TC Document

I. Basic Information for TC

▪ Country/Region:	SURINAME
▪ TC Name:	Support the development of solar floating photovoltaic energy in Suriname
▪ TC Number:	SU-T1138
▪ Team Leader/Members:	Abadal Colomina, Jordi (INE/ENE) Team Leader; Paredes, Juan Roberto (INE/ENE) Alternate Team Leader; Alarcon, Arturo (INE/ENE); Almeida Oleas, Natalia (LEG/SGO); Aoki, Issei (INE/ENE); Cuervo, Javier (INE/ENE); Gangadin, Raijant Amarnath (CCB/CSU); Marquez Barroeta, Fidel (INE/ENE); Noh, Yeo Jin (INO/IEN)
▪ Taxonomy:	Client Support
▪ Operation Supported by the TC:	N/A .
▪ Date of TC Abstract authorization:	08 Mar 2021.
▪ Beneficiary:	Government of Suriname and Staatsolie Power Company Suriname NV (SPCS)
▪ Executing Agency and contact name:	Inter-American Development Bank
▪ Donors providing funding:	Japan Special Fund(JSF)
▪ IDB Funding Requested:	US$300,000.00
▪ Local counterpart funding, if any:	US$34,000.00 (In-Kind)
▪ Disbursement period (which includes Execution period):	24 months
▪ Required start date:	04 de agosto, 2021
▪ Types of consultants:	Firm and individual consultants
▪ Prepared by Unit:	INE/ENE-Energy
▪ Unit of Disbursement Responsibility:	CCB/CSU-Country Office Suriname
▪ TC included in Country Strategy (y/n):	Y
▪ TC included in CPD (y/n):	N
▪ Alignment to the Second Update to the Institutional Strategy 2020-2022:	Productivity and innovation; Environmental sustainability

II. Objectives and Justification of the TC

2.1 The objective of this TC is to promote the development of solar floating photovoltaic (PV) energy in Suriname, by supporting the establishment of a proper strategic, policy and regulatory framework and by preparing a feasibility study for a floating solar PV installation in the Afobaka hydropower dam, making use of the expertise developed by other countries. This TC will benefit from the experiences and lessons learned of the Japanese policy and regulatory framework for solar floating projects, as well as the strategies and technologies used in Japan to adapt the infrastructure to extreme weather events and to integrate the floating solar systems in existing hydroelectric facilities. There will be a particular attention to issues relevant to LAC such as climate resilience and risk mitigation.

2.2 Suriname is a small middle-income country with an estimated population of 551,000 people concentrated in the coastal areas, and a sparsely populated interior that extends to the Amazon Rainforest (locally known as Hinterland).

2.3 The National Power System (NPS) consists of seven isolated power networks served by the public utility company Energie Bedrijven Suriname (EBS) based on hydro and thermal generation. Energievoorziening Paramaribo (EPAR) is the largest network, serving around 143,485 customers, with peak demand of around 203 Megawatts (MW). EPAR has mainly depended on power supply from the 189 MW Afobaka hydropower plant,[1] which generates about 50% of total electricity consumed in Suriname. The Afobaka hydropower plant was recently transferred (December 2019) to SPCS (a subsidiary company of Staatsolie Maatschappij Suriname N.V. in charge of power generation). Currently, the Government of Suriname (GoS) and SPCS are looking into options to increase the generation capacity of the plant.

2.4 Non-conventional renewable energy is being slowly introduced in the country. The biggest solar plant in the country is a 5 MW solar plant that was commissioned in 2014 to supply power to the IAMGold Rosebel gold mine. The Bank is financing several smaller solar mini grids (both isolated and grid connected) with the aim to increase energy access and improve quality of the electricity service in rural areas using renewable energies.

2.5 Suriname is committed to the development of renewable energy as stated in the Policy Development Plan 2017-20212 with the aim of increasing the use of renewable energy sources as part of the optimal energy mix, in particular solar energy due to the progress and the price drop of the technology. The Nationally Determined Contribution 2020 of Suriname3, submitted in December 2019, committed that the share of renewable energies stays above 25% by 2025 and above 35% by 2030.

2.6 The quality of service in the EPAR system is critical during peaks periods in the dry season, coinciding with the warmer periods of the year (partly related to the consumption of air-conditioning equipment) and higher solar irradiation. Solar energy helps to soften these peaks and optimize the management of water resources to have reserves at critical moments. Solar plants can be connected to the same transmission line used for the hydropower facility, in this case solar and hydro generation is managed in an integrated way (hybrid hydro and solar system).

2.7 Floating solar PV installations open the door to new opportunities for scaling up solar generating capacity under the technological leadership of countries such as Japan, China, or South Korea. Floating solar systems have certain advantages over land-based systems, including improved energy yield thanks to the cooling effects of water and the decreased presence of dust, use of affected land, easy installation, and reduction of shading. The possibility of adding floating solar capacity to existing hydropower plants is of particular interest in the case of large hydropower sites that can be flexibly operated and can use the existing electricity transmission infrastructure.

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[1] Constructed in the 1960's by *Suralco* under the *Brokopondo Agreement* (1957) with the Government of Suriname (GoS), as a source of energy that made viable the development of a smelting facility and an alumina refinery near its bauxite sources. The agreement established that were Suralco ever to close the refinery, the hydropower plant would be transferred to the state. In late 2015, Suralco also closed the alumina refinery. As of January 2020, the plant was handed over to the state-owned Staatsolie Power Company.

[2] *Policy Development Plan: 2017-2021*. Government of the Republic of Suriname.

[3] Nationally Determined Contribution 2020.

Because of this, it makes sense to support the implementation of a policy and technical framework to promote solar floating energy.

2.8 Japan is one of the world leaders in floating solar power, owning 73, and more than 50% of the installed capacity, from the 100 largest floating solar plants in the world. The first floating PV system was built in 2007 in Aichi, Japan. The region with more solar floating plants in Japan is Hyogo, an agriculture region with more than 50 MW of installed capacity distributed in 32 solar floating plants. Kagawa is the region with the second largest capacity, with a total of 17 plants and more than 17 MW. The biggest floating PV project in Japan is the 13.7 MW Yamakura solar plant, which became operational in March 2018.[4]

2.9 Recently, plants with capacity of tens and even hundreds of megawatts have been installed in China; more are planned in India and Southeast Asia. In 2018, the cumulative installed capacity of floating solar panels was 1,000 MW, from which more than 500 MW were installed in 2018.[5] LAC has a large share of hydroelectric power generation, with about 200 GW installed, many of these plants have reservoirs, so there is significant potential to integrate floating photovoltaic solar panels into existing plants.

2.10 Several countries in LAC and the Caribbean have shown interest in developing this type of system (Brazil, Chile, Panama), and the IDB currently has dialogues with some countries, such as Suriname (integration in the Afobaka hydroelectric plant), Bahamas (30 MW on the Island of Nueva Providencia) or in Paraguay (at the Acaray plant).

2.11 The TC will contribute to the overarching strategic objectives of the IDB Group Country Strategy (CS) with the Republic of Suriname 2016-2020 (GN-2873), valid until the end of 2021. The support to electricity infrastructure is in line with the need to execute public investments that have growth-enhancing effects (¶3.23 and ¶3.24 of the CS). The institutional support for SPCS and other relevant stakeholders is aligned with the need to improve the management of state-owned enterprises (¶3.14 of the CS).

2.12 The TC is aligned with the IDB's Second Update to the Institutional Strategy 2020-2022. The TC is aligned with the development challenge of "Productivity and Innovation", as solar energy can contribute to reduce the cost of electricity generation, improve the quality of the electricity supply and create new jobs, as well as the TC will explore an innovative solution with very little experience and big potential of replication in the region. The TC is also aligned with the priority area "Regional integration and value chains", as it will include a study to analyze the supply chain of solar floating PV and provide recommendations to promote local content and near shoring. The TC will also promote the introduction of solar energy in Suriname, which will diversify and clean its energy matrix, directly contributing to the cross-cutting issue of Climate Change and Environmental Sustainability.

2.13 The TC is aligned with the several indicators of the IDB Corporate Result Framework (2020-2023): (i) 2.8 Jobs supported (#); (ii) 2.19 Emissions avoided (annual tons CO_2 equivalent); (iii) 2.22 Installed power generation capacity from renewable sources

[4] Top 100 Floating Solar PV Plants. Solar Plaza.
[5] *Where Sun Meets Water: Floating Solar Market Report.* World Bank (October 30, 2018).

(MW); and (iv) 2.23 Value of investments in resilient and/or low-carbon infrastructure ($).

2.14 The TC is aligned with the IDB Climate Change Sector Framework and the IDB Energy Sector Framework, by promoting the implementation of non-conventional renewable energies in the country, which will contribute to climate change mitigation, and by promoting a floating solar system placed in the existing reservoir, which will not compete with other uses of the land and, contribution to preserve the green forest in Suriname.

2.15 The TC is aligned with the IDB Sustainable Infrastructure for Competitiveness and Inclusive Growth Strategy, as well as the CCBs strategic vision Build Forward as: (i) solar floating energy is a very innovative solution in the region, (ii) will explore options for private sector to finance the infrastructure, (iii) will promote the implementation of solar energy in the country, helping to mitigate climate change and (iv) the feasibility studies will take into consideration resiliency criteria.

2.16 The TC is aligned with the G20 Principles for Quality Infrastructure Investment. The project will raise economic efficiency in Life-Cycle cost, as: (i) the floating solar plant will be integrated in an existing hydroelectric facility, reducing the investments required in the transmission infrastructure, (ii) there are no costs related to land acquisition and preparation, (iii) it is an scalable solution, which can be expanded in the future, maximizing the return on the investments made, (iv) the panels are easy to replace or dismantle at the end of its life, as there are no foundations done during the installation. Also, it is aligned with the principle of resiliency against the climate change, as the solar plant will be designed to resist climate extreme events and, the solar resource will complement the energy generated by the hydroelectric power plant, which is planned to reduce in the future due to the impacts of climate change.[6]

III. Description of activities/components and budget

3.1 **Component I: Policy and regulatory framework for floating solar PV systems in Suriname (US$75,000).** This component will include an analysis and will provide recommendation to establish an adequate policy and regulatory framework for the development of floating solar PV systems in Suriname, including environmental and social aspects. The analysis and recommendations will consider the existing policies and regulations developed Japan.

3.2 This component will also finance dissemination activities as: (i) workshops and seminars, including a bilateral workshop between operators and suppliers from Japan and the main stakeholders from Suriname, (ii) knowledge products, including a technical note about the Japanese experiences in the policy, regulation, design, construction and operation of floating solar PV installations and its potential for replication in Latin America and the Caribbean, and (iii) training to relevant stakeholders.

3.3 **Component II: Feasibility studies of floating solar PV installation (US$ 200,000 from JSF and US$34,000 as local counterpart).** To support the development of the

[6] Climate Impacts on Latin America Hydropower (IEA, 2021).

policy framework, this component will include: (i) the technical, economic, institutional, legal and environmental studies, for the installation of a 25 - 75 MW floating solar PV installation, including the connection to the main electrical grid; (ii) the analysis of the value chain for the supply, installation, and Operation and Maintenance of the floating solar PV installations; and (iii) options for working with the private sector for the financing of the investment. The studies will incorporate the lessons learned and experiences of the floating solar plants from Japan operations including resiliency considerations and life cycle costs analysis.

3.4 **Logistic, coordination and evaluation (US$25,000).** This component will finance the dissemination and communication event, supervision, project management, and a final evaluation.

Indicative Budget

Activity/Component	Description	IDB Funding	Counterpart Funding	Total Funding
Component I: Policy and regulatory framework for floating solar PV systems in Suriname	Policy and regulatory framework analysis, technical note of experiences in Japan, workshops, and trainings	US$ 75,000		US$ 75,000
Component II: Feasibility studies of floating solar PV installation	Feasibility studies and technical note for value chain in solar floating plants.	US$200,000	US$ 34,000	US$ 234,000
Logistic, coordination and final evaluation	Dissemination events, consultant to support execution.	US$ 25,000		US$ 25,000

3.5 The team leader for the execution of the TC is Jordi Abadal (INE/ENE), energy specialist based in the country office of Suriname.

3.6 Project teams will report progress annually, by March 15th, through the use of IDB systems standard (Monitoring and Reporting System - M&R system). The progress report will include information about the actual inputs, output delivery, and outcome achievement, among others, as of the last day of the reporting period, which closes on December 31st of the reporting year.

3.7 Project team will also submit JSF Coordinator any additional information needed for the JSF annual reports to the Donor.

3.8 The TC final evaluation report will be submitted according to the schedule established in IDB systems and will be financed using funds from the TC.

IV. Executing agency and execution structure

4.1 The Bank will be the Executing Agency (EA) of this operation, considering the Bank's experience in the preparation and development for both technical and operational instruments proposed for this type of operation. The beneficiaries of this TC are the Government of Surinam (GoS) and Staatsolie Power Company Suriname NV (SPCS), which is the main benficiary of Component II. SPCS will act as technical coordinator

from the government side, providing feedback to the reports and activities, and coordinating the with other stakeholders. In accordance with the Operational Guideline for Technical Cooperation Products (GN-2629-1), being the Bank the EA of this TC is justified under Appendix 10 of the beforementioned guidelines as the TC responds to a request from the beneficiaries and exceptionally – and at the request of the beneficiaries – tasks the Bank with the responsibility for the contracting of consultancies. Furthermore, the Bank and the beneficiaries agree that contracting by the Bank would enhance independence under the impartiality criteria, as several stakeholders might have different interest in the regulatory and institutional aspects, as well as the proposed financial structure for the implementation of the solar floating plant.

4.2 The IDB will be responsible for the selection and contracting of consulting firms and individual consultants, to be carried out in close coordination with the beneficiaries. Activities to be executed are included in the Procurement Plan and will be contracted in accordance with Bank policies as follows: (i) AM-650 for Individual consultants; (ii) GN-2765-4 and Guidelines OP-1155-4 for Consulting Firms for services of an intellectual nature; and (iii) GN-2303-28 for logistics and other related services. The Beneficiaries may provide technical inputs to the terms of reference and reports of the consultants, such inputs should be done directly to the Bank. The Bank will have the autonomy to approve such documents and act as EA of the TC. This dynamic will facilitate proper articulation between the various actors within the framework of the technical dialogue of this TC. The TC does not present fiduciary management risks as it will be implemented by the Bank. For this same reason, no financial audit is required.

V. Major issues

5.1 The main risk in the TC is the potential delay arising from the coordination with multiple stakeholders or a change in the priorities from the main stakeholders. This risk will be mitigated by involving and engaging the main stakeholders from the beginning of the implementation of the TC, through several workshops and seminars, seeking feedback and regularly presenting and discussing progress report.

VI. Exceptions to Bank policy

6.1 The TC does not require exceptions to the Bank policy.

VII. Environmental and Social Strategy

7.1 The project category is C. No environmental assessment studies or consultations are required for Category "C" operations.

Required Annexes:

Request from the Client - SU-T1138

Results Matrix - SU-T1138

Terms of Reference - SU-T1138

Procurement Plan - SU-T1138