation 4: Enhance the design of monitoring and evaluation frameworks. M&E frameworks from NDB should capture project results and provide the necessary intelligence and guidance for the PIA to visualize possible financial gains from project activities. Indicators could have been captured with a better M&E framework. A strong M&E framework is also the result of an efficient ToC and results matrix.

Management Response

The Management acknowledges the importance of enhancing the design of monitoring and evaluation frameworks and as mentioned earlier in the comment to Recommendation 2 has already put in place necessary tools both at appraisal and implementation stages. The NDB Management recognizes the importance of Monitoring and Evaluation framework (M&E) and integrates it in the DMF. It includes indicators tailored to specific project needs. Staff are encouraged to continually improve the quality of DMF with a better designed and robust M&E framework.

Recommendation 5: Strengthen project exit strategies. IEO recommends that future NDB projects should focus not only on strengthening project design and implementation, but also on exit strategies. Exit strategies for development projects are crucial for ensuring sustainability and lasting impact after the project ends. Long-term impacts can be proxied during the project implementation period based on evidence of expansion, replication, and measures of continuity.

Management Response

The Management attaches great importance to sustainability aspects of NDB financed projects. In terms of the example, for the Project at issue, the project entities have been requested to and developed a special decommissioning plan for Phase 1 (the same will also be done for other phases) and allocated a budget of RMB 205 million to cover costs of decommissioning turbines, towers and foundations. The same rigorous approach to sustainability is being practiced in other projects supported by NDB with no exception.

Recommendation 6: Improve project knowledge management. Improving the knowledge management of NDB projects is essential for facilitating scaling up and ensuring the sustainability and replicability of successful initiatives. IEO strongly recommends that NDB systematically document both successes and failures throughout the project lifecycle with a knowledge management and visibility plan.

Management Response

The Management acknowledges the importance of accumulation of knowledge from Bank's operations and exchanging lessons learned and good practice with member countries, clients and development partners. Generally, all lessons learned and good practices are recorded in project completion reports that are subsequently disseminated internally and to the clients. For this specific Project, NDB mobilized international offshore wind experts and domestic pioneering design institutes to provide critical support in project design, construction, operation and maintenance (O&M) and other key technological areas. At the project completion stage, NDB proactively assisted the project entities in summarizing project's achievements and experiences.

The innovation features and lessons learned in project design and construction have been documented and shared by NDB through international and domestic fora, including

(i) a presentation on NDB's experience in supporting offshore wind power projects in China at the 4th workshop of the Climate-Smart 16 Connectivity Infrastructure Workshop Series co-hosted by the Multilateral Cooperation Center for Development Finance (MCDF), Egyptian Ministry of Finance, the Asian Infrastructure Investment Bank, the Islamic Development Bank and the Vulnerable Twenty Group for preparation of the UN Climate Change Conference (COP27); and

(ii) a joint presentation with project implementation unit officials on the Project's strategic planning, development impacts, and pioneering solutions to key technical challenges at the projects showcasing workshop during NDB's Annual Meeting in 2023.

These knowledge disseminating exercises not only received positive feedback from both domestic and international stakeholders but also enhanced the visibility of the Project and NDB. In particular, with the contribution from NDB, the Project was featured as a key case study in MCDF's workshop series summary report "Climate-Smart Connectivity Infrastructure: Best Practices and Case Studies", which was launched publicly on November 20, 2023.

I. BACKGROUND

A. Project context

1. In November 2016, NDB's Board of Directors approved a sovereign loan in the amount of RMB 2 billion to finance the Putian Pinghai Bay Offshore Wind Power Project. It represented as a milestone, being the largest ever project-based lending to offshore wind farms in China proposed by any international development organisation or multilateral development bank (MDB).[1]

2. The project is a sovereign (or public sector) initiative designed to boost renewable energy in China. It represents the second phase of a 604 MW offshore wind power project (phase one of which had been implemented without NDB funding).[2] The total cost of the project for phase II was estimated to be RMB 4.96 billion.

3. The original objective of the project is to increase offshore wind power capacity in Putian Pinghai Bay in the Fujian Province to provide adequate electricity supply to the province and to catalyse offshore wind energy development with technological advances.

4. Following the Board's approval in 2016, the NDB loan agreement (16CN02) was signed on September 3, 2017, and declared effective on November 14, 2017. The project was originally scheduled to be implemented over three years or 36 months. However, due to unexpected challenges during implementation, as well as difficulties caused by the COVID-19 pandemic, the closing date was changed to four years (or 48 months) from the signing date (as per the Loan Agreement Amendment). The project was finally completed in December 2021.

B. Country context

5. China's economy, the second largest globally by nominal gross domestic product (GDP), has undergone remarkable transformations since the reform and opening up policies enacted by the Government in 1978. By the end of 2022, China's GDP reached USD 17.96 trillion, ranking it the second worldwide and representing 18% of global GDP. Between 2013-2021, China contributed on average 38.6%[3] to the world economy's growth, exceeding the overall contribution from G7 countries. Transitioning from a centrally planned system to a more market-oriented one, China has experienced rapid economic growth, averaging around 10% annually for three decades. This growth has lifted hundreds of millions out of poverty, with China's GDP per capita increasing significantly. Nevertheless, due to the COVID-19 pandemic, like the rest of the world, the economy began to show signs of slowing down, transitioning to a more sustainable, albeit slower, growth model focused on domestic consumption, services, and innovation rather than heavy industry and exports. In 2021, China's GDP growth bounced back to 8%, but reduced again to 3%[4] – still, however, outshining most other major economies – in 2022.

1 NDB *Project Completion Report.*
2 In phase I, funded by the Fujian Investment and Development Group Co. Ltd. and commercial banks, 10 turbines were constructed with a total power capacity of 50 MW. In phase II, 41 turbines were added with a capacity of 246 MW. An additional 44 turbines, with a capacity of 308 MW, will be added in phase III of the project, funded by FIDG, the Putian Urban Construction Investment and Development Group Co. Ltd., and commercial banks.
3 National Bureau of Statistics of China (2022).
4 On November 7, 2023, the International Monetary Fund (IMF) adjusted China's GDP growth rate with additional 0.4% increase in 2023 and 2024 due to its stronger performance in Q3 and China's recent published polices.

TABLE 1

Economic statistics of China

					Projected					
	2017	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
GDP, current prices (USD billion)	12,265	13,842	14,341	14,863	17,759	17,886	17,701	18,560	19,782	21,060
GDP growth	7%	7%	6%	2%	8%	3%	5%	4%	4%	4%
Per capita GDP (USD)	8,760	9,849	10,170	10,525	12,572	12,670	12,541	13,156	14,031	14,952
Share of world GDP (in PPP terms)	16%	17%	17%	18%	18%	18%	19%	19%	19%	19%
Population (millions)	1,400	1,405	1,410	1,412	1,413	1,412	1,411	1,411	1,410	1,409

Source: IMF's World Economic Outlook Database (October 2023).

6. China's development achievements are manifold, reflecting its economic boom. The country has made significant strides in infrastructure development, including the world's largest high-speed train network, massive urbanisation, and technological advancements. China has become a global leader in renewable energy sectors, such as wind and solar power, and is investing heavily in next-generation tech industries like artificial intelligence and electric vehicles. Education and scientific research have also received substantial investment, leading to improvements in human capital and innovative capacity.

7. During the first part of the 2010s, when the project was initially conceived, China was dealing with several economic challenges, including industrial overcapacity, prominent levels of corporate debt, and a cooling property market. These issues were compounded by concerns over environmental pollution and the need for structural reforms. The Chinese government was actively pursuing green technologies and policies to decouple the economic growth from carbon emission. Internationally, China was increasing its global economic influence through trade, infrastructure building, south-south cooperation and various global initiatives.

C. Sectoral context

8. By the mid-2010s, China's energy sector had evolved significantly, reflecting the country's ongoing economic transformation, and heightened environmental awareness. There was an evident shift towards cleaner energy and renewable energy. This shift was part of China's broader strategy to transition to a more sustainable energy model and to significantly increase the share of non-fossil fuels in the energy mix. China's investment in renewable energy sources, particularly wind and solar power, continued to grow rapidly. By 2015, China became the world's largest market for renewable energy, leading in the installation of solar photovoltaic (PV) panels and wind turbines. At the same time, increasing concerns over air/water quality and environmental degradation led to the implementation of stricter environmental regulations and policies in the country. Efforts to reduce emissions from coal-fired power plants and industries were intensified, and there was a significant push towards reducing the country's carbon intensity.

9. In 2021, when the project reached its completion, China was the top energy producer and consumer in the world. The fastest-growing energy sources year-over-year were nuclear (11%), renewables (9%), and natural gas (8%). Energy consumption grew by almost 6%; natural gas (12%), nuclear (11%), and renewables (8%) grew the most. In 2022, non-fossil fuels accounted for 49% of total installed electricity generation capacity, most of which came from hydroelectric (16%), solar (15%), and wind (14%).[5] In addition, the Chinese offshore wind energy sector is experiencing rapid growth. It is expected that China will become the world leader in terms of installed offshore wind energy capacity in the upcoming years.

5 International Energy Agency. Data and Statistics (2022).

10. China is strongly committed to "green development". On September 22, 2020, President Xi Jinping stated at the general debate of the 75th United Nations General Assembly that China would strive to achieve a carbon dioxide emissions peak by 2030, and carbon neutrality by 2060. China's 14th Five-Year Plan (FYP)[6] emphasised the development of renewable energy and defined it as a strategic new industry; and also encourages the competitiveness of renewable energy industry chain. In 2022, China's cumulative installed capacity of offshore wind power has exceeded 30 million kilowatts, ranking it the first in the world for two consecutive years, and accounting for about half of the worldwide offshore capacity.

11. Although China started the development of offshore wind power later than many other countries, the industry has entered large-scale development stage with rapid growth. The considerable growth of the Chinese wind energy industry has been driven by its national green development policy, carbon neutral targets, programmatic subsidies, huge energy demands and a unified domestic renewable energy market. This rapid development has encouraged the domestic production of wind turbines and components in China. The Chinese manufacturing of these products has become increasingly mature, and the country is now the world's largest producer of wind energy equipment. Components made in China are now satisfying both domestic and international demand. In recent times, China's attention has gradually shifted from onshore to offshore wind power development.

12. China has abundant offshore wind energy resources with more than 6,000 islands and a long mainland coastline. The available coastal sea area for offshore wind generation is 3×106 km^2, rendering the exploitation capacity to reach 758 GW, which is about three times that of onshore wind energy resources. The electricity demand in central and eastern China has accounted for more than 70% of the whole country. As the economy keeps growing, the maximum power load of eastern China may reach 970 GW in 2030. Therefore, the establishment of offshore wind farms in the eastern coastal areas will meet the growing demand of power and can effectively relieve the construction pressure of the West-East Electricity Transmission project in China.

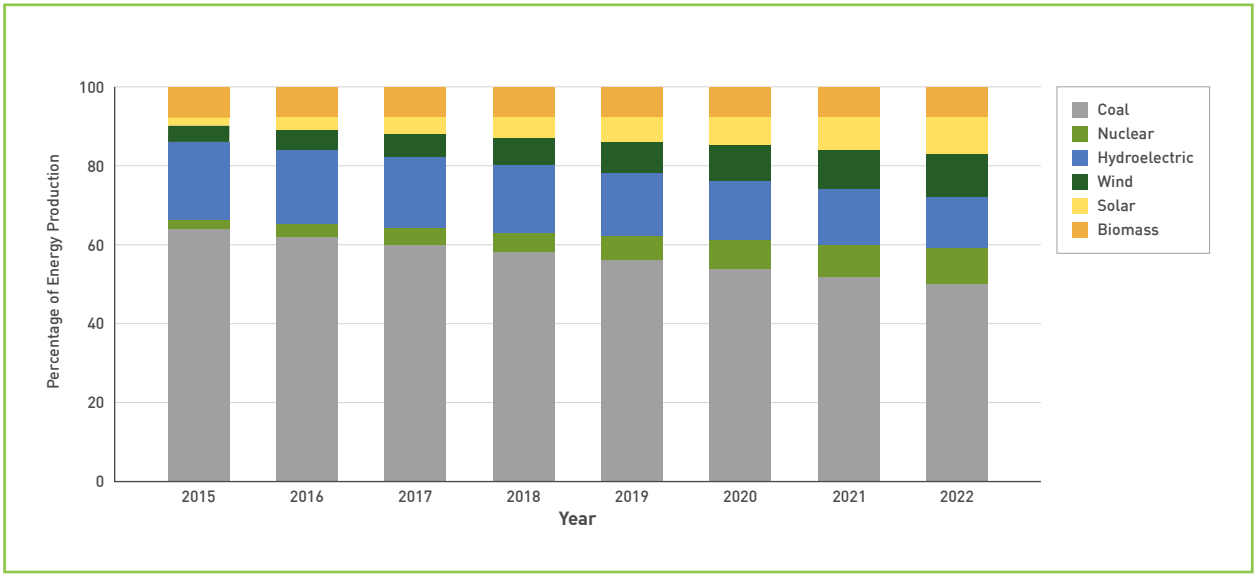
13. Since 2014, a fixed feed-in tariff policy and tax incentives have contributed to the rapid development of offshore wind power in the country. From 2015 to 2022, China's offshore wind power price policy has gone through two stages: the first stage is the gradual decline of electricity prices; the second stage is the termination of state subsidies along with the emergence of compensational local subsidies. As of May 2019, the price of all newly approved offshore wind power projects should be determined through market competition.[7] Since February 2020, new offshore wind power initiatives may no longer take advantage of central financial subsidies.[8] To benefit from the feed-in tariffs policy, many offshore wind power projects began prior to the subsidy termination period, in 2019, and government departments also accelerated the approval of several large offshore wind power projects.

14. The figure 1 illustrates the energy matrix of China from 2015 to 2022. The percentage of wind power has shown an increasing momentum. This trend reflects China's efforts to reduce reliance on coal and increase the use of renewable and cleaner energy sources to meet its environmental and sustainability goals.

6 The 14th FYP of China, officially the 14th Five-Year Plan for Economic and Social Development and Long-range Objectives Through the Year 2035 of the People's Republic of China, is a set of economic goals designed to strengthen the Chinese economy between 2021 and 2025.
7 *Notice on Perfecting the Feed-in Tariff Policy for Wind Power* (Fa Gai Price [2019] No. 882).
8 *Several Opinions on Promoting the Healthy Development of Non-hydro Renewable Energy Power Generation* (Cai Jian [2020] No. 4).

FIGURE 1

Energy matrix of China – 2015 to 2022



Source: Adapted from statistics derived from China Energy Portal (March 2024), and International Energy Agency (March 2024).

D. Fujian Province and the City of Putian

15. With the city of Fuzhou as its capital, Fujian Province is located on the southeastern coast of China. The province's territory is 530×480 km and occupies 124,000 km^2 of landscape. By 2022, the population of Fujian was 41.88 million (29.37m urban; 12.51m rural), ranking the 15th (out of 34) in mainland China. In 2022, the province's GDP was RMB 5,310.85 billion, ranking it 8th in mainland China. Putian's GDP was RMB 311.62 billion, ranking it the 7th out of 9 cities and one district of Fujian in 2022.

16. Fujian is a national leader in clean energy. Since 2019, it has managed to reach 50% of its power supply from non-coal energy sources and it has been increasing since then – see figure 2. Fujian's per capita income reached RMB 68,700 by 2015, almost 40% higher than the national average. As one of the more developed provinces, the provincial public finance and power companies can support large scale new energy projects. In the late 2010s, thermal, hydro, and nuclear power plants contributed 50%, 24% and 11% of Fujian's installed capacity, respectively. In the mid-2010s, Fujian still relied traditionally on coal and oil for its energy needs, supporting its industrial base and residential consumption. The increase in power capacity in the next decade or so will come from nuclear and wind energy, as thermal energy faces more stringent environmental regulations and questionable compatibility with Fujian's natural resource endowment, since most of coal, the primary resource for thermal power generation, is transported from other provinces.

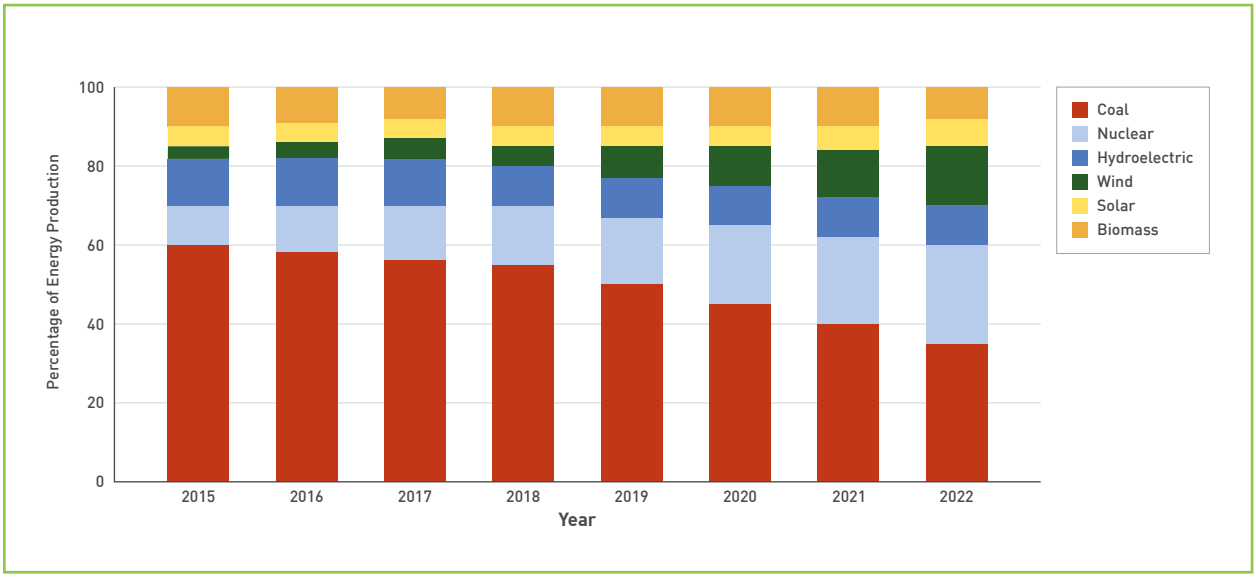
17. Influenced by the "valley effect" in Taiwan Strait, the sea area where the project's wind turbines are located experiences stronger winds which are suitable for large scale offshore wind development. The annual average wind speed exceeds nine meters per second, making the annual average utilisation hours for offshore wind power range from 3,500 to 4,000 hours. The favourable wind resource conditions provide unique advantages for the batch operation of large-capacity wind turbines.

18. By end of 2022, Fujian province's clean energy installed capacity had reached 45.4 million kilowatts, and its offshore wind power grid-connected scale had reached 7.42 million kilowatts,[9] ranking it the third in China. Offshore wind power is gradually becoming a new engine of green development in Fujian. Putian city belongs to a new national energy industry innovation demonstration zone, and it has seen rapid growth of offshore wind power in recent years. The annual new energy power generation in Putian ranked first in Fujian province in 2022. By the end of 2022, the city's total installed wind power capacity was 2.5 million kilowatts, accounting for 33.7% of the province; the annual wind power generation capacity was 6.07 billion kilowatt hours, accounting for 39.94% of the province.

19. To speed up the development of offshore wind power, Fujian set the goal to focus on promoting project construction in Fuzhou, Ningde, Pingtan, Zhangzhou, Putian and other regions. During the 14th FYP, Fujian province plans to develop approximately 10.3 million kilowatts of new offshore wind power in provincial waters. Although the national tariff policy has been gradually lifted, Fujian is making new policies and arrangements to smoothen the transition for the offshore wind power development in the province. The following figure depicts the decreasing reliance on coal, with increasing contributions from nuclear and wind energy.

FIGURE 2

Energy matrix of Fujian Province – 2015 to 2022



Source: Adapted from Fujian State Grid Company (March 2024).

9 Fujian Statistics Bureau and Fujian Energy Bureau.

II. THE PROJECT[10]

A. Project objectives and context

20. As approved by the Board in November 2016, the objectives of the project are two-fold:

    (i) to increase offshore wind power capacity in Putian Pinghai Bay to provide adequate electricity supply to Fujian province; and

    (ii) to catalyse offshore wind energy development with technological advances, supporting the reduction of CO_2 emissions in the province and country.

21. In China, the policy environment was very favourable for renewable energy development at project concept stage, as the country aims to be the global leader to tackle climate change and explore green technologies. In 2016, China had the largest capacity in the world for installed wind energy, with around 145 GW, a figure higher than the aggregate capacity of the European Union. Offshore wind sites are explored for their capacity to provide vast wind sources at sea, without the constraints that exist onshore. Due to the large scale and intensity in cost and technical aspects, offshore wind projects are most likely to succeed with the government's engagement.

22. The project is located in Pinghai Bay, at the centre of the west coast of Taiwan Strait, and thus enjoys the "valley effect" through the Strait. The site of the project is located 12 km southeast of Pinghai County. According to meteorological data, the project location is classified as Category A, ideal for offshore wind development.[11] The optimal location leads to high effective hours for power generation. See annex VIII for the assessment of effective hours during project life cycle.

23. The project cost at appraisal was RMB 2 billion, with NDB financing 40% of the total cost. The borrower is The People's Republic of China, The People's Government of Fujian Province is the Project Entity, and the Project Implementation Agency (PIA) is the Fujian Investment and Development Group Co., Ltd. (FIDG). The key dates can be found in table 2 below.

TABLE 2

NDB loan key dates

NDB loan key dates	Date	Stakeholder(s)
Concept note and appraisal stage	January – October 2016	NDB
Loan approval	November 22, 2016	NDB
Loan agreement signing	September 3, 2017	People's Republic of China NDB
Project agreement signing	September 3, 2017	People's Government of Fujian Province NDB
Loan agreement amendment signing	June 12, 2020	People's Republic of China NDB
Loan effectiveness	November 14, 2017	NDB

Source: Project Completion Report, Loan Agreement, Project Agreement.

10 This part of the report has made reference to the PDB, PCR and Project Approach Paper.
11 Project Document to the Board.

B. Cost and financing

24. The project cost was estimated at RMB 4,960 million, comprising equipment and installation, construction, design, land-use, supervision and administration charges, contingencies, and interest during construction. Capacity-building and the front-end fee were complemented in NDB financing plan as listed in the Loan Agreement.[12] The detailed expenditure in comparison with actual spending is listed in table 3. The table illustrates NDB specifically allocated RMB 5 million in capacity-building in the initial planning stage. The NDB financing plan is listed in table 4.

25. The actual project cost totalled RMB 4,634 million, which was 6.6% lower than the appraisal estimate.[13] NDB's RMB 5 million budget for capacity-building was not utilised, part of capacity-building was included in equipment contracts, and on top of this, the PIU paid RMB 0.69 million for other capacity-building activities using its own budget, mainly for safety and maintenance related training. Part of the RMB 759 million contingency was planned and allocated in different subcategories of actual spending to compensate for the overruns. The construction cost was higher, mainly due to the unexpectedly complex geological situation and extended implementation period; the decrease of land usage cost was because of reduced costs of sea area acquisition caused by the turbine design change.

26. The financing plan at appraisal included a NDB loan of RMB 2,000 million (40%), FIDG's equity infusion of RMB 992 million, and other borrowing of RMB 1,968 million from domestic banks in China. At completion, actual NDB financing was RMB 1,969 million, accounting for 42.5% of the project cost. Equity contribution from the PIA increased by 16.3%, to compensate for fewer than expected funding sources from Chinese banks, which also demonstrated PIA's strong financial performance. The evaluation team has assessed that although there was a change of funding source, the debt-equity ratio[14] requirement was not surpassed. Compared to the appraisal stage, the China Development Bank and Agricultural Bank of China (instead of five Chinese banks/financial intermediaries as indicted in the Project Document to the Board [PDB] and Project Progress Report [PPR]) participated in the financing plan. The detailed breakdown and difference are presented in table 3 and figure 3.

TABLE 3

Project cost

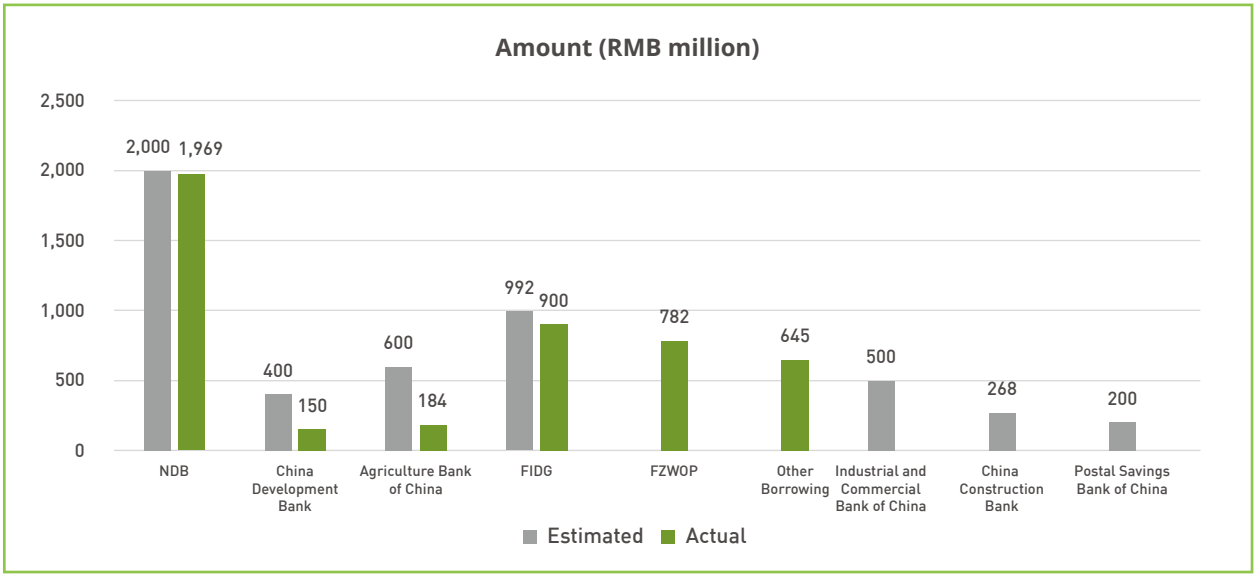
Category	Estimated at appraisal (RMB million)	Estimated at appraisal (USD million)*	Actual (RMB million)	Actual (USD million)**
Equipment and installation	2,700	398.23	2,720	427.00
Construction	1,100	162.24	1,567	246.00
Design, land-use, supervision & admin charges	386	56.93	240	37.68
Capacity building	5	0.74	-	-
Contingency	759	111.95	-	-
Interest during construction	5	0.74	102	16.01
Front-end fee	5	0.74	5	0.78
Total	**4,960**	**731.56**	**4,634**	**727.47**

Source: Project Completion Report.
* RMB/USD equivalent exchange rate November 7, 2016.
** RMB/USD equivalent exchange rate December 21, 2021.

12 Schedule III of *Loan Agreement.*
13 *Project Completion Report.*
14 According to the *Project Agreement*, the Project Implementation Agency shall at all times maintain a debt-equity ratio for the project lower than 80:20.

FIGURE 3

Estimated vs actual project funding source breakdown



Source: *Project Document to the Board, Project Progress Report, Project Completion Report.*

TABLE 4

NDB financing

Expenditure category	NDB financing amount (RMB million)	NDB financing amount (USD million) *
Equipment and installation	1,620	238.94
Construction	370	54.57
Capacity building	5	0.74
Front-end fee	5	0.74
Total	**2,000**	**294.99**

Source: Loan Agreement.
* Exchange rate November 7, 2016.

C. Project design

27. The project was designed to increase the share of offshore wind power in the energy mix of the country, with an outcome aimed at increasing offshore wind power-based electricity generation. Specifically, it was designed to generate 873 million kWh of electricity in the first year with full capacity installed and avoid an average of 869,900 tonnes of carbon dioxide emissions annually.

28. NDB financed phase II of the Putian Pinghai Bay wind farm. Phase I was a testing prototype of 10 turbines with a capacity of 50 MW, which had been successfully executed by the same company, FZOWP, and generated valuable experience and a ready workforce for phase II. It's worth mentioning that the overall project is the first commercial-scale offshore wind farm in Fujian. The design concept and experience from phase II also paved the way for success implantation of phase III.

29. As per the PDB, in the design phase, the project outputs included the construction and commissioning of an offshore wind power plant with cumulative installed capacity of 250 MW, assuming 50 units of similar wind turbines as used in phase I. However, the actual project implementation constructed 41 turbines of 6 MW direct-drive wind turbines. Fourteen of these were imported, complete, from Denmark as whole sets; and 27 in parts for assembly in China by the Shanghai Electric Group – the parts were imported from Denmark and Germany. The foundations and substructures were planned to be 13 jackets and 37 high rise pile caps each designed to suit the seabed conditions at the different turbine locations. In reality, 28 high-rise pile cap/multiple foundation[15] and 13 single-pile foundations[16] were used for turbine base construction. (See annex X for illustrations of foundation design of wind turbines for the project.) Other components in project design documents included subsea cables, construction of an electrical substation on Cormorant Island and 110 kV onshore electrical substation to 220 kV.

30. The project design also considered the policy change effect to the project. The estimated feed-in tariff price was 0.8 RMB/kWh in appraisal stage; but 0.85 RMB/kWh in actual practice was guaranteed by the timely connecting-to-grid before the end of 2021. The appraisal report also mentioned that the provincial grid company will ensure 100% power offtake of the project, since the project is approved at the national level by National Energy Administration (NEA) and enjoys preferential policy in power offtake. This has been executed after project completion, with 100% connection to the grid.

D. Implementation arrangements and support

31. **Implementation arrangements.** The evaluation team made a complete map of project stakeholders and their roles, as can be seen in annex VI. In brief, the project was implemented according to the implementation arrangements in PDB. The People's Republic of China is the borrower, and the People's Government of Fujian Province is the project entity. The implementation agency of the project is Fujian Investment and Development Group Co.,Ltd. (FIDG). It is 100% owned by the Fujian State-owned Assets Supervision and Administration Commission (FSASAC). The Fujian Investment and Development Group Co., Ltd (FIDG) fully owns Fujian Zhongmin Offshore Wind Power Co., Ltd. (FZOWP), the project company.[17] See table 2 for details of the signings of both the Loan Agreement and Project Agreement. The project entity also signed the on-lending agreement with the PIA FIDG.

32. **Supervision arrangements.** NDB made continuous effort to monitor and supervise the project. In total, nine missions were undertaken by the NDB team from January 11, 2016, to April 17, 2023. Two of the missions took place online, due to the travel constraints during the COVID pandemic. The project completion review mission was completed, in person, by the NDB team in April 2023. No midterm review (MTR) missions took place.[18]

33. **Project timelines.** The project was originally scheduled to be completed by the end of 2019, and delayed for two years due to various challenges such as the COVID-19 pandemic, the complex geological situation, the change of turbine design, change of procurement plan, etc. In addition, the timeline for first installed capacity was also delayed from 2017 to 2019. A detailed analysis is shown in the "Efficiency" chapter below. However, under the joint effort of NDB and all stakeholders, all 41 turbines were fully installed and connected to the grid on December 21, 2021, before the application deadline for the feed-in tariff price at 0.85 RMB/kWh.

15 Includes 6 high-rise vertical pile cap, 3 high-rise group pile cap, 19 high-rise inclined pile cap.
16 Includes 9 Type I single-pile, type 2 single-pile and 2 pile-barrel composite foundations.
17 With reference to *Project Documents to the Board*. The "project company" is referred to as "project implementation unit (PIU)" from now on with same practice with the PCR.
18 Currently, the MTR is necessary when a project faces difficulty in implementation according to the operations team. However, MTR for development projects serves several important purposes, helping to ensure that the project remains effective and relevant throughout its implementation.

III. EVALUATION OBJECTIVES, METHODOLOGY AND PROCESS

A. Evaluation rationale and objectives

34. This is the second project evaluation in China to be conducted by IEO, following the evaluation of the Luoyang Metro Project,[19] completed at the end of 2023. This evaluation will follow the provisions in the *NDB Evaluation Policy* and *Evaluation Strategy 2024-2026 and IEO's Work Programme and Budget 2024 and indicative Work Programme for 2025-2026.*

35. The main reasons for the selection of the Putian project for evaluation by IEO are as follows:

(i) it is a completed operation with close to 100% loan disbursement, thus offering the opportunity for a thorough assessment of results and sustainability; and

(ii) it is in a different sector as compared to the first IEO project evaluation in China, which covered the transport infrastructure sector. Thus, the Putian project evaluation provides the opportunity to generate lessons, especially in the sector of clean energy and energy efficiency, and to build the required knowledge base for the first planned China country portfolio evaluation (CPE) by IEO in 2025.

36. The main objectives of the evaluation are two-fold:

(i) to promote accountability by the independent assessment of results;

(ii) to assess the performance of the project towards achieving its objectives, and to generate lessons learned and recommendations for improving the quality of similar ongoing and future operations in China and other NDB member countries.

B. Methodology, evaluation questions, and rating scale

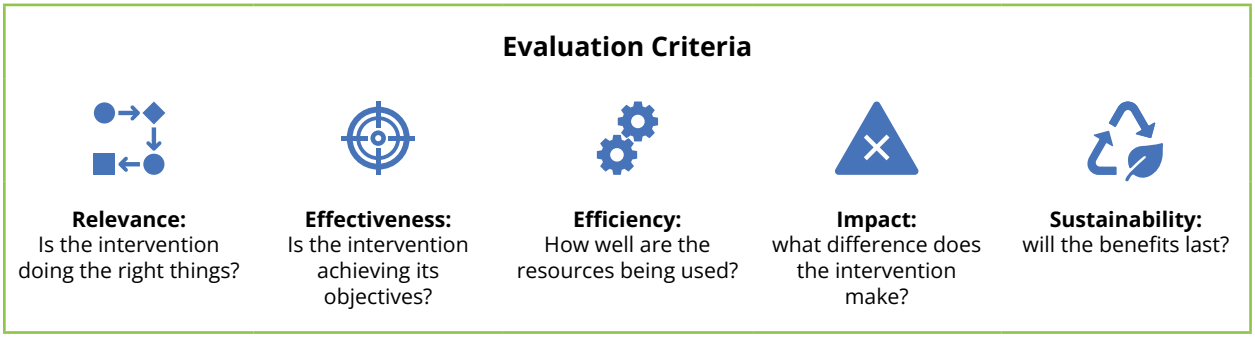
37. The evaluation was undertaken within the overall framework of the NDB Evaluation Policy, approved by the Board in August 2022. The project evaluation followed internationally recognised evaluation methodologies, criteria, and processes, as adopted by the Evaluation Cooperation Group of the MDBs, though appropriately customised to China and Fujian, NDB and project contexts.

38. More specifically, the evaluation assessed project performance using the following evaluation criteria: relevance, effectiveness, efficiency, sustainability, and impact (see figure 4 and annex II for further descriptions). In addition, the evaluation assessed and rated "overall project achievement" drawing on the analysis and ratings of the five criteria stated above. Finally, as per established practice, IEO assessed and rated, respectively, NDB and borrower performance.

19 See https://www.ndb.int/wp-content/uploads/2024/02/China-Report-PPE_FULL-DOCUMENT_Feb21.pdf

FIGURE 4

Key evaluation criteria



39. The key questions that were used to assess the performance under each criterion are listed below. In addition, a complete set of questions analysed may be seen in the evaluation framework in annex IV.

    (i) **Relevance:** To what extent were project objectives aligned with the priorities of the NDB, government and target beneficiaries, and was the design appropriate to meet the objectives defined?

    (ii) **Effectiveness:** To what extent have project objectives been achieved, or likely to be achieved, at the time of the evaluation?

    (iii) **Efficiency:** To what extent does the NDB intervention deliver results in an economic and timely manner?

    (iv) **Impact:** To what extent has the NDB intervention generated or is likely to generate significant positive or negative, direct, or indirect, intended, or unintended, higher-level longer-term effects from an economic, social, institutional perspectives?

    (v) **Sustainability:** To what extent are the net benefits of the project likely to continue after project completion?

40. The evaluation is summative and relied on mixed methods of both quantitative and qualitative analysis. Based on the evidence collected and using techniques of triangulation, the evaluation team assigned a performance rating to each evaluation criterion, using a six-point scale (see table 5 below).

TABLE 5

Evaluation rating scale

	Rating scale	Description
6	Highly Successful	The project achieved or surpassed all main targets, objectives, expectations, and results and can be considered as a model within its project typology (overwhelming positive results and no shortcomings).
5	Successful	The project achieved almost all (indicatively, over 80-95%) of the main targets, objectives, expectations, and results (strong results, with minor shortcomings).
4	Moderately Successful	The project achieved the majority (indicatively, 60 to 80%) of the targets, objectives, expectations, and results. However, a significant part of these was not achieved (positive results with some shortcomings in several areas).
3	Moderately Unsuccessful	The project did not achieve its main targets (indicatively, less than 60%), objectives, expectations, and results (several shortcomings that outweigh some positive results).
2	Unsuccessful	The project achieved only a minority of its targets, objectives, expectations, and results (largely negative results, with very few positive results).
1	Highly Unsuccessful	The project achieved almost none of its targets, objectives, expectations, and results (significant negative results, with hardly any positive results).

41. **The evaluation sought to address an overriding query:** To what extent has the project contributed to increasing the share of offshore wind power in the energy mix of the country, as well as increasing offshore wind power-based electricity generation?

42. This main evaluation line of sight was supported by several other sub-questions that addressed the five criteria used in the evaluation methodology such as:

- To what extent was the project in line with China's energy plan and renewable energy plan?
- To what extent did the project achieve its outputs, outcomes, and impact, including amendments?
- How was the project's financial performance?
- To what extent were environmental, social and governance (ESG) dimensions incorporated in the design and implementation of the project?
- Were land acquisition and resettlement activities minimal as anticipated at appraisal and, when required, were they in compliance with national and state regulations?
- Was the project's results framework sound and to what extent were the performance indicators monitored and reported in a timely manner?
- To what extent did the project contribute to carbon emission reduction?

43. **Stakeholders' participation.** In accordance with the NDB Evaluation Policy, the main project stakeholders were involved at key stages of the evaluation process. This ensured that their concerns were duly considered. It also helped the evaluation team fully understand the context in which the project was designed and implemented. Regular interactions and communication were held particularly between IEO, the NDB operations team, the Government of China, Fujian provincial authorities, and other partners concerned. More formal and informal interactions were made during the process of discussing findings, lessons and recommendations.

C. Limitations

44. It is reasonable for the evaluation to outline some significant constraints that may have limited project design, implementation, and supervision/monitoring. The project was the first operation approved by NDB in China – and one of the first ever projects approved by the Bank. At that time, most of the Bank's policies were still being put in place and there were few good example projects that could have served as a benchmark. NDB also had quite limited staff, with approximately 20 team members and just above 30 consultants at the time. In addition, the COVID-19 pandemic affected the timeliness of the final mission by NDB to prepare the project completion report (PCR).

45. A PCR report was made available to the IEO team two months before the main evaluation mission, yet several reports containing technical details of the project were not yet readily available to the IEO team. During the evaluation mission, the team was required to wait several days to acquire information to support the evaluation process. IEO reviewed many reports both in English and Chinese which had been produced to piece together a consolidated view of the various dimensions of project performance.

D. Evaluation process

46. The evaluation involved the following phases:

- **Desk review.** The evaluation team conducted an initial desk review based on available project documents and reports produced by the project implementation unit and NDB. These documents included, inter-alia, the project design document, the project loan agreement, including its amendment, the project progress reports, the project completion report, disbursement plans and reports, project statutory audit reports, and mission technical reports. For verification purposes, the evaluation team reviewed secondary data regarding the energy sector in China and Fujian province, and the data produced by the Bureau of Statistics and other national agencies on population growth rates, the changing nature of the demographic profile, and other relevant data on energy related and local issues.

- **Preparatory field mission.** A mission led by the IEO Director-General was conducted to meet with local authorities and the implementing agency in mid-December 2023, with the broad aim of briefing them about IEO, discussing the evaluation methodology and process, as well as identify additional sources of data and information for the evaluation. Following the preparatory mission, IEO prepared the draft evaluation approach paper,[20] which was shared with key partners for comments. The approach paper was finalised and disseminated before the main mission.

- **Field work – main mission.** IEO conducted an evaluation field mission to Fujian Province in the week of March 4-8, 2024. The IEO team of experts interviewed key informants and institutions, collected additional evidence, and visited project sites, including the booster substation on Cormorant Island and the onshore electrical substation. A detailed agenda with stakeholders met and meetings conducted is presented in annex VII. A debriefing meeting was organised at the end of the main mission to share the team's initial findings with multiple stakeholders.

- **Preparation of the main evaluation report.** Following completion of the field work, IEO drafted the evaluation report. The draft report followed the standard outline for public sector evaluation reports. An important dimension of the evaluation is to ensure a transparent and coherent evidence trail, which entails that the evaluation conclusions are clearly anchored in the findings (and cross-referenced accordingly) and recommendations based on the conclusions of the evaluation. The draft report is shared with the main stakeholders (the Ministry of Finance, Fujian provincial authorities, NDB Management) for comments, which are carefully considered in the finalisation of the evaluation. Based on this final report, NDB management will prepare a written Management Response.

- **Peer review.** The Asia Pacific Finance and Development Institute (AFDI) in Shanghai served as peer reviewer of the evaluation. They reviewed the draft evaluation report, and their comments were included in the final report.

- **NDB Management Response and Board discussion.** The evaluation report along with the Management Response will be considered by the NDB Board in the third quarter of 2024.

- **Knowledge sharing and outreach.** In line with the NDB Evaluation Policy and Evaluation Strategy 2024-2026, the final evaluation report, inclusive of NDB Management Response, will be published on the IEO webpages. Evaluation findings will also be shared through relevant social media and communication instruments. An "Evaluation Lens" – a two-page pamphlet about the evaluation – will be prepared and disseminated to a wider audience.

20 Containing the evaluation's objectives, methodology, process, timelines, and other related information.

IV. PROJECT PERFORMANCE

47. Overall, under the careful oversight and coordination from the Government of Fujian Province and support from Putian local government and NDB, the financial and operational diligence from FIDG, the technical and operational capacity of the PIU, represented by FZOWP, and the well-established country systems in China, the project performed well and has achieved its stated goals and objectives in general. As a milestone project in NDB's history, it has showcased the Bank's dedication in delivering sustainable projects with high quality and value for money. Even with the speeding up of implementation to conclude all activities before the end of the central government's subsidy withdrawal, communication, and organisation of stakeholders at the field level achieved exemplary results to be shared among project teams at the Bank.

A. Relevance

48. In line with the internationally recognised definitions, the relevance criterion assessed the extent to which:

(i) project objectives are aligned with government policies and the needs of the borrowing country as well as with NDB's general strategy and other relevant Bank policies and priorities;

(ii) the design of the intervention is appropriate to meet project objectives; and

(iii) the intervention has been adapted, as needed, to address changes in the context during implementation.

(i) Relevance of project objectives

49. The project is highly relevant to China's national strategy in strengthening the development of renewable energy and green development path. China's offshore wind power developed from supplementary energy to substitutive energy during the 12th Five Year Plan. China's 13th FYP has set the installed capacity target of 5 GW, and encourages coastal provinces (districts, cities) to construct offshore wind power projects. The Putian Pinghai Bay Offshore Wind Power Project has been included in National Offshore Wind Development List (2014-2016) by the NEA. The project also contributes to China's commitment to hit carbon peak by 2030 and carbon neutrality by 2060 with its significant effect in reducing carbon emissions.

50. The project is in alignment with Fujian province's development strategy in promoting non-fossil fuels and a green economy. Fujian's 12th and 13th FYPs have both emphasised the necessity of energy structure reform to reduce the dependence on fossil fuels. As an important source of clean energy, Fujian's offshore wind power capacity increased by 276.1%[21] during the 12th FYP. The development of offshore wind power is also highly consistent with Fujian Province's focus on developing four major economies, i.e. digital economy, cultural tourism economy, green economy, and marine economy.

21 As noted in the Fujian Province 14th FYP on Energy Development.

51. **Alignment with NDB general strategy.** The project was approved in 2016 when NDB did not have a general strategy yet. However, it is highly aligned with NDB General Strategy for 2017-2021 which states that, "NDB's goal is to become a key player in sustainable infrastructure development, including in sectors such as renewable energy, energy efficiency, clean transportation and water and waste management". Offshore wind energy is also listed as the key area of operation in the General Strategy.[22] The project is a local currency loan, which also aligns with the statement in General Strategy for 2017-2021 that, "Opportunities to offer local currency loans will be actively sought – both to reduce risks to borrowers as well as to promote local capital markets". The approved NDB project loan of RMB 2 billion contributed 18.41% of the local currency loan of the approved project in 2016.

52. **Issuance of a green bond denominated in RMB is highly aligned with the Bank's development mandate.** RMB 350 million of the project is funded by a green bond issued by NDB. In 2016, NDB issued its first green bond, which is also the first green bond by an MDB in China. The green bond is valued at RMB 3 billion with a 5-year tenor. As per the General Strategy for 2017-2021, the verification of a green bond is conducted against a set of industry-specific criteria by an independent third-party to assess whether the projects funded can be classified as green or as related to green projects. This strongly demonstrates the project's alignment with NDB development and with the member country's recognised standard of what a green and sustainable project is.

53. **Alignment with SDGs.** The project is highly relevant to SDG 7 and SDG 13. SDG 7 aims to "ensure access to affordable, reliable, sustainable, and modern energy for all" by 2030. This goal is crucial for combating climate change and promoting sustainable development worldwide. Providing access to safe, affordable, accessible, and sustainable energy is a well-recognised goal of the international community and in direct alignment with the project. In addition, the project objectives are aligned with SDG 13, which focuses on "taking urgent action to combat climate change and its impacts." This goal emphasises the need for immediate and enhanced responses to the global climate emergency. The construction of offshore wind power turbines also contributed to a reduction in green-house gas emissions by helping to reduce energy dependency on other pollutant energy sources, such as coal and thermal energy. As indicated in the project's PCR, 1,020,400 tonnes of CO_2 emissions will be avoided annually during project lifetime. Besides this, the project is also relevant to SDGs 9, 11, 14 and 15, with regard to the project's use of innovative technologies, clear benefits to local community, and improving the diversity and flourishing of marine life brought about by the project.

22 See NDB General Strategy 2017-2021, page 20. Specific projects could include offshore wind energy, distributed solar energy generation, hydro-power plants and smart urban energy systems. NDB emphasises in its operations the adoption of innovative new technologies, such as energy storage systems, adaptable smart electricity grids and solid-waste-based energy generation.

(ii) Relevance of project design

54. **The project document to the Board well analysed the relevance of the project to the country's needs, the provincial development pathway and sector development** (including institutional priorities). The design document addressed social and environmental aspects of the project, and 18 risk and mitigation measures were included. A technical appraisal was undertaken, but as mentioned before, more extensive technical assistance could have been offered. Although the DMF includes a relatively good set of indicators illustrating the links between activities/inputs, outputs, outcomes and impacts in the form of a "results chain", the presentation is rather linear and it is not tantamount to a use theory of change (ToC). The project team made great efforts in conducting economic analysis and, while there may be elements of a ToC in the narrative of the PDB, the latter is not explicitly articulated in a specific section of the document, nor did the document include a ToC "map". Including the latter would illustrate the project approach in a non-liner manner.[23]

55. **The project has a strong institutional arrangement.** The project implementation agency, FIDG, is a state-owned company with strong financial and technical ability. FIDG designated its 100% owned subsidiary FZOWP to implement the project, which has gained extensive experience from developing offshore wind power in Putian with the experience from phase I of the project. Also, renowned design institutions[24] have been deeply involved in the project design to make sure of its operational success.

56. **Budget and resource allocation.** NDB financing of RMB 2 billion was allocated to different expenditure categories (see table 4). It is worth noting that NDB allocated RMB 5 million for capacity-building for the project, although it was not actually utilised. Even after the first loan amendment, the allocation amount of RMB 5 million was kept for capacity-building. Without the utilisation of the capacity-building budget from NDB loan, capacity-building activities were financed by the PA/PIU themselves. The PIU has included some of the trainings in contracts signed with vendors who supply equipment, and also allocated its own budget towards capacity-building for staff. Besides this, environmental, social and governance (ESG) monitoring and safeguards could have benefited from more financial and expert resources at an earlier stage of project implementation, which would have contributed to the design of an exit strategy, including a contingency plan for turbines decommissioning, either from the Bank or the borrower.[25] Such decommissioning was mentioned in the PDB, however, decommissioning plans for all phases were not yet in place as relevant laws and regulations had still to be formulated at that time. The PIA has planned RMB 250 million for decommissioning and the removal[26] of the project's infrastructure after its life span, not as part of the NDB loan. It is important to mention that the borrower needs to showcase accountability from their side and embrace all aspects of the project, including the exit strategy. The Bank can have an important role in supporting this exit strategy with relevant resources allocated and mobilised, though it should not be held accountable for all project aspects after the loan has concluded.

23 Such a map would show how different components are expected to interact, and the multiple pathways through which change is expected to happen. It terms these components as intermediate outcomes; the specific changes expected as a result of the project implementation. These are linked together by causal pathways, which determine the direction of the relationship between these changes and show how they lead to the long-term outcomes and impact to which the project intends to contribute. Between these intermediate outcomes, interventions (the concrete activities undertaken as part of the project), rationale (the justification or existing evidence that suggests that a specific approach is likely to work in the context), assumptions (the uncertainties to be tested) and indicators (metrics of change linked to each intermediate outcome, determining whether and how much change has been achieved towards reaching this intermediate outcome) are plotted.

24 Fujian Investigation, Design and Research Institute of Water Conservancy and Hydropower and Northwest Survey and Design Research Institute of China Electric Power Construction Group as one consortium, and Fujian Electric Power Survey and Design Institute and East China Research Institute of China Electric Power Construction Group.

25 It is noteworthy that the Bank's operations team has organised an expert panel to provide guidance and assistance in preparing O&M activities.

26 This is crucial for ensuring the project's long-term success and sustainability after external support from NDB ends. This is part of NDB´s additionally.

57. **The Design and Monitoring Framework indicators could have been more tailored.** The project design document has a well-structured DMF with specific impact, outcome, outputs and inputs specified. However, one issue is that the correlation of different layers has not been specified; another is that the indicator is limited to technical and climate achievement, financial achievement and ESG related indicators can be considered as part of the DMF to better monitor and assess the project. Also, the impact indicator is not specified, and was not updated along with the change of China's 14th FYP on renewable energy development target. The evaluation team finds that for such a large and comprehensive project, the proposed DMF could have further indicators presenting social and environmental aspects that could be better monitored. SDG related analysis was not identified in PDB, and the project would have benefitted from a well-designed ToC to better align indicators to projects activities.

58. **The change of turbine design from 5 MW to 6 MW did not impact the DMF.** In 2017, with the most recent technological advancement of large capacity offshore wind turbine capacity at 6 MW, the PIA decided to adopt the 6 MW turbines instead of the 5 MW as originally designed. For this, the client did another assessment on the change of turbine, and no significant impact will be made on the project in terms of the PDB. The NDB operations team agreed with the client that such a change will not have any significant impact on the DMF indicators, and therefore the design document has not been revised.

59. **Risks and mitigation measures.** Chapter VII of the project design report includes a comprehensive table with 18 risks identified and corresponding mitigation measures. They cover numerous areas, including financial, management, social, technical, environmental, and other risks. These risks were relevant and well specified.

60. **Summary.** The project objectives were indeed relevant not only to the country and local context and government priorities, but also consistent with the broad development goals that China has been in pursuit of. They were also consistent with NDB's general strategy at the time. Considering the improvements at project design stage, especially related to the DMF and ToC, as reflected in the below and above section, the relevance of the project is rated as Successful (5).

Criterion	Rating
Relevance	**Successful (5)**

B. Effectiveness

61. The effectiveness criteria assessed the extent to which the project objectives and targets have been achieved or likely to be achieved. Other areas that are assessed under this criterion are the extent to which the project supported innovations in response to stakeholders' needs, and whether the project achieved other objectives or had any unexpected consequence(s).

62. **Project Design and Monitoring Framework.** As indicated in the NDB Project Implementation Guidelines (2018), the DMF is a core element of the project administration arrangements to ensure a logical structure is in place for a result-focused project design.

63. The DMF for the project only contained two outcome indicators – kWh of electricity generated, and tonnes of carbon dioxide emissions avoided annually; and one simple output indicator – successful commissioning of 250 MW offshore wind power capacity – for assessing progress and results. The IEO team consider that this is quite limited when considering the amount of financing provided by NDB and the technical complexity of the project. It also lacked some significant indicators that could facilitate the assessment of project outreach and benefits, such as social and environmental indicators.

64. **Project objectives have been exceeded.** Even though simple, the chosen indicators have all been achieved with successful completion. The project constructed 41 offshore wind turbines with a capacity of 246 MW, with each of the turbines at 6 MW. The Fujian Provincial Department of Industry and Information Technology approved the integration of the turbines into the power grid for operation on May 21, 2019, and the first turbine was connected to the grid on June 27, 2019. Construction of all 41 turbines were completed and connected to the grid in December 2021. The slightly lower capacity, at 246 MW instead of 250 MW, was caused by the fact that the PIA decided to change the wind turbine capacity from 5 MW to 6MW, which was the latest technology in 2017. Although there is a slight difference with the original target of 250 MW, the updated wind turbines however contributed to the exceeded power generation, 1,043 million kWh of electricity generated in 2022, more than the original DMF indicator at 873 million kWh in 2019. This is because 6 MW turbines have more effective hours and power generation, and the overall result shows that they achieved more than the 5 MW turbines. Also, 1,020,400 tonnes of CO_2 emissions will be avoided annually during project lifetime, more than the original target at 869,900 tonnes. The following table presents the DMF showing exceeded indicator targets (as outlined in the PCR).

TABLE 6

Design and monitoring framework achievements

Design summary	Performance indicators and targets	Reporting mechanism	Achievements
Impact			
Increased share of offshore wind power in the energy mix of the country	• Installed offshore wind power capacity increases to 30 GW by the year 2020.	• Statistics published by the NEA	• **Exceeded.** 9 GW installed offshore capacity by end of 2020.
Outcome			
Increased offshore wind power based electricity generation	• 873 million kWh of electricity generated in 2019. • 869,900 tons of carbon dioxide emission avoided annually.	• Project financial statements • Project progress reports • NDB proiect review	• **Exceeded.** 1,043 million kWh of electricity generated in 2022. • **Exceeded.** 1.020.400 tons of CO_2 emissions avoided annually during proiect lifetime.
Outputs			
Construction and commissioning of offshore wind power plant	• Successful commissioning of 250 MW offshore wind power capacity by 2019	• Project progress reports from FIDG and PIU • NDB proiect reviews	• **Achieved.** 246 MW offshore wind power capacity was commissioned in December 2021.
Activities, milestones and inputs			
Activities and milestones	• Commissionine of 250 MW offshore wind capacity by 2019.	• None	• **Achieved.** 246 MW offshore wind power capacity was commissioned in December 2021.

Source: Project Completion Report.

65. **The project promoted offshore wind power technology localisation and innovation in China.** The project faced challenges with complex geological conditions, and the PIU invented 11 patents and several innovative solutions to combat the challenges. These innovative initiatives made the project less dependent on the construction time on the sea, reduced the construction cost, and improved construction quality. The detailed list of innovations and patents is presented in annex XI. Also, several of the technologies have been replicated in other offshore wind power projects in China. For example, the patent of the large-diameter single pile-barrel composite foundation has been promoted and applied in projects such as Taizhou 1# offshore wind power project in Jiangsu Province and the Zhuanghe 4 Area II offshore wind power project in Dalian, Liaoning Province. This utility model patent won the first-class achievement of geotechnical engineering technology innovation application in 2022 and the outstanding typical case of equipment management in the national power industry in 2023. Thus, the Putian Offshore Wind Power Project has been set as a reference project to develop offshore wind power in complex geophysical situations.

66. **The project provided good demonstration that green financing is supporting offshore wind power sector development in its early stages.** As one of the early commercial offshore wind power projects in China, the project provided good demonstration that green financing could ably support large scale offshore wind farms, mitigating potential risks and benefiting the sector (including supply chains in China). In the past decade, sector cost reductions not only stem from technology innovation and supply chain improvement, but also from improved financing conditions for offshore wind power projects. With the gradual expansion of offshore wind power capacity in recent years, the sector in China is attracting more and more investment.

67. **The project has generated valuable experience in project management and safety manuals for offshore wind development in China.** At the time of project initiation, there were not many references for management and safety manuals for offshore wind projects. The PIU has innovated several manuals for operations and safety. FZWOP formulated many rules and regulations and compiled relevant operation manuals. For example, offshore traffic regulations, operations and maintenance guidelines and manuals, a safety cultural manual, a maintenance manual, etc. The manuals have guaranteed the safe operation of the project for over 2,300[27] consecutive days since it launched, and no accidents have been reported.

68. **The relevant content has important and significant reference in formulating industry standards.** Staff safety and professional skills training were implemented to enhance safety and reliability. For example, staff could only sail out to the turbines in the sea if they had obtained three certificates, namely, the climbing certificate, the electrician certificate, and the seaman's certificate; and they had to do their work, such as predicting faults, maximizing maintenance efficiency, and complete defect elimination work and return to shore on the same day. The PIA/PIU prepared the "Safety Manual", "Operation Manual", "Special Manual", "Operating Procedures" and "Maintenance Procedures" specific to this project.

69. **Summary.** Overall, the objectives stated in the project design document were achieved, and some DMF indicators and targets were exceeded. In terms of the DMF indicators, despite a quite straightforward design, successful achievements were made. Since project completion, not only have indicators exceeded their targets, but several innovations have resulted from the project, including 11 technological patents and project management manuals. As such, overall, the evaluation assesses effectiveness as Highly Successful (6).

Criterion	Rating
Effectiveness	**Highly Successful (6)**

27 Safety days were shown on the digital screen in the control centre when the IEO evaluation team conducted its field mission onsite.

C. Efficiency

70. The assessment of efficiency focuses on analysing to what extent the NDB intervention delivered, or is likely to deliver, results in an economic and timely way. "Timely delivery" refers to the delivery of results within the scheduled time frame, or a time frame adjusted due to the evolving context. Efficiency also considers operational efficiency – i.e. how well the intervention was managed.

(i) Operational efficiency

71. **The project faced multiple challenges, and project completion was delayed for two years.** The challenges faced by the PIA and PIU included:

(i) the complex geological situation led to longer time for project design;

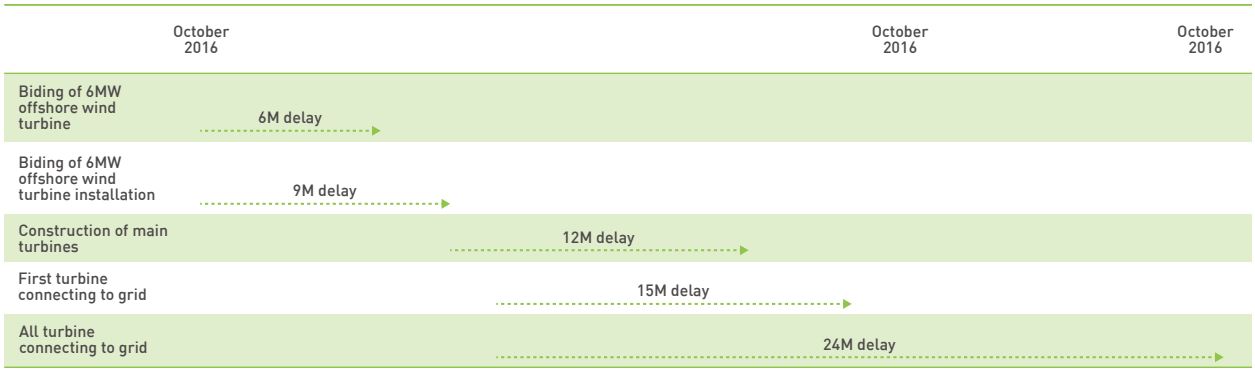
(ii) the change of turbine capacity from 5 MW to 6 MW, which caused the PIU to make an additional assessment on the project and change of the procurement bidders;

(iii) although the PIU had set up a special team to continuously operate during COVID-19 and designed special regulations to make sure of smooth operation, the shortage of supply, workers, etc. still caused a negative impact on the project timeline; and

(iv) to guarantee the benefit of 0.85 RMB/ kWh on-grid price, the client was facing shortage of supply of wind turbines, towers and blades, and the installation ship was also delayed during the rush of offshore wind power installations before the end of 2021.[28]

FIGURE 5

Project implementation timetable



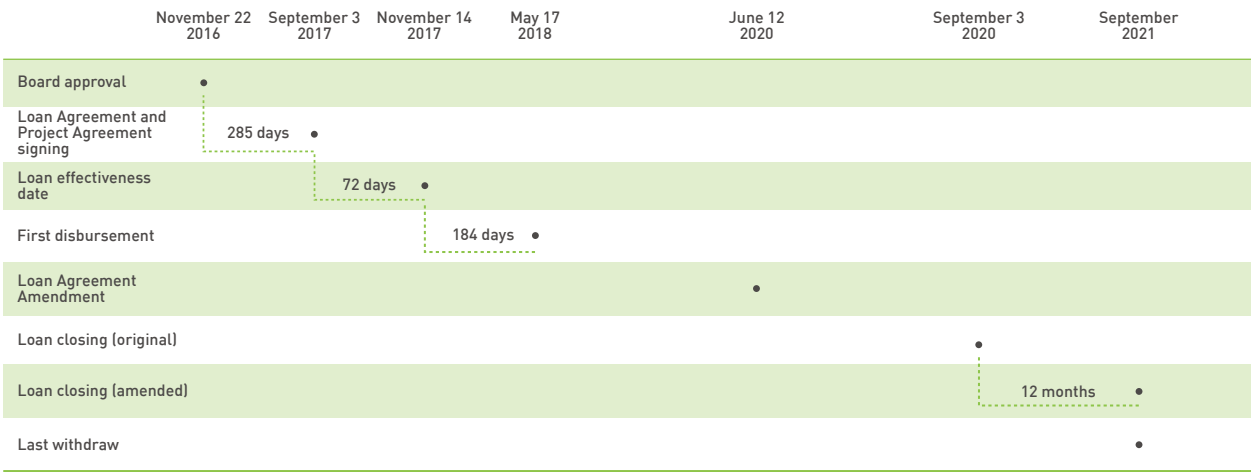
Source: Elaborated from PDB and PIU project completion report.

72. The NDB loan closing date was extended by 12 months with the amendment to the loan agreement dated 12 June 2020 changing the closing date from 36 months to 48 months. This is due to the delay in the project's construction. The Putian project also took 285 days after Board approval for the loan agreement to be signed, which is more than double the normal NDB China project average at 140 days. Considering that the Bank had only just been established by then, and that this is one of its first projects, this gap is understandable. It took 72 days for the loan to become effective; and 184 days to have the first loan disbursement, below the NDB average for China projects.

28 This is because, according to the Chinese regulation, the 0.85 RMB/kWh tariff price would only be available to projects connecting to the grid before the end of 2021.

FIGURE 6

NDB loan key dates



Source: Elaborated by IEO based on PDB and PIU project completion report.

TABLE 7

Days for NDB loan agreement signing, effective and first disbursement

	Project approval to Project Loan Agreement signing	Project Loan Agreement signing to loan effective	Loan effective to first loan disbursement
Putian project	285 days	72 days	184 days
NDB average for China project	Around 140 days	Around 69 days	Around 236 days

Source: Calculated based on the Loan Dashboard.

73. **Digital documentation during project lifecycle contributed to project efficiency.** The PIA and PIU have both adopted digital methods in documentation management. The engineering document, design document, approval process, quality assurance, investment plan, bidding process, contract documentation, safety supervision, etc. all adopted digital processes, which largely increased the transparency of the project and increased the efficiency.

(ii) Economic and financial efficiency

74. **The project is financially efficient.** Both the PDB and the PCR conducted economic assessments according to the NDB Policy on Financial Management and Financial Analysis, as well as an economic analysis of the project. It is verified that the economic internal rate of return at completion with different rank of carbon price (16.23% – 20.01%) is higher than appraisal stage (13.37%). The economic net present value is significantly higher at completion. It is worth mentioning that the calculation at appraisal stage is agile, and adapted multiple diameters such as effective generating hours and CO_2 emissions mainly caused by the change of turbine design, the actual feed-in tariff policy, decommission cost estimation, etc. Also, according to the PIU's data, the project is also a "cash cow" for the local government with RMB 300-400 million generated in taxes annually. This is mostly due to the timely connecting of the project's energy generation to the national energy grid, to benefit from the RMB 0.85/kWh subsidised tariff. This would not have been possible without the support from NDB as well.

75. **Budget utilisation and allocation.** The PIU reports quarterly to NDB regarding the budget plan. The loan amount at project appraisal was at RMB 2,000 million, while the actual disbursed amount was RMB 1,968.97 million. The expenditure categories' allocation includes equipment and installation, construction, capacity-building and the front-end fee. Originally, RMB 5 million was allocated for capacity-building activities, however it was not utilised. The main reason is that the PIU integrated the capacity-building and training into designated contracts, and local government also provided funds for capacity-building. The use of Project Preparation Fund (PPF) could empower the Bank to better utilise its resources to provide additionality. IEO encourages the use of PPF in the early stages of future projects.

76. **Direct payment method and zero-error loan disbursement.** NDB adopted a direct payment method in alignment with the client, in which payments go directly from the Bank to the contractor appointed by the PIU. This translates into more efficient payments to facilitate disbursement processes, although it consumes more resources from NDB to constantly review contracts, invoices, and withdrawal requests. Forty-three disbursements have been made with no errors from either the PIA or NDB's side. The times of disbursements were affected by the payment method. With the direct payment method, more individual disbursements were required depending on the project's real-time evolvement. Also, as reflected in the amendment of the loan agreement, the basis for disbursement has been changed for equipment and construction, from 60% to 100% and from 34% to 59% respectively as shown in table 8. A larger percentage of total expenditure of these two items would make it easier for the PIA to better utilise the fund and proceed with loan withdraw procedures more efficiently. An advance payment of 1.74% of the total loan – around RMB 34.35 million – was made to serve as an operation fund, mainstreaming and reducing the financing pressure for the PIA. The advance payment was made to support the procurement for the main transformer to the booster station and centralised control system for project.[29] Even though a retroactive financing scheme was made available in appraisal stage, the project did not utilise it.

TABLE 8

Loan expenditure categories

Expenditure category	NDB financing amount (RMB million)	Basis of disbursement (loan agreement)	Basis of disbursement (loan agreement amendment)
Equipment and installation	1,620	60% of the total expenditure	100% of the total expenditure
Construction	370	34% of the total expenditure	59% of the total expenditure
Capacity-building	5	100% of the total expenditure	100% of the total expenditure
Front-end fee	5	100% of the total expenditure	100% of the total expenditure
Total	**2,000**		

Source: Loan Agreement and Loan Agreement Amendment.

77. NDB financed 21 contracts, of which 18 were for equipment and three were for construction. Five of the contracts adopted an advance procurement modality. All the bidding processes were categorised as open bidding, and the PIA assigned a professional bidding company for the process. Although the procurement process was delayed due to project operational challenges, the NDB procurement team did not delay any process and invited PIA for training sessions and capacity-building exercises. The procurement country system also made it less complicated for the client to prepare procurement documents, which increased efficiency.

29 Liquidation drawdown requests provided by FBA.

78. **Project management costs.** The project management costs include construction management expenses. In 2016, at the beginning of the project, this value was at 38.59% of the total project cost, considered slightly high due to the high cost of the preparation stage of offshore wind power. In 2017, it was reduced to 5.37%, which was also caused by the increase of overall project cost, and remained around 1% from 2018 until project completion.

79. **The innovative financial mechanism of NDB guaranteed financial efficiency.** The loan in local currency (RMB) guaranteed the efficiency of the project loan and reduced costs for the PIA. Both the Fujian Department of Finance and the PIA highly valued the local currency loan, which increased the efficiency and protected the PIA from foreign-exchange hedging loss risk. Furthermore, the timely issuance of the green bond guaranteed sufficient funds for the client.

80. **Summary.** Despite multiple challenges, the project was completed with only one amendment and the actual total project cost was lower than the original design (with utilisation of contingency). It also confirmed the strong capacity of the PIA and the joint effort among PIA, government authorities and NDB operations staff. However, the project completion date was indeed delayed for two years, and some counter measures could have been taken, such as a more thorough investigation of seabed geological situation before implementation. The evaluation rates efficiency as Successful (5).

Criterion	Rating
Efficiency	Successful (5)

D. Impact

81. Impact is concerned with the extent to which the project has generated significant positive or negative, intended, or unintended, higher-level effects.

(i) Environmental impact

82. **Environmental and biological effect.** The project has reduced 1,020,400 tonnes of CO_2 emissions per year. A natural coral reef has also developed around the foundations of the wind turbine, attracting many fish to grow and reproduce, promoting the development of the ecological environment and fishery resources. The turbines have adopted noise cancellation technology, and the location of turbines avoided the birds' flying routes. However, the local pigeon association reported that the turbines have had some effect on its annual pigeon contest.[30]

83. **Land usage was reduced.** The number of wind turbines changed from 50 to 41 due to the change of capacity of each turbine, from 5 MW to 6 MW. Thus, the coverage of the sea area was reduced from the appraisal stage. The non-residence booster island was also used to save project costs, as it was being purchased at a lower price than expected and enabled the project to save on the costs and additional land usage originally intended.

84. **Adoption of energy saving and environmental-friendly measures during project implementation.** Measures included: the waste water from the project during construction of the foundation pillars was collected by a professional third-party company and taken to the shore for proper disposal; the residual mud was disposed of on the land, not into the sea; enhancement and compensation measures were released after the project to compensate for the local bio diversity environment; special equipment was installed to drive away birds from the region; and the project innovated with the construction onshore of specific components, which only then would be brought offshore to reduce environmental impact.

30 This is a game organised by a local pigeon association annually.

(ii) Economic impact

85. The project increased the local government's revenues and promoted the development of the local industrial chain. Between RMB 300-400 million tax[31] revenue was generated annually from the project. In addition, Shanghai Electric built the main engine manufacturing factory in Putian. On the one hand, it reduced the time and distance of equipment transportation and generated great cost savings; and on the other hand, it promoted local employment, and it made a positive contribution to increase local tax revenue. During the project construction, hundreds of people moved into the region and developed the local catering industry, house rental industry and maritime transportation industry. As an example of the regional economic upturn generated from the project, the number of local restaurants in Pinghai Town has grown from one to 10.

86. Local residents' lives have been improved. With the new industries brought to the village, fishermen's incomes were diversified, where some have even become owners of shipping companies to support the project. The GDP of Xiuyu district, where the project is located, achieved GDP growth at 9.57% in 2022. The local fishermen's incomes increased from RMB 120,000 to 200,000 per year from 2016 to 2020. The number of family businesses owned by Pinghai local residents in catering, entertaining, etc. increased from 15 to 35.

(iii) Impact on China's offshore wind power sector

87. As the project (including phase I) is one of the earliest large scale offshore wind projects on the south-east coast of China, it made very good demonstration of offshore wind power technology localisation. For this project, the PIA not only innovated with several innovative technologies and patents during project construction and operation, but also made various contributions to many new technical standards and engineering guidelines. Also, project suppliers Siemens and Shanghai Electric built a production base in Putian City, where equipment was assembled and then moved offshore for installation. Therefore, much technical knowledge has been accumulated and later used in other new offshore wind power projects. Today, 60% of the wind power generation equipment in the global market comes from China. By the end of 2022, the global installed capacity of offshore wind power reached 57.6 gigawatts. The share of China's installed power capacity in the world market increased to 53%, reaching 30.51 gigawatts. The experience and knowledge also benefited project design of the NDB-financed Guangdong Yudean Offshore Wind Power Project.

(iv) Societal impact

88. The project has increased local employment. 60% of the employees in FZWOP are from Putian. Fixed and temporary job positions have increased in distinct stages of the project, and overall, 1,101 jobs were created, and women employees accounted for 38 fixed positions and 47 temporary jobs. It's worth mentioning that one of the main designers of the project is female, and the in-charge staff of the financial department is also a female. During the PIU appraisal stage, the local government initiated a Social Stability Survey, and five women participated in the survey. Although the number is low, it still represented women's involvement and consultation.

89. The PIA and PIU took multiple measures to guarantee the equal treatment and safe working environment of female employees. All positions were open to female candidates, flexible working hours and remote working schedules were provided to women in order to balance their family and working responsibilities. During the project construction, PIU provided safety protection training and equipment to all employees including women and reduced the night shifts and onshore construction workload for women considering specific risks.

31 Data provided by the PIU.

FIGURE 7

Job creation in project

Source: Elaborated from PIU data.

90. Plans were well in place to compensate for the impact on local residents. From January to December 2017, compensation plans were used for land booster stations, fishery, forest, etc. RMB 31,495,303[32] was used for compensation to mitigate the effects of the project, especially during construction.

91. Green bond issuance also largely increased the project's social impact and public awareness. However, it has been observed that the PIA and PIU were not familiarised with the green bond and its relation to this project. With better alignment, this could be an opportunity to add further social impact for the project and the Bank.

92. Overall, the project impact is considered as positive given that the project has achieved its main objective of a modern and efficient offshore wind power system for the province which will lead to economic growth, was environmentally friendly, and brought very positive economic and social impact at the same time. The project also brought positive impact to China's offshore wind development overall. IEO rates impact as Highly Successful (6).

Criterion	Rating
Impact	**Highly Successful (6)**

E. Sustainability

93. This criterion assesses whether project benefits will last or are expected to last after completion. More specifically, sustainability is about whether the net benefits of the project will continue or are likely to continue.

(i) Financial sustainability

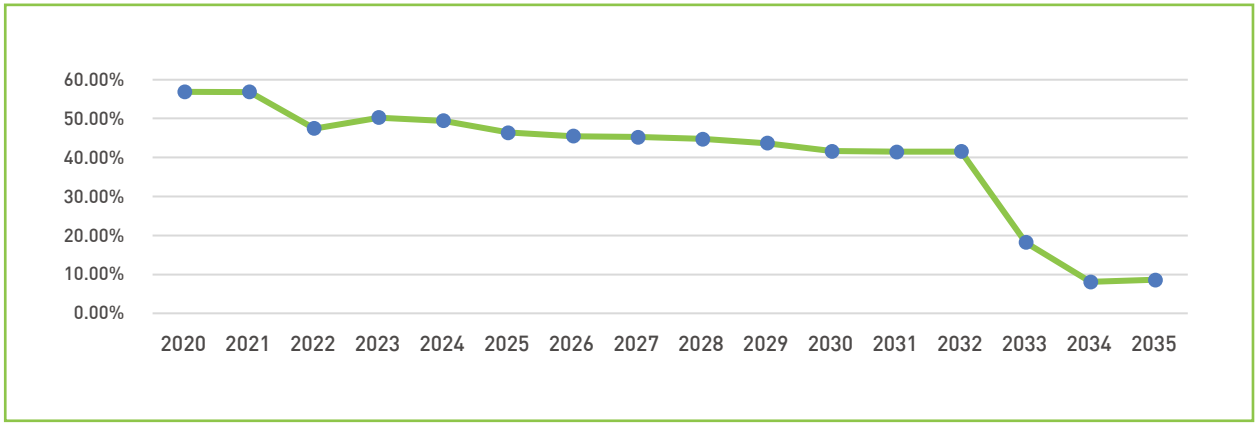
94. In the appraisal stage, the post-tax financial internal rate of return (FIRR) for the project at 6.42% (in real terms), is higher than the weighted average cost of capital (WACC), which is estimated at 1.94%. In the completion stage, the FIRR at 9.10% is higher than the WACC at 1.97%, suggesting that the overall project is financially viable. Similarly, the PIU has hired a professional accounting firm to elaborate a profit analysis for the project. The result showcases that the project will have a positive profit margin before 2035, which is the last repayment year when considering all factors including the financial cost. The significant drop of net profit margin from 2032 will be caused by the fact that subsidised tariff price at 0.85 RMB/kWh has a limit of 52,000 hours, and the tariff price will be decreased to 0.392 RMB/kWh.

32 Data provided by the PIU.

95. Appendix 9 of the PCR also presents several financial and economic evaluations, including a sensitivity analysis, indicating the several possible conditions for the project, both positive and negative (e.g. less energy generation, higher costs, etc.). In all cases it presented a positive financial sustainability score for the project.

FIGURE 8

Net profit margin of the project



Data source: PIU profit assessment table.

(ii) Institutional sustainability

96. The PIU was up and running at the start of the overall project with staff skilled from phase I of the operation. Under phase II, which was funded by NDB, the main institutions and workers undertaking various technical assistance interventions received both specialised and on-the-job training to strengthen their capacity. This will be beneficial for years to come. Partnerships have been built that will allow the project to continue performing until the decommissioning of the turbines and foundations. In addition, government stakeholders have provided a positive business-enabling environment to support project activities by implementation agencies. In addition, the PIU and PIA have already engaged in similar future projects, with business prospects that will allow the agencies to sustain for many years, financially and technically. The Fujian province has become a reference beacon for offshore wind power, strengthening the position of the PIU and PIA.

97. In terms of institutional sustainability caveats, a point where the project could have improved is its exit strategy. The evaluation team did not find an explicit and well-established decommission plan or exit strategy related to turbines and foundations, and resources could have been allocated to do so in the design phase. Even though decommissioning might take place in 25-30 years, and the context will change, it is important to have contingency and mitigation plans ready. It is key to strengthen operation and maintenance planning for the phase after the insurance closure for turbines. Financial and operational aspects should be noticeably clear since maintenance will conclude in 2027. An O&M assessment has been done with a 3% cost increase annually; however, the plan of O&M after the five-year warranty has not been in place, also affecting rating for this criterion.

98. Based on the above, the evaluation rates sustainability as Successful (5).

Criterion	Rating
Sustainability	**Successful (5)**

F. Overall project achievement

99. Overall project achievement is a composite criterion made up of the five core criteria used in this evaluation (relevance, effectiveness, efficiency, impact and sustainability). The rating assigned to overall project achievement is not an arithmetic average of the ratings assigned to the other evaluation criteria. Instead, the rating is informed by the ratings of the five core criteria and reflects IEO's wholistic judgement based on the evidence available of the project's achievements and room for improvement.

100. The highly satisfactory ratings for project impact and effectiveness are specifically significant and are decisive milestones of this operation. The lessons and good practices from the Putian Offshore Wind Power Project will enable opportunities for replicating the good practices in other NDB operations in China and other member countries.

101. As presented in table 6, the overall project achievement is considered Successful (5), in light of some areas of development, such as a more explicit and documented theory of change, provision of deeper technical assistance in design and implementation support during execution, and the use of funds earmarked for capacity-building which were reallocated for other purposes.

TABLE 9

Summary of evaluation ratings

Criterion	Rating
Relevance	Successful (5)
Effectiveness	Highly Successful (6)
Efficiency	Successful (5)
Impact	Highly Successful (6)
Sustainability	Successful (5)
Overall Project Achievement	**Successful (5)**

V. OTHER EVALUATION CRITERIA

A. NDB performance

102. The assessment of NDB's performance covers several aspects during the project cycle including project design, technical support provided, monitoring and supervision, self-evaluation, knowledge management, and others.

(i) Strategic and project design performance

103. NDB, as the MDB aiming to support infrastructure and sustainable development projects in emerging markets and developing countries (EMDCs), issued its loan to support offshore wind project in China, which is an inspiring initiative for other MDBs investing in renewable energy like offshore wind power and showed the Bank's confidence in China's offshore wind development. Green financing plays a particularly significant role for capital-intensive technologies like offshore wind power projects. The largest share of offshore wind project costs comes from upfront capital expenditures (CapEx), e.g. turbine parts, machinery, and electrical equipment. CapEx needs to be financed long before revenues from energy generation are obtained through a combination of debt (loans) and equity (ownership stakes in the project), each of which comes at a cost. With limited staff, NDB provided a sovereign loan in the amount of RMB 2 billion to finance 40%[33] of the overall cost of phase II of the project. The loan was in in local currency. The share is much larger than customary practice of investment from other MDBs on renewable energy projects. This is also in line with NDB's mandate to support clean energy and energy efficiency and mitigate the negative impact of climate change.

104. Phase II of the project aligns with the high-priority goals of the Chinese government, NDB, and global objectives, and was based on good practices from phase I, incorporating technical changes such as different wind turbine models. Phase II was distinctively crafted to overcome two emerging challenges:

(i) enhancing the share of renewable energy sources; and

(ii) reducing costs more effectively, while aiming to expand on a larger scale on the country. NDB's participation significantly enriched the project's framework. Initially, offshore wind technology was quite new for major Chinese developers. Leveraging insights from phase I, NDB collaborated with international experts in offshore wind and top local design institutions to provide crucial support in design, construction, operations and maintenance, along with other vital technical aspects. The project's strategic objectives were clearly established from the beginning and consistently adhered to, imposing an increased responsibility on the project team to navigate the project's complexities, including the endorsement of activities supported by the project.

105. This initiative served as a flagship project in the realms of renewable energy and sustainable development, contributing to climate change mitigation and adaptation, including energy transition. It's worth mentioning that in the beginning of the Bank's initiation, it has paid attention to climate finance with the international recognised approach and followed the joint MDB methodology for tracking climate finance. Since 2021, NDB started contributing to the Joint Report on Multilateral Development Bank's Climate Finance. This is a collaborative effort to make MDB calculations public with consistent methodologies for tracing climate finance.

33 Appraisal stage.

106. The dynamic aspect of the project's tasks may cause operational fragmentation and add pressure to the PIU if not properly overseen. At the outset of NDB's operations, limited staffing and the absence of established standard operating procedures led to a project design and monitoring framework that was insufficient for assessing outcomes against the fundamental benchmarks suitable for a project of such scale. Consideration of additional metrics, like social and environmental indicators beyond CO_2 emissions, were overlooked. Despite these limitations, phase II of the project was effectively tailored to assist China and Fujian Province in addressing major obstacles and advancing the use of renewable energy. Furthermore, the design of the activities in the initial year of execution was commendably structured, aligning well with the project's goals.

107. The method of budget allocation in the project planning phase could have been improved to more accurately showcase NDB's added value. The budget planning process in the PDB at the appraisal stage mirrored the client's feasibility analysis. However, the initial budget did not account for allocations towards capacity-building, visibility, technical support, nor the environment and social considerations like the decommission plan with an explicit exit strategy. This necessitates strategic and systematic planning by the Bank to amalgamate resources and contributions from different departments, creating a budget allocation that is more bespoke to the project. This approach could also highlight the unique contribution and expertise of NDB as an MDB aiming at mobilising resources for infrastructure and sustainable development projects in BRICS and other EMDCs.

108. An explicit ToC could have benefited the rationale for project interventions and present its role into a larger scale intervention that would play into the province and the country strategy, as well as its role in other sustainable development interventions, such as the SDGs. This was a project with a straightforward design, yet complex technical and technological solutions. It served as a reference point that generated 11 technological patents, a feature that few projects of its kind manage to accomplish.

109. The evaluation process highlighted that NDB does not have a China country nor sector strategy, hindering a macro evaluation of the NDB portfolio in the country, and linkage among the Bank's projects. Though it is a truly relevant project to the Bank and the country, the evaluation finds that it would be most useful for such a planning instrument to be put in place.

(ii) Operational performance

110. **Project appraisal.** It's important to acknowledge that the project was initiated at the onset of the Bank's operations when there were constraints in terms of staff and reference for the application of the Bank's policies. Despite these limitations, NDB Management, including the VP & COO, showed considerable interest in the project, participating in all three appraisal missions. The evaluators noted that during the appraisal phase, involvement was primarily from the operations team, lacking a full-fledged team encompassing ESG, procurement, strategy, etc., for an in-depth on-site project appraisal. Despite the challenges during the Bank's initial stages, the NDB operations team provided valuable knowledge and support for project design and implementation. The operations team managed to mobilise five experts from domestic and international bodies, including the China Renewable Energy Engineering Institute, American Bureau of Shipping DNV GL, Shanghai Donghai Wind Power Company, China Africa Development Fund and ITP Energised Group (United Kingdom),[34] to conduct thorough due diligence and appraisals necessary for the project's design. Their expertise mainly focused on turbine design, electricity, O&M, electricity and tariff policy. Additionally, a report titled Guidelines for the Development and Construction of Offshore Wind Farm Projects in China was published, contributing further to the sector's knowledge base.

34 Information provided by the operations team.

111. These sector experts provided advice during the appraisal stage and the initial construction stage of the project and provided supplementary guidance on O&M. Four experts participated in the appraisal mission, and one participated in one seminar[35] and virtual meeting to provide guidance. Nevertheless, NDB engaged with the project after the PIA had already finished much of its feasibility study and environmental assessment. The relatively late involvement from NDB meant its inputs could not be fully incorporated from the beginning. More extensive technical assistance could have been provided to the PIA. For example, the PIA referred to several challenges on the construction of the undersea foundation platforms. Although technical experts hired by NDB have given valuable advice for dealing with the difficulties during appraisal and construction stage, NDB could mobilise broader international expertise to support the project. Also, further technical assistance related to the social and environmental aspects of the project could have been allocated, especially concerning international best practices on social, gender, south-south cooperation, and environmental issues. Procurement could also have benefited from more technical expert guidance throughout the procurement process. During project implementation, NDB could have also provided further support in areas such as M&E.

112. **Implementation support and M&E from NDB.** Since the start of the project, nine missions have been carried out, with five occurring during its implementation phase and two taking place virtually. During the COVID-19 pandemic, NDB staff maintained regular project supervision through online meetings and discussions, but no mid-term review was undertaken. It is normal practice documented in loan agreements in all MDBs/international financial institutions (IFIs) to conduct one MTR of all projects, irrespective of their implementation performance. Beyond periodic supervision missions, MTRs offer an opportunity to take stock of implementation in a holistic manner, with the aim of generating lessons and recommendations for fine-tuning design and implementation as needed for the remaining project period for better outcomes at completion.

113. Every six months, the PIA provided the NDB operations team with a project progress report, detailing key project challenges, fund utilisation, contract and financing summaries, procurement updates, progress on implementation, environmental and social impact management plans, progress on project performance indicators, financial reports, and more. The PPR served as an effective means for delivering timely updates from the PIA/PIU to the NDB operations for M&E purposes. However, the evaluation team noted that the PPRs initially lacked uniformity in format and standardisation, e.g. with no established template for ESG at the onset of the Bank's activities.[36] Recognising the PIU's limited experience in managing MDB operations and loan administration, the NDB included the PIU in a procurement and disbursement training workshop organised by the Bank in 2017.

114. On April 17, 2023, NDB undertook a five-day project completion review mission, involving a comprehensive "delivery team" from various departments and divisions including the Vice Presidency for Operations, the Environmental, Social and Governance Department, the Procurement Division, the Finance, Budget and Accounting Department (FBA), and the Strategy, Policy and Partnerships Department. Following this, NDB compiled a PCR based on the mission's insights. The PCR, with its structured format, compared the actual project outcomes and data with the initial appraisal projections. By and large, the PCR adhered to the guidance provided by IEO for the preparation of such report. An in-depth economic analysis was also performed using the latest data from the completion phase of the project. This analysis served as a solid foundation for IEO to carry out an independent evaluation of the project. NDB agilely responded to project and process hurdles, for example in making one amendment of the loan arrangement regarding the extension of loan closing date – the only amendment necessary during the lifecycle of the project. During the COVID-19 pandemic, the NDB team provided constant project supervision via online meetings and consultations.

35 Offshore Wind Investment and Construction International Experience Exchange Seminar in March 2017.
36 Now the ESG template is in place which is integrated in PPR.

115. **High staff turnover at NDB, especially at project appraisal and design stages.** The evaluation team found it quite difficult to reach team members who had been working at the project design stage but had since finished working on the project. Permanency of staff, especially what the evaluation refers to as the "delivery team", is crucial, inter-alia, to preserve a continuous and fluent discussion with the PIU, PIA and other stakeholders. This is especially true when generating the knowledge material derived from the project, follow-up on previous supervision mission findings and recommendations, as well as to enable a smooth implementation process.

116. Also, since the project took place when the Bank was at its initial phase and no knowledge systems were in place, much of the narrative and storyline of the project, especially regarding project design, could not be found easily.

117. **Procurement and disbursement.** NDB executed procurement and loan disbursement with professionalism and efficiency. Despite facing staff shortages, especially technical consultancy in procurement, the NDB team managed to carry out these processes on schedule. The PIA/PIU also benefited from the country system, which eased the need for extensive documentation. Additional technical support would have been beneficial for the NDB procurement team throughout the project's lifecycle.

118. Five advance procurements ensured the acquisition of essential foundations and systems for project, aiding the timely grid connection before the 2021 deadline to avail of the feed-in tariff price at 0.85 RMB/kWh. Project design adaptations were necessary due to the complex geology affecting procurement strategies for the client, which also affected the procurement plan. Nonetheless, NDB ensured no delays in these processes. Government audits were performed, revealing no major issues in procurement and contract management. The procurement of wind turbines from non-member countries was communicated by the client and approved by the Board.[37]

119. In comparison to other MDBs, NDB's disbursement process was notably efficient, facilitated by the loan in the local currency. Appreciation was expressed for NDB's disbursement methods. The direct payment method enabled the client to make prompt payments to contractors with a simpler process for the PIA and PIU. This may have increased the workload for FBA to conduct frequent procedures such as review of loan withdrawal requests, contracts and invoices, etc., yet NDB achieved a flawless disbursement record without delays or errors. Besides this, an advance disbursement of 1.74% of the total loan offered flexibility to the PIU.

120. **Knowledge management and visibility.** Knowledge management and innovation are critical for NDB's development value proposition as an MDB. It is in the interest of the Bank to be seen not only as a co-financier, but also as a Bank that can support clients with technical assistance issues, knowledge exchange and non-financial products. At project completion, the NDB team assisted the PIA and PIU in reviewing the project's accomplishments and experiences. At completion stage, two workshops[38] were organised for knowledge dissemination among design institutes, developers, investors, and equipment manufacturers.

37 As mentioned in the PDB, as requested by the borrower, the procurement of wind turbines and other high technology equipment would be opened also to non-NDB member countries subject to approval by the Board.

38 The 4th workshop of the Climate-Smart Connectivity Infrastructure Workshop Series co-hosted by the Multilateral Cooperation Centre for Development Finance (MCDF), Egyptian Ministry of Finance, the Asian Infrastructure Investment Bank, the Islamic Development Bank and the Vulnerable Twenty Group for preparation of the UN Climate Change Conference (COP27); and a joint presentation with PIU officials on the project's strategic planning, development impacts, and pioneering solutions to key technical challenges at the projects showcasing workshop during NDB's Annual Meeting in 2023.

121. The evaluation team assessed that NDB had positive results on knowledge management for this project, with opportunities to present the project in international fora, as well as to prepare one report for the offshore wind development. However, a systematic knowledge management strategy and products, including a visibility plan was not in place, which could have benefited not only this project but also other similar projects in the Bank. Projects need to be better documented and presented to the public, as NDB is still emerging in international events and fora for its knowledge products. For example, the opportunity to promote and highlight the project's issuance of green bond was not captured, which could have been another chance to increase visibility and knowledge sharing.

(iii) Additionality

122. NDB provided financial additionality towards the project, specifically related to capacity-building. However, the RMB 5 million that was assigned towards capacity-building activities in the loan agreement was not used for its intended purpose. The PIA and PIU carried out capacity-building activities themselves with their own budgets, instead of utilising the loan budget which was designated for capacity-building. The details are illustrated in the borrower performance chapter. It is noteworthy to understand that capacity-building, knowledge management and other non-financial services are some of the most important additionalities that the Bank can provide to borrowers.

123. Nevertheless, NDB did support the PIA with low-cost funding in local currency borrowing, long-term tenure, and an attractive grace period, reducing currency risk for the PIA, compared to other MDBs. Significantly, NDB showcased suitable flexibility during the implementation, especially during COVID-19 pandemic which heavily impacted China. At the appraisal stage, NDB supported the PIA and PIU with some international expert exchanges.

124. A benchmark of actions taken by other MDBs to support the client based on the major challenges faced in offshore wind power projects to support future NDB operations in this area is laid out in the following table. This should support the "additionality" factor of NDB in renewable energy (RE) and similar projects.

TABLE 10

Benchmark of actions taken by other MDBs to tackle challenges in RE projects

Major challenges in RE/offshore wind project development	Challenge details	Actions taken by MDBs to support PIA/PIU
Policies & regulations	Policy & regulatory environment established by governments and the opportunities/incentives created are a major factor that can facilitate or hinder public and private investments in RE.	• Bank supports PIA/PIU building partnerships with national level governmental agencies and create enabling environment. • Facilitates exchange with international experiences.
Integrating RE to power system	Introducing innovative technology to enable flexible power systems to integrate RE smoothly and efficiently into the grid (via systems planning, strengthening transmission networks, and developing storage and dispatchable capacity, power trading, and pooling).	• Undertake wind resource assessments. • Develop knowledge database, not only benefiting project but also the sector. • Mitigate commercial and market risks.

Major challenges in RE/offshore wind project development	Challenge details	Actions taken by MDBs to support PIA/PIU
Technical challenges in project construction/ operation	Cost-effective manufacturing, installation, and maintenance.	• Bank introduces international experts or service providers to support PIA/PIU to address issues as below: • Robust power system planning to integrate RE. • Issue adequate grid codes and standards for grid-friendly equipment. • Strengthen and expand transmission infrastructure. • Reduce system congestion with distributed generation.
Insufficient design & technical standards	To construct high-quality RE infrastructure, the designs and developments should meet industry and international standards.	• Bank brings international good practices and expertise to ensure high-quality RE infrastructure developments necessitate compliance with industry and international design and technical standards.
Inadequate institutional capacity	PIA lacking capacity, standard operating procedures, guidelines on technical, safeguards (environmental, safety, resettlement, procurements, M&E etc.).	• Bank provides knowledge sharing through international experience - this includes knowledge sharing and South-South Cooperation of similar technologies or experiences. • Capacity-building on assorted topics.
Significant investment risks	Even with improved policies and institutional capabilities, there may be residual risks, either on a transitional basis or permanently that are outside the control of developers, and which may discourage investments (i.e. commercial/off-taker risks, political risks, RE resource risks).	• Bank introduces innovative business models, multilateral investment guarantee agency, green bonds, carbon financing etc. • Mobilizing finance for RE can remain a challenge, especially when RE markets are not mature for a specific technology.
Constraints on mobilising financing	In addition to the above barriers, the typically high up-front investments make it more challenging to mobilise financing for RE. This can occur when RE is new to certain markets, at a scale that exceeds capacity of domestic capital markets, or in small markets where financial institutions are not well developed.	• Bank works with PIA to design optimal financing model, build partnerships with public – private banks as co-financier. • Help PIA design transparent and predictable procurement processes. • Help with financing for innovation, including energy storage and distributed generation. • Help attract high-quality sponsors that rely on limited recourse debt markets by preparing strong project documentation and robust financial models, and capitalising on bank's strong knowledge of infrastructure markets in member countries to inform potential investors and their lenders of opportunities. • Support PIA on development of carbon assets for domestic or international carbon market.

Source: IEO team.

125. The completion of this offshore wind project highlighted NDB's contribution to support China's movement to a cleaner and more sustainable energy route. With a series of innovative technical solutions, the project has established the viability of installing offshore wind turbines in complex geological and weather circumstances, adding to the provincial and central governments' assurance for additional expansion of offshore wind power bases in Fujian and other coastal provinces, as outlined in Fujian's 14th Five-Year Plan for Energy Development, China's 14th FYP for Renewable Energy Development, China's 14th FYP for a Modern Energy System, and the national Action Plan for Carbon Dioxide Peaking Before 2030.

Criterion	Rating
NDB Performance	**Successful (5)**

B. Borrower performance

126. The overall endorsement and strong institutional support from the government of the People's Republic of China, the Ministry of Finance of the People's Republic of China, the National Development and Reform Commission, and other related central governmental agencies are the cornerstone of the project's success. The People's Government of Fujian demonstrated strong commitment and institutional support to guarantee the success of the project. The Fujian Department of Finance is comprised of competent officials with professional experience in cooperating with MDBs, and successfully fulfilled its mission to supervise the utilisation of the loan during project lifecycle, provided timely support to PIA, and built a good rapport with the NDB team. Provincial government agencies such as the State Grid Fujian Electric Power Co., Ltd., Fujian Ocean and Fishery Bureau, Fujian Provincial Department of Ecology and Environment, Fujian Province Tax Service, State Taxation Administration; and municipal level government such as Putian Xiuyu District government and corresponding government agency in Putian,[39] all provided a good business enabling environment to guarantee the smooth approval procedures and operation of the project.

127. The borrower, local government and the PIA/PIU consistently showed dedication to the project, efficiently addressing obstacles during project design and execution. In the face of the complex geological situation, the PIU adopted new technologies and construction methods in both the building and operation phases, earning numerous national awards and securing eleven patents. Throughout the project's progression, the PIU utilised its own resources to engage specialists and advisors for a range of expert services, such as the validation and approval of engineering plans, as well as project oversight and administration. The team at the PIU exhibited the necessary technical expertise and know-how, contributing to the project's successful outcomes. Necessary capacity-building for the project was also carried with PIU's own budget in combination of local government's support.[40] The PIA/PIU also endeavoured to secure important contracts during the "rush" period to guarantee the timely completion of the project in face of supply shortages.

128. However, initially, both the PIA and PIU faced challenges in their interactions with NDB and requirements for smooth project operation – further technical assistance would have helped at this stage. One of the main drivers for the successful project accomplishments was the elevated levels of communication and engagement established by all implementing stakeholders and the dynamic management of activities through these players. With timely communication mechanism, difficulties during project implementation were timely addressed.

129. Both the PIA/PIU have strong financial performance and have the capacity to guarantee the success of project. PIA/PIU are state-owned enterprises with strong technical and financial capacity, and proactively utilised their own budgets for the capacity-building and decommission plan. PIA/PIU have the resources and capacity to mobilise and partner with the most renowned institutions for project design and implementation.

130. Project progress reports were provided in a timely manner to NDB, with constant engagement with NDB team. Along with the NDB operations team, a project completion report was finalised in time. However, the reporting process might have been improved from increased international expertise throughout the project lifecycle, especially at earlier stages. Moreover, there was room for improvement in more advanced and thorough appraisal and planning, M&E, maintenance and decommission strategy throughout the project's duration.

Criterion	Rating
Borrower Performance	**Successful (5)**

39 E.g. Putian Ocean and Fishery Bureau, Putian Ecology and Environment Bureau, Putian Tax Bureau, etc.

40 PIA organised training by its own funds on "Professional Technical Training for New Employees", "High Voltage Electrical Operation Certificate", "Low Voltage Electrical Operation Certificate", "Climbing Operation Certificate", "Dispatching Certificate", and "Maritime Traffic Safety Skill Certificate", the project also hired experts to conduct on-site training at the booster station on "Statistics and Teaching of Protection of Offshore Power Phase II", "Interpretation of Electrical Equipment Insulation Test Specifications and Precautions", "Regulations on the Management of Power Transformation Operation and Maintenance of State Grid Corporation of China" and "Regulations on the Management of Power Transformation Overhaul of State Grid Corporation of China", with a total of 53 trainees (1,780 person-times) and an PIA investment of RMB 0.686 million.

VI. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

131. The following conclusions reflect a cross-cutting view of all the areas and criteria approached by the evaluation. After evaluating all aspects from the project, the evaluation team finds it important to present conclusions that may support the evidence finding process and offer recommendations that will allow NDB to improve future operations in China and all member countries. Conclusions and recommendations follow as much as possible the project lifecycle process, from concept and appraisal to project implementation and knowledge dissemination.

(i) General remarks

132. Overall, the Putian Pinghai Bay Offshore Wind Power Project has been successful and contributed greatly to generating renewable energy in the Fujian Province and China. There is already evidence that the major initiatives supported by the project are being mainstreamed, generating further results after project completion. The project was significant to the sector priorities of the Government of China and the Province of Fujian. It enhanced the country and the province's renewable energy capacity even further than conceptualised at the appraisal stage of the project. Additionally, it contributed to a decrease in the overall CO_2 emissions of the country and the province. The evaluation also states that the project design could have included further areas, such as the socio-economic and development impacts, including at the community/beneficiary level, but which didn't happen due to an insufficiently explicit ToC and impact related early technical advice at design level. Lastly, it was also highlighted that NDB is the MDB that provides loans with the local currency to the emerging markets and developing countries, a factor that was highly praised by the borrower and the PIA at several moments of the evaluation.

133. The success of the project showcases the significance of high-level and strong commitment and coordination between a range of public and private agencies with the capacity for planning, designing, financing, implementation, and management of the project. There was high-level institutional support provided by a range of state planning, financing and regulatory institutions working closely with both public institutions and the private sector in China, especially in the province of Fujian. The experience of the project showcases that the presence of this effective support system is critical to the successful achievement of an operation. Stakeholders responded positively even under pressure, such as the end of the subsidised tariff.

134. The effective institutional and communication arrangements at the project site were fundamental for the planning and implementation of the project, even as implementation was sped up. A two-level institutional structure was created from the start: FIDG was designated as the project implementing agency, whereas FZOWP was the project implementing unit. The project accomplishments can be recognised as a consequence of the prominent level of dedication and coordination at all levels. The contractors and vendors also established an efficient and effective communication mechanism with the PIA/PIU, which guaranteed the timely response of any issues occurred. While the COVID-19 pandemic negatively impacted the implementation of the project, the team managed to successfully complete the project, only requiring one amendment to the whole operation. During the COVID-19 pandemic, NDB staff maintained regular project supervision through online meetings and discussions. It is worth noting that designing and supervising the implementation of such operations require a high-capacity NDB as well as counterpart teams that can guide the project throughout including adequately managing operational matters (e.g. procurement, loan disbursements and M&E) and maintaining a sound communication mechanism with all stakeholders.

135. The project has accomplished and surpassed its indicated goals and indicators as presented at the DMF. It contributed to China's goals in providing a "greener" energy mix by delivering supplementary wind power energy which supports the moving away from coal and other polluting sources of energy. Specifically, the project generated an additional 246 MW of installed renewable power generation capacity with fewer turbines than originally proposed. As a result, CO_2 emissions are estimated to decrease even further than projected at appraisal. According to the PCR, the project is projected to generate 19.5% more clean electricity than the appraisal estimates during its economic life. Other harmful emission such as nitrogen oxides, sulphur dioxide, etc. also decreased considerably due to the benefit of offshore wind power, bringing a long-term positive impact on environmental sustainability and mitigating climate change. Annex IX presents the energy conservation and emissions reduction effects of wind farms. Not only did the environment benefit from the project, but as presented, there were also many positive social and economic outcomes derived from the intervention.

136. The resettlement and relocation of households in the Pinghai Bay area followed a consultative approach and did not cause negative results. The affected households were provided cash compensation based on a rate provided for similar interventions and mostly included fishermen from the region, who have relocated to nearby areas, and continued their activities in the village. They also benefited from the one-time fry stocking supply to local fishermen by the PIA after the completion of the project. The evaluation team met with beneficiaries from the project site who confirmed that the appropriate compensation and the relocation based on close consultations with the affected households had been made.

(ii) Technical assistance

137. It was clear from the evaluation that projects like this, even though implemented at the local/province level, can have large scale "national" impacts when they are designed within a framework to comprehensively address national sector goals and policy. The project is a good example of where the initiative attempted to tackle major barriers with the goal of nationally scaling-up the deployment of renewables. As a milestone project of the Bank, its experience also contributed to another NDB-financed project in China, the Guangdong Yudean Offshore Wind Power Project. The Putian project employed a simple design to evolve with the shifts in markets as well as the needs of the client. This enabled the project team to secure the Government of China's commitment for the major reforms by providing the underlying analytical work and subsidised tariff to justify interventions and align them with the country's development objectives. Nevertheless, as mentioned by several project stakeholders, and recognising the operations team's effort in pulling in resources and organising the expert panel, technical assistance, especially international technical expertise mobilised by the MDBs in the beginning (and even during later) stages of the project is encouraged and would benefit the project and its staff, especially when technical challenges rose. More extensive support could also be utilised in procurement, operational assistance, environmental and social considerations, and M&E.

(iii) Project design/theory of change

138. Local projects that aim to have national implications require a well-articulated ToC/logical framework that clarifies how project level actions strategically lead to high-level results through attribution. This was insufficiently shown in the project design. The fact that this project was the second phase of a larger intervention showed that such an articulation would also need to be iteratively revised and documented during project design and implementation, with a solid ToC reflecting the involvement of various components and stages of the overall project. At the time of project appraisal, the ToC logic is embedded in the project's design and monitoring framework, however an explicit ToC can be better designed, and it is noteworthy to highlight that an integral part of project design could address this issue with adequate quality-control scrutiny at later stage, preparing the scene for later phases of the operation. The project DMF was inadequate to determine project performance at several levels that go "beyond the basics" and could have better evolved to reflect some of its key results, especially in environmental and social issues. Fortunately, the PIU and other implementing agencies monitored various indicators that enabled

an accurate assessment of project performance at other levels than just "energy generation" and "CO_2 emissions."

(iv) Monitoring and evaluation

139. Effective M&E systems are crucial for assessing the progress, effectiveness and impact of a project. They help in tracking performance against planned objectives, identifying areas for improvement, making informed decisions, and ensuring accountability and transparency. During the project's implementation, there was space for improvement for project M&E. From the NDB side more standardised M&E processes and templates need to be developed. NDB still lacks a digital and uniformed M&E system with public data available to relevant stakeholders for most projects, especially initial projects. M&E systems need to be well thought-out at the design stage of the project, which as presented above, needed further improvement when tailoring the DMF. The DMF that was developed for the project was insufficient for evaluating the performance of a comprehensive and complex project.

(v) Project implementation and supervision

140. The stretched workforce in the Bank's initial stages, and change of project team leader affected the evaluation team to get the project's complete storyline, including project implementation support and M&E. It is important to mention that when the loan was approved in 2016, the Bank was still initiating its operations, staff numbers were quite limited, and internal practices were still being fine-tuned. Until then, most personnel working on project operations were consultants, who are no longer working at the Bank. This was made clear when the evaluation team could not reach almost any of the original team members that participated in the project design and appraisal; a factor that hindered the understanding of the narrative on how the project was designed from the Bank´s perspective. As full-time staffing mostly began in 2017 onwards, after the project had already been initiated, it was unclear from where staffing resources would be available to improve the technical assistance and other works from the Bank towards the PIA and PIU. Also, the frequent change of important focal points such as the project team leader does not contribute to the continuous communication between NDB and the PIA/PIU. The new team leader would need time to digest the project and familiarise himself/herself with the process and PIA/PIU focal point, which may affect effective and timely M&E.

(vi) Project conclusion/exit strategy

141. Exit strategies for development projects are crucial for ensuring sustainability and lasting impact after the project ends. Offshore wind turbine decommissioning can generate multiple negative environmental and social impacts to local communities; with proper planning and intervention, the negative effects could be mitigated. Although decommissioning was considered in the project economic analysis and was mentioned at the appraisal stage, there is a lack of systematic planning from either the PIA/PIU or NDB. NDB as an MDB can remind the client to contrive an exit strategy with a decommission plan with reference to international experience, which is also the added value of NDB as a financier.

(vii) Knowledge management and dissemination

142. NDB was highly praised during project implementation by local government stakeholders, though more value-addition could have been provided at an early stage of the project, and a more systematic knowledge management and visibility plan are missing. This support could have helped to put in place a stronger system of monitoring and evaluation of impact, sustainability, gender, and climate resilience. For example, limited attention was given to possible non-financial interventions in which NDB may play a strong role, such as knowledge management, policy dialogue and South-South Cooperation. Also, a systematic knowledge and promotion plan can enhance the awareness of the impact of the project and the Bank. As mentioned, it is understandable given that NDB was still at an early stage of operations, though it is important to note that future operations should pay more attention to this issue.

143. IEO considers that the following recommendations, based on this evaluation of the Putian Offshore Wind Power Project, would allow NDB to increase its influence with member countries and support the Bank's position not just as co-financers of infrastructure and sustainable development projects, but additionally as a well-established MDB with worldwide recognition whose values, protocols and practices are based on its strategy, including non-financial products and services.

B. Recommendations

144. **Recommendation 1: Further consolidate technical assistance at the initial stage of the project and better use the Project Preparation Fund for future projects.** As a global development Bank, NDB's expert advice and the intervention of TA at the initial stage of a project is crucial. Technical experts can provide valuable insights on the feasibility and practical aspects of the project, helping to refine ideas and ensure that the project is grounded in realistic expectations and industry standards. TA helps in accurately estimating the resources needed, including time, human resources, materials, and finances. Additionally, early technical involvement can identify potential risks and challenges associated with the project. Technical advisors can also advise on relevant regulations and standards that the project must comply with. Also, TA helps in selecting the right technologies and methodologies for the project, ensuring that the most efficient and effective tools and processes are used. A project supported by competent TA can enhance credibility and build confidence among stakeholders, including investors, government bodies and the beneficiaries. TA with NDB's international expertise and resources can also set the tone for an MDB financed project with better guarantee of quality and impact. The PPF is NDB's multi-donor fund designed to support the preparation of bankable projects in the Bank's member countries through the provision of technical assistance.[41] The PPF should be used as a common practice for most projects that involve engineering and other technical challenges, avoiding possible risks and developing high quality projects. Also, more technical assistance resources could also be allocated in future projects to procurement, operational support and M&E.

145. **Recommendation 2: Design a well-adjusted theory of change at appraisal and gradually fine-tune it during project implementation.** Project design should be flexible enough to adjust to evolving conditions so that objectives can be effectively reached, with suitable team capacities to drive implementation results and supervise operational characteristics of a flexible designed project. This would allow the Bank to better support clients and stakeholders. In preparing and designing new projects, adequate consideration should be given to ensuring that the design document effectively showcases the NDB added value to clients and projects, which begins with a well-defined ToC. As has been explained earlier in the evaluation, a well-defined ToC is in essence a central pillar of a strong results chain analysis (the DMF). It should address what issues need to be analysed, any assumptions necessary to reach the objectives, what would be the rationale and logic to address the issue, and what results it would lead to. The development of a project's ToC should clearly state how NDB's interventions will lead to expected outcomes. Outcomes are to be measured through specific, relevant, measurable, sustainable indicators, as reflected in the design of DMF. The ToC is also supposed to be flexible and fine-tuned based on the real evolvement of each project – a bespoke and agile approach.

146. **Recommendation 3: Improve project implementation support and supervision.** With several areas to consider – operations, ESG, FBA, strategy, procurement, M&E, and so on, NDB needs to improve project implementation support and supervision. This is crucial to ensure the success, impact, sustainability and effectiveness of projects. At the beginning of every project, a delivery team should be constituted, and frequent meetings should take place, with the project team leader organising the "delivery team". Information and communication need to be constantly updated among this team. Not all team members of the delivery team need to be present in every field mission, though constant supervision is required to ensure a smooth flow of information. Clear communication channels need to be established with open lines of communication among the delivery team, as well as other stakeholders, such as PIA/PIU, government officials and

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beneficiaries. The stability of the delivery team with regards to its staffing is also important to guarantee the success of the project with strong and effective monitoring. The evaluation team also recommends that the Bank value more the importance of mid-term reviews for projects, not just when projects are facing difficulties in implementation. Lastly, selected interventions from NDB teams should be strategic to leverage maximum impact towards achieving project objectives – the 80-20 pareto rule should be applied in operations of the project to maximise results with minimal effort, allowing flexibility to the delivery team in case of contingent cases take place – such as the speeding up of implementation that took place in the Putian project.

147. **Recommendation 4: Enhance the design of monitoring and evaluation frameworks.** M&E frameworks are fundamental for assessing project performance, facilitating informed decision-making, ensuring accountability, driving learning and improvement, innovation, managing risks, enhancing stakeholder engagement, and supporting the sustainability and scalability of future NDB projects. An M&E framework from NDB should capture project results and provide the necessary intelligence and guidance for the PIA to visualise possible financial gains from project activities. Indicators could have been captured with a better M&E framework, e.g. SDG-related indicators can be better tracked and attributed from the design stage to sustain the Bank's projects' high-level relevance to SDG commitments, to boost the criticality of achieving the SDGs and climate goals as one of the Bank's building blocks, and to enhance the strategic imperatives in financing for impact. A strong M&E framework is also the result of an efficient ToC and results matrix. It is important for Bank teams to understand that all of these tools are interrelated, and enough time should be given for these planning exercises at the initial stage of the project. A robust M&E framework should provide real-time data and insights into project progress, allowing the PIA/PIU and NDB supervision staff to make informed decisions related to the project. This data-driven approach helps in identifying what is working well and what needs adjustment, leading to more effective resource allocation and strategy modification.

148. **Recommendation 5: Strengthen project exit strategies.** IEO recommends that future NDB projects should give more emphasis and resources to project exit strategies.Long-term impacts can be assessed during the project implementation period based onevidence of expansion, replication and measures of continuity. It is important to not only establish short-term results (i.e. by project completion) but reflect on proxy indicators that demonstrate the probability of project results and outcomes taking hold and having a long-term impact (e.g. the renewable energy project leading to approaches being adopted country-wide; contributing to standards for offshore wind). The exit strategy should reflect upon all other project design and implementation strategies for the project, such as community ownership and engagement, capacity-building and training, sustainable financing models, phased withdrawal, partnerships to keep operations ongoing, M&E, and policy integration. By incorporating these strategies, development projects can increase the likelihood of sustained impact and continued benefits for the community long after the project's formal completion.

149. **Recommendation 6: Improve the creation of projects' knowledge management.** Improving knowledge management in NDB projects is essential for facilitating scaling up and ensuring the sustainability and replicability of successful initiatives. IEO strongly recommends NDB to systematically document both successes and failures throughout the project lifecycle. A knowledge management and visibility plan in the initial stage of the project can contribute to improving knowledge capturing initiatives. Developing case studies, best practices, and lessons learned documents throughout project implementation, capturing what worked and what did not, provides a valuable resource for scaling up. This includes the creation of a centralised database or knowledge management system where all project-related information and learnings can be stored and easily accessed by current and future teams – a valuable tool for the high turnover the Bank has been going through. This should include reports, research findings, project documentation, and evaluation results. Project knowledge management should capture not only the financial information but help identify the non-financial benefits of the project, such as South-South Cooperation possibilities/cases, important policy dialogue that took place during project implementation, as well as partnerships and advocacy elements that could be replicated in future projects.

ANNEXES

The annexes to the report (listed below) are available on the Independent Evaluation Office website at: https://www.ndb.int/wp-content/uploads/2024/08/ANNEXES-China-Putian-Pinghai-Bay-Offshore-Wind-Power-27-August_Final.pdf

Annex I:	Project data
Annex II:	Definition of the evaluation criteria used by IEO
Annex III:	Project design and monitoring framework
Annex IV:	Evaluation framework
Annex V:	Project disbursements
Annex VI:	Stakeholders map
Annex VII:	Evaluation mission agenda
Annex VIII:	Effective hours during project life cycle
Annex IX:	Energy conservation and emission reduction effects of wind farms
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