ADB

Report and Recommendation of the President to the Board of Directors

Project Number: 42916
November 2013

Proposed Loan and Administration of Loans Sarulla Operations Limited, Sarulla Power Asset Limited, Kyuden Sarulla Private Limited, OrSarulla Incorporated, and PT Medco Geopower Sarulla

Sarulla Geothermal Power Development Project (Republic of Indonesia)

This is an abbreviated version of the document approved by ADB's Board of Directors that excludes information that is subject to exceptions to disclosure set forth in ADB's Public Communications Policy 2011.

Asian Development Bank

CURRENCY EQUIVALENTS

(as of 30 October 2013)

Currency unit	–	rupiah (Rp)
Rp1.00	=	$0.0001
$1.00	=	Rp11,090.00

ABBREVIATIONS

ADB	–	Asian Development Bank
CEFPF	–	Clean Energy Financing Partnership Facility
CTF	–	Clean Technology Fund
EPC	–	engineering, procurement, and construction
ESC	–	energy sales contract
ESIA	–	environmental and social impact assessment
GHG	–	greenhouse gas
IPP	–	independent power producer
JBIC	–	Japan Bank for International Cooperation
PLN	–	Perusahaan Listrik Negara
SOL	–	Sarulla Operations Limited
S&P	–	Standard & Poor's

WEIGHTS AND MEASURES

GW	–	gigawatt
MW	–	megawatt
km	–	kilometer
kV	–	kilovolt
kWh	–	kilowatt-hour

NOTES

(i) The fiscal year (FY) of Sarulla Operations Limited ends on 31 December. FY before a calendar year denotes the year in which the fiscal year ends, e.g. FY2013 ends on 31 December 2013.

(ii) In this report, "$" refers to US dollars.

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PROJECT AT A GLANCE

1. Project Name: Sarulla Geothermal Power Development Project **2. Project Number:** 42916

3. Country: Indonesia **4. Department/Division:** Private Sector Operations Department
Infrastructure Finance Division 2

5. Sector Classification:

Sectors	Primary	Subsectors
Energy	✓	Renewable energy

6.Thematic Classification:

Themes	Primary	Subthemes
Economic growth	✓	Widening access to markets and economic opportunities
Environmental sustainability		Global and regional transboundary environmental concerns
Private sector development		Private sector investment

6a. Climate Change Impact:

Adaptation	
Mitigation	✓
Not applicable	

6b. Gender Mainstreaming:

Gender equity theme	
Effective gender mainstreaming	
Some gender elements	✓
No gender elements	

7. Targeting Classification:

	Targeted Intervention		
General Intervention	Geographic dimensions of inclusive growth	Millennium development goals	Income poverty at household level
✓			

8. Location Impact:

Rural	
Urban	
National	High
Regional	

9. Nonsovereign Operation Risk Rating : NSO7

10. Safeguard Categorization:

Environment	A
Involuntary resettlement	A
Indigenous peoples	A

11. ADB Financing:

Sovereign/Nonsovereign	**Modality**	**Source**	**Amount** ($ million)
Nonsovereign	Project Finance Loan	OCR	250.0

12. Cofinancing:

Financier	**Category**	**Amount** ($ million)
JBIC	Loan	533.6
ADB Clean Technology Fund	Official Loan	80.0
Canadian Climate Fund for the Private Sector in Asia Under the Clean Energy Financing Partnership Facility	Official Loan	20.0
Commercial Banks	Loan	355.7
Total		989.3

13. Counterpart Financing: Not Applicable

14. Aid Effectiveness: Not Applicable

I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on a (i) proposed direct loan of $250 million from the Asian Development Bank (ADB) ordinary capital resources; (ii) proposed administration of a loan of up to $80 million, to be provided by the ADB Clean Technology Fund (CTF);[1] and (iii) proposed administration of a loan of up to $20 million, to be provided by the Canadian Climate Fund for Private Sector in Asia under the Clean Energy Financing Partnership Facility (CEFPF) to Sarulla Operations Limited, Sarulla Power Asset Limited, Kyuden Sarulla Private Limited, OrSarulla Incorporated, and PT Medco Geopower Sarulla for the Sarulla Geothermal Power Development Project in Indonesia.

II. THE PROJECT

A. Project Identification and Description

1. Project Identification

2. **Identifying a clean energy path.** A more secure and sustainable future for Indonesia is contingent upon increased access to clean energy. The country presented strong economic performance throughout the global recession, with annual gross domestic product growth averaging 6% during 2009-2012.[2] If this growth continues, demand for electricity is projected to rise by more than 8% per annum until 2029. As Indonesia currently uses coal and oil to produce 65% of its electricity and fuel its economic growth, a failure to diversify into cleaner energy sources for power generation will magnify the country's contributions to global greenhouse gases (GHGs) and ultimately its own exposure to climate change risks.

3. The Government of Indonesia recognizes the imperative of sustainable growth and aims to increase the share of renewable energy in the country's primary energy supply from 5% in 2010 to 25% by 2025 and achieve a reduction in GHG emissions of 26% by 2020.[3] Indonesia is endowed with several renewable energy options, including wind, solar, geothermal, and biomass. However, geothermal energy is particularly suited to support Indonesia's more sustainable future:

(i) Geothermal power comes from thermal energy that is naturally generated in the earth and most accessible and abundant near tectonic plate boundaries.[4] Due to its location at the edge of the Pacific plate, Indonesia has extensive geothermal resources estimated at about 29 gigawatts and equivalent to 40% of the global geothermal resource base.

(ii) Geothermal power plants are very reliable and demonstrate high capacity factors. Thus, they can provide a sizeable portion of base load power, unlike intermittent renewable energy sources like wind or solar, and contribute to a more secure energy mix.

(iii) Geothermal power plants typically emit less than 10% of the GHG emitted by fossil-fuelled thermal plants, and thereby provide an effective means for Indonesia to achieve both domestic and international climate change mitigation objectives.

(iv) Power generation costs of large geothermal power plants in Java and Sumatra are less than the country's total average power generation cost. Geothermal sector development can therefore improve the long-term financial health of the national electricity utility, Perusahaan Listrik Negara (PLN), while reducing the country's reliance on fossil fuels.[5]

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[1] Financed by the ADB's Clean Technology Fund. http://www.climateinvestmentfunds.org.
[2] Sector Overview (accessible from the list of linked documents in Appendix 2).
[3] Geothermal Sector (accessible from the list of supplementary linked documents in Appendix 2).
[4] In a geothermal power plant, high-pressure steam from a production wellhead powers a turbine to generate energy.
[5] PLN. 2013. *2012 Statistik PLN*. Jakarta.

4. Indonesia's 3,200 megawatt (MW) geothermal development project pipeline accounts for 24% of the capacity of geothermal projects now planned globally. Despite the compelling opportunity presented by untapped geothermal resources, only 1,226 MW of installed capacity, or 4.2% of the country's total geothermal potential, has been developed to date. Challenges in geothermal power development include high up-front costs and geological risks that can affect exploration, development, and long-term operations.[6] Commercial financing has not materialized even though geothermal regulation in Indonesia has substantially improved since 2003. The investment needed to develop the country's full geothermal potential will only appear when the actual and perceived risks are reduced through the financing, implementation, and operation of projects with the demonstrative capacity to initiate market transformation.

5. **History.** The project's geothermal resources were originally explored by Unocal North Sumatera Geothermal in 1993. The company spent about $80 million in initial resource and site development and technical studies, but suspended its works in 1998 due to challenges presented by the Asian Financial Crisis and later sold its development rights to PLN. In 2004, soon after a law was adopted to promote private sector participation in the geothermal sector, PLN invited qualified power generators to participate in an Independent Power Producers (IPP) bidding process for the Sarulla development rights.[7] The first-ranked bidder failed to secure financing during 2005, and the right was offered to the second lowest bidder, a consortium formed by Itochu Corporation, Ormat International, and Medco Power Indonesia in 2006. Kyushu Electric Power Company joined the consortium in 2008. ADB and the Japan Bank for International Cooperation (JBIC) were subsequently invited to support the project due to its need for long-term foreign currency financing.

6. **Concessional financing.** The proposed project will be ADB's first loan in Indonesia administering resources allocated by the ADB CTF and the Canadian Climate Fund for Private Sector in Asia under CEFPF. Funded by the multilateral Climate Investment Funds, ADB CTF promotes financing for demonstrating, deploying, and transferring low-carbon technologies with significant potential for long-term reduction of GHG emissions. It is implemented by multilateral development banks, including ADB, and is one of the largest multilateral funds helping developing countries finance climate change mitigation projects.[8] Given the inherent resource risks, capital-intensive development, and current market stagnation in the geothermal sector, ADB, the government and development partners have identified a clear need to deploy a discrete amount of concessional financing to leverage commercial lending and accelerate sector development.

2. Project Design

7. The project will develop the steam resources in the Sarulla concession area and construct, operate, and maintain three geothermal power generation units with a total capacity of about 320 megawatts (MW). The units will be powered by steam from production and injection facilities at the Silangkitang and Namora-I-Langit reservoirs, located in North Sumatra. The project will be developed and implemented under a 30-year energy sales contract (ESC) with PLN, a 30-year joint operating contract (JOC) with Pertamina Geothermal Energy (PGE)

[6] As a result of the drilling required, capital costs for geothermal plants can be more than three times those for conventional fossil fuel plants. In addition, future development of the geothermal market is unlikely to benefit from dramatic, technology-driven cost reductions that have recently occurred in the solar, wind, and natural gas sectors. See Geothermal Sector (accessible from the list of supplementary linked documents in Appendix 2).

[7] Government of Indonesia. 2003. *Geothermal Law No 27/2003.* Jakarta.

[8] The CTF Trust Fund Committee approved the ADB Private Sector Geothermal Energy Program on 11 October 2013, pursuant to the Financial Procedures Agreement entered into between ADB and the International Bank for Reconstruction and Development as trustee of the Trust Fund for the Clean Technology Fund on 18 March 2010.

and a 20-year guarantee from the Ministry of Finance, as stipulated under a business viability guarantee letter (BVGL). The project is intended for base load operation and will include a 14 kilometer transmission line from Namora-I-Langit to a 150 kilovolt (kV) substation to be built by PLN near Silangkitang. The substation will connect power from the generation units to the Sumatra grid through a 275 kV transmission line, to be built by PLN. The project benefits from strong contractual arrangements with creditworthy, investment-grade parties: the Government of Indonesia, rated BB+ by Standard & Poor's (S&P) and Baa3 by Moody's; PLN, rated BB by S&P and Baa3 by Moody's; and Pertamina, rated BB+ by S&P and Baa3 by Moody's.

3. The Borrowers and Sponsors

8. The project sponsors are Itochu Corporation, Kyushu Electric Power Company, Ormat International and Medco Power Indonesia, as seen in Table 1. The sponsors own multiple special purpose vehicles that will act together as borrowers and be jointly and severally liable to the lenders. [9] The borrowers are Sarulla Operations Limited (SOL), Sarulla Power Asset Limited, Kyuden Sarulla Private Limited, OrSarulla Incorporated, and PT Medco Geopower Sarulla. SOL will be the operating company for steam resource development, and construction and operation of plant facilities.

Table 1: Project Sponsors

Sponsor	Description
Itochu Corporation	Itochu Corporation is a leading Japanese trading company founded in 1858 and incorporated in 1949. Through its 124 offices around the world, Itochu engages in multiple businesses in areas such as machinery, textiles, aerospace, energy, and logistics. Itochu has developed and continues to operate more than 15 power generation facilities in North America and is increasingly active in power asset development in Asia and the Middle East.
Kyushu Electric Power Company	Kyushu Electric Power Company is Japan's fifth-largest electric power generator. It serves more than 8 million clients in the Kyushu region, providing thermal, geothermal, nuclear and hydroelectric power generation. Kyushu Electric has six geothermal power plants with a combined output of 212 MW, or 40% of Japan's total geothermal power generation. It is active overseas, and ADB has provided financial assistance to several of Kyushu Electric's overseas projects.
Ormat International	Ormat International is based in the United States and is the developer, owner, and operator of geothermal projects worldwide. It is a wholly owned subsidiary of Ormat Technologies, which is headquartered in Nevada and listed on the New York Stock Exchange. With more than 40 years of experience in geothermal power, Ormat Technologies is the only vertically integrated provider of geothermal services and power that designs, develops, builds, and manufactures most of the equipment used in its plants. It currently owns and operates 575 MW of geothermal power assets in Guatemala, Kenya, Nicaragua, and the United States and has also installed more than 1,600 MW in geothermal and recovered-energy power generation capacity in 72 countries for both its own operations and third-party customers.
Medco Power Indonesia	Medco Power Indonesia is a leading developer, operator, and power project services provider for small-to-medium sized IPPs in Indonesia. It is 51% owned by Saratoga Power [a] and 49% by Medco Energi Internasional. [b]

ADB = Asian Development Bank, IPP = independent power producer, MW = megawatt.

[a] Saratoga Capital is a leading Indonesian investment firm with more than $2 billion of assets under management in the natural resources, energy, infrastructure, telecommunications and consumer goods sectors. The International Finance Corporation has an 11% indirect stake in Medco Power Indonesia through Saratoga Capital.

[b] Medco Energi Internasional is an integrated energy company which benefits from the strategic guidance of technical leaders such as Mitsubishi Corporation. Mitsubishi Corporation owns a 39.4% equity interest in Encore Energy, which in turn owns a 50.7% stake in Medco Energi Internasional.

Sources: Itochu Corporation, Kyushu Electric Power Company, Ormat Technologies, and Medco Power Indonesia.

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[9] Sponsors and Ownership Structure (accessible from the list of linked documents in Appendix 2).

B. Development Impact, Outcome, and Outputs

9. **Impact.** The project will help the government advance towards its renewable energy and climate change mitigation goals. Successful implementation of the project and deployment of concessional cofinacing will lead to: (i) increased geothermal power generation in Indonesia; (ii) more private sector investment in the geothermal sector; and (iii) increased electrification rate in Indonesia.

10. **Outcome.** The project outcome will be expanded geothermal power generation in North Sumatra. The project will demonstrate the viability of a large-scale IPP geothermal project for the first time since 1999. By developing new geothermal, base load power generation in North Sumatra, the project will help displace fossil fuel-generated power, which is the dominant alternative for base-load generation in the Sumatra grid. The construction and operation of the power plants will generate employment for the local community, including opportunities for women, and support climate change mitigation through an estimated net reduction in carbon dioxide (CO_2) emissions equivalent to 1.3 million tons per year. A smaller carbon footprint helps provide healthier and more sustainable living conditions for the people of Indonesia.

11. **Output.** The project output will be the construction and commissioning of three geothermal power generation units with a total capacity of about 320 MW.

C. Alignment with ADB Strategy and Operations

12. **Consistency with Strategy 2020**. The project is consistent with ADB's Strategy 2020, which emphasizes support for environmentally sustainable growth, and development of the private sector.[10] The strategy supports expanding environment-friendly technologies for clean energy generation and energy efficiency, as well as a larger role for private sector financing of infrastructure through public–private partnerships. Through the administration of the ADB CTF and CEFPF loans, the project increases direct, value-adding cofinancing in nonsovereign projects supporting multiple strategies and objectives under ADB's finance ++ approach.[11]

13. **Consistency with the country strategy.** The project is aligned with ADB's country partnership strategy for Indonesia for 2012–2014.[12] It supports the strategy's second pillar of environmental sustainability through climate change mitigation, which prioritizes projects designed to promote renewable energy and energy efficiency. The project also supports the government's long-term objective under the endorsed CTF investment plan for Indonesia[13] to deploy CTF resources to leverage commercial financing of geothermal projects.

14. **Consistency with the sector strategy.** The project is consistent with ADB's Energy Policy, which emphasizes investment in energy efficiency, renewable energy, and wider access to energy.[14] Though ADB reached its internal goal of $2 billion per annum in clean energy in 2011, the project helps sustain that level of investment in 2013 and further bolster the private sector role in catalyzing additional resources in the renewable energy sector.[15]

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[10] ADB. 2008. *Strategy 2020: The Long-Term Strategic Framework of the Asian Development Bank, 2008–2020.* Manila.

[11] The finance++ approach enhances ADB's direct loan financing by (i) leveraging resources through partnerships, and (ii) providing knowledge to developing member countries to maximize development effectiveness.

[12] ADB. 2012. *Country Partnership Strategy: Indonesia, 2012–2014.* Manila.

[13] Government of Indonesia. 2013. *CTF: Revision of the Country Investment Plan for Indonesia.* Jakarta.

[14] ADB. 2009. *Energy Policy.* Manila.

[15] Of the $2.3 billion in clean energy financing ADB provided in 2012, 42% ($996 million) was through ADB's Private Sector Operations Department.

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D. Implementation Arrangements

15. Table 4 summarizes the implementation arrangements.[16]

Table 4: Summary of Implementation Arrangements

Aspects	Arrangements
Regulatory framework	The project is to be developed as a public–private partnership under Indonesia's IPP program and was awarded development rights through an international, least-cost, competitive bidding process.
Management	Itochu Corporation, Kyushu Electric Power Company, Ormat International, and Medco Power Indonesia have formed a consortium that has a combined 40-year track record in geothermal power development and generation, as well as extensive experience in installing and supplying more than 1,800 MW of geothermal power in 70 countries.
Implementation	Steam field development (drilling of production and reinjection wells) and construction of electricity generating units and field facilities will commence on February 2014. Each unit will operate under a 30-year offtake contract.
Construction arrangements Contractors	The construction of the three electricity generation units and associated special and field facilities (including access roads, gathering pipeline system, and separator system equipment) will be managed through a fixed-price, date-certain, turnkey EPC arrangement undertaken by a consortium led by HDEC, in cooperation with Multi Fabrindo Gemilang, a Medco subsidiary.
Operation and maintenance Relevant parties	O&M works will be carried out by NAES for power plant management services, Medco Power Indonesia for O&M support staffing, and West Japan Engineering Consultants for reservoir management, all of which maintain proven track records in power plant management worldwide. Revenue offtake is supported by PLN (rated BB by S&P). Development rights are supported by PGE, a subsidiary of Pertamina (rated BB+ by S&P). Mitigation of political or interface risks between PGE and PLN is supported by the Government of Indonesia (rated BB+ by S&P).
Performance monitoring	SOL will submit the following to ADB during construction and annually thereafter: (i) semiannual unaudited and annual audited financial statements, (ii) semiannual environmental and social monitoring reports, and (iii) semiannual development effectiveness reports.

ADB = Asian Development Bank; EPC = engineering, procurement, and construction; HDEC = Hyundai Engineering and Construction; IPP = independent power producer; MW = megawatt; NAES = North American Energy Service Corporation; OEC = Ormat Energy Converter, O&M = operation and maintenance; PLN = Persusahaan Listrik Negara; PGE = Pertamina Geothermal Energy; S&P = Standard & Poor's; SOL = Sarulla Operations Limited.
Source: Sarulla Operations Limited.

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III. THE PROPOSED ADB ASSISTANCE

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IV. POLICY COMPLIANCE

A. Safeguards and Social Dimensions

16. **Environment and social safeguards**. In compliance with ADB's Safeguard Policy Statement (2009), the project is classified as category A for environment, involuntary resettlement, and indigenous peoples. The potential environmental and social impacts of the project have been identified and effective measures to avoid, minimize, mitigate, and compensate for the adverse impacts are incorporated in the safeguard reports and plans. SOL's institutional capacity to manage the project's social and environmental impacts is deemed adequate. Information disclosure consultations with affected people were conducted in

[16] Details of Implementation Arrangements (accessible from the list of linked documents in Appendix 2).

accordance with ADB requirements.[17] The government approved the environmental and social assessments and management plans in 2005 and 2009.[18] The documents were submitted to ADB and disclosed on its website in August 2009. SOL has prepared an environmental and social impact assessment addendum based on (i) supplemental environmental studies and investigation;[19] and (ii) an environmental compliance audit report of existing facilities, including a time-bound corrective action plan[20] to meet the Safeguard Policy Statement requirements. An audit of prior land acquisition was conducted and the corrective action plan was prepared to address potential economic impacts on landowners. The remaining land identified for acquisition is being procured through negotiated settlement, and a resettlement plan was prepared to mitigate any potential economic displacement. In addition, an indigenous peoples plan has been prepared to mitigate impacts on members of the Batak ethnic group and to maximize project benefits for affected communities.

17. To help avoid the anticipated impacts, SOL will implement generally recognized good practices, as well as preventive and control measures outlined in the World Bank Group environmental, health, and safety (EHS) guidelines and laid out in the project's environmental and social assessments and management plan. Key community concerns raised during consultations included EHS, employment, corporate social responsibility opportunities, and land acquisition impacts. SOL is committed to developing and implementing an EHS management system in line with applicable national legislation and industry codes and standards. Through a contractors' safety management system, SOL has also committed to accord equal priority in the protection of its contractors, vendors, customers, and company employees.

18. **Other social dimensions.** The project is expected to have some gender elements. Measures to benefit women have been incorporated in the project design in accordance with ADB's Policy on Gender and Development (2003).[21] These include assistance for vulnerable women affected by the land acquisition, facilitating the employment and involvement of women and collection of sex-disaggregated data during surveys. The project is also expected to generate job opportunities during both its construction and operational phases, and SOL will try to meet the employment targets set for women and indigenous peoples. ADB will ensure that the investment documentation includes appropriate provisions requiring SOL to comply with the national labor laws and, in addition, take specific measures (including in relation to contractors) to meet internationally recognized core labor standards for the ADB-financed portion of the project, in compliance with ADB's Social Protection Strategy.[22]

B. Anticorruption Policy

19. The sponsors and borrowers were advised of ADB's Anticorruption Policy (1998, as amended to date), and policy relating to the Combating of Money Laundering and the Financing

[17] Since 2008, consultation and negotiation activities were conducted by SOL in a culturally appropriate manner, using Batak facilitators and both the Bahasa Indonesia and Batak languages. Key information from the safeguard plans were disclosed to affected villages, project-affected households and civil society organizations during additional consultations in August and September 2013.

[18] These comprise the environmental and social impact analysis and environmental management and monitoring plans. Due to design changes, an addendum environmental and social impact analysis was prepared and is awaiting government approval.

[19] Supplemental studies on water resources extraction, potential occurrence of natural and geologic hazards, biodiversity and cumulative impacts, hydrogen sulfide modeling, among other assessments were undertaken, and associated management plans were prepared.

[20] A contingency budget has been allocated to implement the environmental corrective action plan.

[21] ADB. 2003. *Policy on Gender and Development*. Manila (adopted in 1998).

[22] ADB. 2003. *Social Protection*. Manila (adopted in 2001).

of Terrorism (2003).[23] Consistent with its commitment to good governance, accountability, and transparency, ADB requires the borrowers to institute, maintain, and comply with internal procedures and controls following international best practice standards for the purpose of preventing corruption and money-laundering activities and the financing of terrorism; and to covenant with ADB to refrain from engaging in such activities.

C. Investment Limitations

20. The proposed loan is within the medium-term, country, industry, group, and single-project exposure limits for nonsovereign investments.

D. Assurances

21. Consistent with the Agreement Establishing the Asian Development Bank, the Government of Indonesia's no objection to the proposed assistance to Sarulla Operations Limited, Sarulla Power Asset Limited, Kyuden Sarulla Private Limited, OrSarulla Incorporated, and PT Medco Geopower Sarulla will be obtained. ADB will enter into suitable finance documentation, in form and substance satisfactory to ADB, following approval of the proposed assistance by the Board of Directors.

V. RECOMMENDATION

22. I am satisfied that the proposed loans would comply with the Articles of Agreement of the Asian Development Bank (ADB) and recommend that the Board approve

(i) a loan not exceeding $250,000,000 from ADB's ordinary capital resources;
(ii) the administration by ADB of a loan not exceeding $80,000,000 to be provided by the ADB Clean Technology Fund; and
(iii) the administration by ADB of a loan not exceeding $20,000,000 to be provided by the Canadian Climate Fund for Private Sector in Asia under the Clean Energy Financing Partnership Facility

to Sarulla Operations Limited, Sarulla Power Asset Limited, Kyuden Sarulla Private Limited, OrSarulla Incorporated, and PT Medco Geopower Sarulla, for the Sarulla Geothermal Power Development Project in Indonesia, with such terms and conditions as are substantially in accordance with those set forth in this report, and as may be reported to the Board.

Takehiko Nakao
President

12 November 2013

[23] As of 21 June 2013, the Financial Action Task Force classified Indonesia as a strategically deficient jurisdiction in relation to combating money laundering and the financing of terrorism. The project team was mindful of this when conducting its integrity due diligence, which did not disclose any significant integrity risk.

DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Targets and Indicators with Baseline	Data Sources and Reporting Mechanism	Assumptions and Risks
Impact (2025) Increased geothermal power generation in Indonesia	Installed capacity of geothermal power increases by 6,200 MW in 2025 from 1,226 MW (2012)	MEMR Handbook of Energy and Economic Statistics of Indonesia[b] Bloomberg New Energy Finance	**Assumptions** Fossil fuel prices increase or stay at current levels. National policy priorities regarding energy sector climate change mitigation continue. Private sector financing is available for scaling-up geothermal energy development.
Increased private sector investment in geothermal resource development	Commercial financing of geothermal projects increases by $14 billion by 2025[a]		**Risks** Lack of either access to, clear ownership of, or usage rights for the steam resources could limit further investment in geothermal energy.
Increased electrification rates in Indonesia	Electrification rates in Indonesia increase from 71.2% (2011) to 92.3% (2021)	National Power Development Plan (2012–2021)	Transmission and distribution networks expand more slowly than needed.
Outcome (2020) Geothermal power generation in North Sumatra expanded	Annual electricity production of 2,529 GWh from 2018 onwards[c]	SOL operation reports. PLN power development plan[d]	**Assumption** Transmission lines and substation are constructed and operational on schedule by national electric utility.
	Net reduction of 1.3 million tons of CO_2 equivalent emissions per year from 2018 onwards[e] Annual corporate tax paid averages at least $20 million per annum Employment equivalent to 100 full-time skilled or semiskilled jobs provided during operations by 2020[g] Women comprise at least 20% of the technical or laboratory and administrative positions during operations by 2020[g] Indigenous peoples comprise 20% of the semiskilled labor from the affected area (Pahae Jae and Pahae Julu) and the North Tapanuli Regency during operations by 2020[g]	SOL operation reports. Ministry of Environment, State of the Environment Report[f] Development effectiveness reports. SOL operation reports	**Risk** Broader resource risks inherent in any geothermal project materialize.
Output (2018) New geothermal power plants constructed and commissioned	Commissioning of three units to supply geothermal power generation plants designed to deliver about 320 MW by 2018	SOL quarterly progress or project completion reports.	**Assumption** Experienced and reputable contractors appointed for implementation.

Design Summary	Performance Targets and Indicators with Baseline	Data Sources and Reporting Mechanism	Assumptions and Risks
	Local purchase of goods and services amount to $200 million by 2017 Employment equivalent to 802 full time skilled or semiskilled jobs and 822 fulltime unskilled jobs provided during construction in 2013–2017[g] Women comprise at least 30% of unskilled labor for services[h] provided during construction in 2013–2017[g] Indigenous peoples comprise 30% of the unskilled labor from the affected area (Pahae Jae and Pahae Julu) and the North Tapanuli Regency during construction in 2013–2017[g]	SOL operation reports Development effectiveness monitoring reports	**Risk** Implementation delays may be caused by lack of timely availability of budgeted resources and by lengthy approval processes for land acquisition and safeguards compliance.
Activities with Milestones 1. Update resettlement plan based on detailed design submitted prior to first disbursement. 2. Make institutional arrangement for ESMP, EMOP, IPP, and resettlement plan prior to construction. 3. Construction work in progress, as scheduled upon loan signing. 4. Sign loan agreement by March 2014.			**Inputs** ADB direct loan: $250.0 million ADB Clean Technology Fund loan: $80.0 million Canadian Climate Fund for Private Sector in Asia under CEFPF loan: $20.0 million

ADB = Asian Development Bank, CO_2 = carbon dioxide, CEFPF = Clean Energy Financing Partnership Facility, CTF = Clean Technology Fund, EMOP = environmental monitoring plan, EPRG = extended political risk guarantee, ESMP = environment and social management plan, GWh = gigawatt-hour, IPP = independent power producer, JBIC = Japan Bank for International Cooperation, MEMR = Ministry of Energy and Mineral Resources, MOF = Ministry of Finance, MW = megawatt, PLN = Persusahaan Listrik Negara, SOL = Sarulla Operations Limited.

[a] Based on an average cost per MW of geothermal power in Indonesia of $4.5 million and current geothermal development pipeline of 3,200 MW to be financed on a fully commercial basis by the private sector. Source: Bloomberg New Energy Finance. *Q2 2013 Geothermal Market Outlook*. New York (27 June 2013). This includes projects that have been publicly announced, received permits, commenced drilling, and/or are under construction.

[b] http://www.esdm.go.id/publikasi/handbook.html

[c] Calculated as sum of net deliverable capacity (MW) of each unit (unit 1—105.4 MW; unit 2 and unit 3—107.7 MW each) multiplied by 90% capacity factor and 8,760 hours in a year.

[d] Persusahaan Listrik Negara. 2012–2021. Rencana Usaha Penyediaan Tenaga Listrik. 2013. Jakarta.

[e] For the supply side, tCO_2=GWh generated/saved* CO_2 emission factor(tCO_2/GWh). Assuming the latest average emission factor for the Sumatra grid (0.748 in 2011), the tCO_2 = 2,529 GWh *0.748 = 1891.62 CO_2 equivalent per year or 1.9 million tons of CO_2 equivalent per year. The net reduction of greenhouse gas emission of 1.3 million tons of CO_2 equivalent per year takes into account the estimated annual project emissions of 0.6 million tons of CO_2 equivalent per year. (http://pasarkarbon.dnpi.go.id/web/index.php/dnacdm/read/23/pembaruan-faktor-emisi-sistem-interkoneksi-tenaga-listrik-2011.html)

[f] http://www.menlh.go.id/penghargaan-lingkungan-2012/

[g] Employment figures will be disaggregated by skill level and gender.

[h] Applicable services provided during construction include the management and operation of a cafeteria, laundry and cleaning service, or basic office administration.

Source: Asian Development Bank.

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