



Project Information Document/ Integrated Safeguards Data Sheet (PID/ISDS)

Concept Stage | Date Prepared/Updated: 27-Aug-2018 | Report No: PIDISDSC24177

**BASIC INFORMATION****A. Basic Project Data**

Country Micronesia, Federated States of	Project ID P165183	Parent Project ID (if any)	Project Name SUSTAINABLE ENERGY DEVELOPMENT AND ACCESS PROJECT (P165183)
Region EAST ASIA AND PACIFIC	Estimated Appraisal Date Sep 21, 2018	Estimated Board Date Nov 16, 2018	Practice Area (Lead) Energy & Extractives
Financing Instrument Investment Project Financing	Borrower(s) Federated States of Micronesia	Implementing Agency Department of Finance and Administration (DoFA), Centralized Implementation Unit (CIU)	

Proposed Development Objective(s)

To improve PUC's operational performance, increase the share of renewable energy and expand access to electricity in the state of Chuuk, and enable renewable energy solutions in the states of Yap and Kosrae.

PROJECT FINANCING DATA (US\$, Millions)**SUMMARY**

Total Project Cost	30.00
Total Financing	30.00
of which IBRD/IDA	30.00
Financing Gap	0.00

DETAILS**World Bank Group Financing**

International Development Association (IDA)	30.00
IDA Grant	30.00



Environmental Assessment Category

B - Partial Assessment

Concept Review Decision

Track II-The review did authorize the preparation to continue

B. Introduction and Context

Country Context

- 1. The Federated States of Micronesia (FSM) include 607 islands (74 of which are inhabited) and have a population of 104,196.** FSM is a federation of four semi-autonomous states (Chuuk, Kosrae, Pohnpei, and Yap), each with its own executive and legislative bodies and with considerable autonomy to manage its domestic affairs. Most states have their own development strategy, while the National Government provides an integrated perspective and vision, which is described in the FSM Strategic Development Plan for 2004-2023.
- 2. Economic growth is constrained by the small size of the FSM economy and remoteness to markets, and limited transportation links.** FSM Gross Domestic Product (GDP) is about US\$334 million and the nearest major market is Japan at over 3,700 kilometers. All petroleum products and a very high proportion of food are imported.
- 3. FSM, a former Trust Territory of the Pacific Islands, entered a Compact of Free Association (COFA) with the United States (US) in 1986, ensuring 15 years of development aid.** The Compact - an international agreement establishing and governing the relationships of free association between the United States and three Pacific Island nations - has provided large external financial transfers to support the operations of the FSM Government and substantial public-sector investment at the state level. Indeed, the agreement was designed to assist FSM with the development of its infrastructure and economy. Overall, infrastructure development was successful: roads, electric utilities, harbors, airports, schools, hospitals, and public facilities were constructed. However, maintenance was not sufficient, and thus the infrastructure is now in poor condition and needs to be updated to meet the population's increasing demands. This has contributed to the limited success of the progress of a self-sustaining economy.
- 4. In 2003, the US and FSM entered an Amended Compact II agreement, under which FSM receives payments of US\$92.7 million per year for 20 years.** This includes US\$76.2 million in the form of grants, US\$16 million to be placed in a trust fund, and US\$500,000 allocated each year for an annual audit. The trust fund is expected to become a permanent, interest-bearing fund after Compact II expires in 2023, and to provide the same level of income to FSM as Compact II does. However, current financial trends indicate that the FSM Trust Fund will not provide that level of income after 2023 when Compact II ends.
- 5. FSM's heavy dependence on imported petroleum fuels makes the country highly vulnerable to petroleum price volatility and shocks.** FSM currently spends about US\$40 million annually on imported fuels. This represents over 50 percent of the aggregate sectoral grants that the nation receives from the US under the Compact II agreement, and nearly 15 percent of nominal GDP, making energy the costliest sector of its fragile economy.



6. **In August 2007, an agreement to transfer Mobil Oil Micronesia, Inc. (MOMI)'s assets in FSM to the FSM Government and for MOMI to maintain fuel supply for a transitional five-year period was signed with the FSM Government.** Following negotiations, the FSM Petroleum Corporation - referred to as PetroCorp - was established by the FSM Congress and signed into law in September 2007. The FSM Petroleum Corporation does business under the trade name of "Vital" and is a wholly government-owned enterprise operating the nation's fuel storage and wholesale distribution facilities in the four states. The most recent petroleum supply contract with MOMI became effective on September 1, 2013 for a period of five years with an option to renew.
7. **The joint IBRD/IDA/IFC/MIGA Regional Partnership Framework (RPF) for the period FY17-FY21 was adopted in 2017.** The RPF outlines the World Bank Group's (WBG) strategic program for nine Pacific island countries (PIC9)¹ including FSM. The RPF builds upon the deepening engagement with Samoa, Tonga, and Kiribati, and the ability to channel significantly more resources to FSM, the Republic of Marshall Islands, Vanuatu, and Tuvalu following their recent reclassification as IDA-eligible. This RPF comes at a time when IDA support to the Pacific Island Countries (PICs) is rising to unprecedented levels. The unique features that define the PIC9 - and which consequently have a direct bearing on their development agenda - are their small size (they are among the 25 smallest independent states on earth), remoteness, geographic dispersion, environmental fragility, and high degree of exposure to a volatile mix of economic shocks, climate change, and natural disasters.
8. **The RPF defines four focus areas including the cross-cutting area of Strengthening the enablers of growth and opportunities (macro-economic management, infrastructure, and addressing knowledge gaps).** WBG interventions in this area will support the efforts of the PIC9 to strengthen macroeconomic management, improve access to basic services and connective infrastructure, and address prevailing knowledge gaps.
9. **In addition, the FSM Strategic Development Plan (SDP) provides a roadmap for the country's social and economic development over 20 years (2004-2023).** Energy is an integral component of the SDP, as it includes reducing FSM's reliance on fossil fuels and vulnerability to fluctuations in fuel prices.

Sectoral and Institutional Context

Electricity sector context

10. **At present, electricity generation in the four states is based almost completely on fossil fuels.** As in other PICs, petroleum fuels are used largely for electricity generation and transportation. Only a small amount is currently generated from solar, though this amount is predicted to increase; a small hydro-electric plant operates in Pohnpei. Practically all fossil fuel is imported by the FSM Petroleum Corporation; a small amount may be imported by fishing and marine transport vessels re-fueling from tankers at sea. Fuel in transportation is used mostly for marine services because vehicle transportation is modest due to FSM's small land mass. In addition to fossil fuels, firewood, and other vegetable matter (especially coconut husks) are also used as energy sources.

Table 1. FSM Percentage of Physical Use of Fossil Fuels by Sector, 2015²

¹ Report No. 120479, January 1, 2017. The PIC9 include: Kiribati, RMI, FSM, Republic of Nauru, Republic of Palau, Independent State of Samoa, Kingdom of Tonga, Tuvalu, and Vanuatu. Eight of these countries are IDA-eligible and have seen a substantial increase in WBG presence and engagement in recent years.

² Source: Government of the Federated States of Micronesia, Department of Resources & Development - Experimental Energy Accounts for the Federated States of Micronesia, May 2017: <http://www.fsmstats.fm/wp-content/uploads/2017/07/FSM-Experimental-Energy-Accounts.pdf>



Electricity	All Other Industries	Government + NPISH*	Households	Exports
40%	47%	3%	4%	6%

*NPISH: Non-Profit Institutions Serving Households

11. It is currently estimated that around 76 percent of households in FSM had some form of electrification. However, access rates vary widely among states, with Kosrae and Pohnpei having a 95 percent electrification rate, and Chuuk only 27 percent.

Table 2. FSM Population, GDP, and Electrification Rate by State, 2018

State	Population	GDP	Electrification Rate
Chuuk	47%	28%	27%
Kosrae	7%	8%	95%
Pohnpei	35%	47%	95%
Yap	11%	17%	87%

12. In 2018, electricity use in FSM was divided as follows: residential (20 percent), commercial & industrial (35 percent), government (28 percent), and system losses (17 percent). The largest amount of electricity is used for air conditioning (especially in the government sector) and lighting. Pohnpei has 6.6 MW peak load, Chuuk 2.7 MW, Yap 2.3 MW, and Kosrae 1.2 MW.

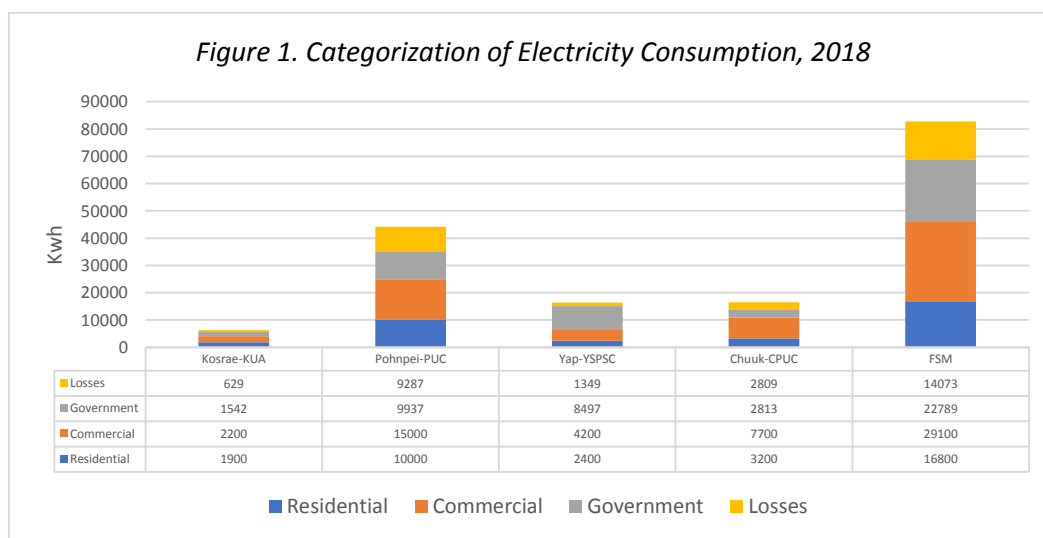
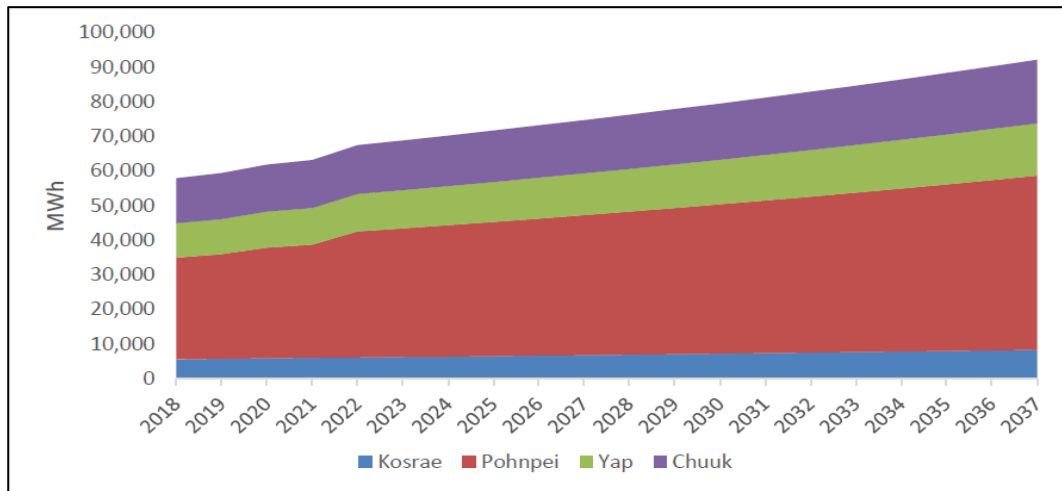


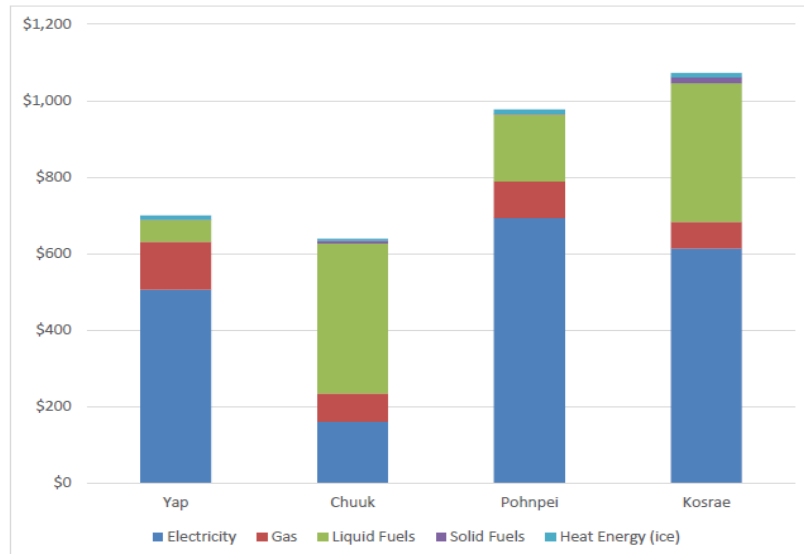
Figure 2. FSM Electricity Consumption and Forecast, 2018³

³ FSM Master Plan.



13. **Currently and per local authorities, renewable energy (small hydro and solar PV) constitutes 2.5 percent of FSM’s energy generation mix, while petroleum-based fuels account for 97.5 percent.** Figure 3 shows average annual expenditure on different energy sources by state in 2013. Information broken down by outer islands is not available, however households on the four main islands spent significantly more on energy than outer islands. On average, main island households spent US\$35 a month on energy, whereas outer island households spent only US\$15.37 in 2009. On main islands, electricity is generally available and households pay the utilities while on outer islands, biomass is generally available at no cost. Energy demand in rural areas generally reflects basic needs, such as lighting (often with kerosene, oil lamps, and flashlights) and cooking (wood or other biomass, such as coconut husk, and some kerosene, although its consumption has dropped due to cost increases).

Figure 3. Annual Energy expenditure by State, 2013



Source: 2013 Household Income Expenditure Survey (HIES)

14. **Problems typically associated with a lack of electricity access are present in FSM; these include health problems caused by indoor air pollution, and environmental problems such as deforestation and land degradation.** It is estimated that



about 42 percent of FSM’s total population⁴ is affected by household indoor air pollution. Only 10.6 percent of the population uses electricity for cooking; most use kerosene (44.1 percent) or wood (41.5 percent), while a few people use gas (3.6 percent) and other fuels (0.2 percent). Women and children are often responsible for most household chores, including cooking and fuel collection. This places them at greater health risks due to poor ventilation, increased drudgery, time loss, etc. Consequently, women’s health and time loss are particularly affected by poor access to electricity and clean, modern fuels for cooking. No specific statistical study has been conducted on energy-use habits and expenditures in rural areas in FSM.

Institutional Context

15. **Two main forms of energy are supplied in the market economy of FSM:** fossil fuels by Vital (FSM Petroleum Corporation, also known as PetroCorp) and electricity by the following four state-owned power utilities: Chuuk Public Utility Corporation (CPUC); Kosrae Utilities Authority (KUA); Pohnpei Utilities Corporation (PUC); and Yap State Public Service Corporation (YSPSC).

Table 3. FSM State Utilities data, 2018

Utility	Number of Staff	Number of Customers	Distribution Losses	Collection rate	Turnover (in millions of US\$)
Chuuk - CPUC	65	2,057	17%	98%	6.79
Kosrae - KUA	30	1,800	10%	89%	2.54
Pohnpei - PUC	156	7,334	21%	94%	13.72
Yap - YSPSC	104	2,858	8%	99%	5.6

16. **The four power utilities are responsible for energy generation, transmission, and distribution.** Each utility has its own tariff structure and is regulated by the Utility Board at the State level. These power utilities are also in charge of water and waste water systems; this double responsibility implies that some means are mutualized but also multiplies the number of issues to be solved, creates higher overall expectations including from customers, and increases the array and variety expertise within each utility:

- In Chuuk, water and wastewater systems are also the responsibility of CPUC;
- In Kosrae, water and wastewater systems are currently the responsibility of the Department of Transportation and Infrastructure, although part of KUA’s mandate is also to deliver water and wastewater utility services on a self-funding basis;
- In Pohnpei, PUC also provides the tap water in town, which comes from the Nanipil River dam at the foot of the mountains south of Kolonia;
- In Yap, water and wastewater systems are also the responsibility of YSPSC, with the Southern Yap Water Authority and Gagil-Tomil Water Authority supplying water to other parts of the main Yap islands.

17. **The Utility Board, appointed by the Governor and confirmed by the state legislature, governs these utilities, and has the authority to approve and adjust tariffs (as proposed by the utility’s management) upon the presentation of a tariff review proposal.** At present, tariffs cover basic operation and maintenance (O&M) costs at different levels in each state, and some include a fuel price pass-through. None of the utilities can generate enough revenue to support large-scale infrastructure rehabilitation or new investments in conventional or renewable energy.

⁴ Estimated using data from: Global Alliance for Clean Cookstoves: <http://www.cleancookstoves.org/countries/asia/micronesia.html>



18. **Utility networks are focused primarily on the main islands of each state.** For households on the main islands, the access rate to grid electricity is high. Electricity for the grids comes almost entirely from diesel generation. Each utility has some grid-connected solar, and Pohnpei has a small hydro generation facility.
19. **All utilities but KUA maintain infrastructure outside the main islands.** YSPSC has diesel mini-grids on some outer islands, and stand-alone solar systems at households and community buildings on others. CPUC and PUC manage some stand-alone solar systems on outer and lagoon islands, typically located on schools, dispensaries, and community offices. Across FSM, it is common for outer island and other isolated households to have small solar panels powering one or two lightbulbs.
20. **On May 29, 2014, the World Bank Board approved the Energy Sector Development Project (ESDP) financed through a SDR9.4 million IDA-grant (approximately US\$12.7 million equivalent at the time).** The ESDP aims to increase the available generation capacity and efficiency of electricity supply in the state power utilities, and to strengthen the planning and technical capacities of the National Government and the state power utilities in the energy sector. As of December 2017, the ESDP has progressed steadily, although there were initial delays. Commitment is now 60 percent and the disbursement rate has increased to 46 percent. As part of **Component 1** of the ESDP - *Increasing available generation capacity and efficiency of electricity supply in the state power utilities* (US\$9.27 million equivalent), two gensets of 2.0 MW (diesel generators) and one of 1.5 MW were installed, respectively, in Pohnpei and Yap, and a 0.6 MW-genset will soon be delivered in Kosrae. LED streetlights were installed in Kosrae and Chuuk and grid-connected solar PVs will be mounted in Chuuk as part of the project. Under Component 1, Yap's substation is being upgraded and a 500 kVA Pad mounted distribution transformer installed. Under **Component 2** - *National and state energy planning* (US\$3.4 million equivalent), FSM Energy Master Plan and Pohnpei Energy Assessment are being prepared. Both studies have informed this concept note. ESDP's **Component 3** - *Technical assistance and project management* (US\$1.5 million equivalent) supports project management functions and technical assistance. A restructuring of the ESDP is currently being processed to extend the July 2018 closing date by one year.
21. **The first National Energy Policy (NEP) for FSM was developed in 1999, providing FSM's energy policy framework and the actions at national and state level to achieve its objectives.** It was developed based on four primary components: Policy and Planning, Conventional Energy (fossil fuel), Energy Efficiency and Conservation, and Renewable Energy. The second and most recent version of the NEP was adopted and published in 2012 and progresses the goals of the SDP. It is divided into two volumes:
- The first volume contains the country's major renewable energy and energy efficiency goals, including increasing the share of electricity generated from renewable sources to 30 percent by 2020, while increasing energy efficiency by 50 percent as part of the "Green Micronesia Initiative." It also outlines several other targets, such as raising the average energy generation efficiency of conventional generating units by 20 percent by 2015 and increasing the rural electrification rate to 90 percent by 2020. In addition, the policy establishes the following guiding principles for energy development in FSM: (i) the spread of benefits to disadvantaged communities; (ii) increased public awareness and local capacity; (iii) private sector involvement; and (iv) community solutions;
 - The second volume presents the national- and state-level energy action plans necessary to achieve the overall national energy targets. The national-level energy actions focus on energy efficiency in public facilities, energy



standards for all buildings, and energy awareness campaigns. The state-level actions are much more specific and encompass 20 to 30 specific renewable energy and energy efficiency projects. Each of the four states has prepared its own action plan for meeting NEP goals; however, in 2012 Chuuk was the only state to propose additional policies, committing to investigate a feed-in tariff for renewable energy by 2015.⁵

22. **In FSM, the National Energy Workgroup (NEW) oversees and coordinates activities in the energy sector, especially the implementation of the NEP.** NEW comprises members of key departments in the National Government⁶ and interacts closely with the National Government, the Regional Energy Committee (REC),⁷ and the Association of Micronesian Utilities (AMU)⁸. NEW also interacts with the four State Energy Workgroups (SEWs)⁹. SEWs are responsible for: (i) overseeing and coordinating all state efforts in the energy sector; (ii) implementing State Energy Action Plans that are in line with NEP; (iii) advising the respective state governments on energy issues; and (iv) assisting in the development and design of specific and technically sound energy efficiency and renewable energy projects for development partners' consideration, funding, and implementation.

23. Key sector issues that affect FSM electricity sector are:

- **Outdated power infrastructure assets and lack of maintenance.** Power generation assets are outdated and lack proper maintenance especially in Pohnpei where the electricity demand is the largest among the four states. In the case of PUC, there is also insufficient generation capacity to cover peak demand and unscheduled generator shutdowns. As a result, PUC's performance in delivering electricity services is currently well below the standards achieved by YSPSC, KUA, and CPUC. The thermal power plant needs a medium- to long-term investment approach as opposed to past short-term solutions achieved through the installation of small, high-speed gensets. The participation of independent power producers (IPPs) contributing to PUC's generation has improved the situation to some extent. However, the existing power purchase agreement does not bring any competitive advantage in the region due to absence of economy of scale. Indeed, FSM scattered territories nature has an adverse effect on utility operations, translating for example, into 4 different utilities for a country this size: economies of scale typically enjoyed by electric utilities in power generation, fuel storage, inventory and procurement are extremely limited. This leads to high electricity costs on the main islands and even higher on the outer islands. Therefore, public-sector intervention is still needed. The IDA-supported [P148560] has provided PUC with two high speed gensets.
- **Varied energy access rate.** The average electricity access rate in FSM is about 62 percent of all households. However, Chuuk, where 47 percent of the population resides, lags other states with the lowest access rate at 27 percent. CPUC already prepared a Whole of State Electrification Outline Plan, mapping out effective technologies and implementation methodologies. The Outline Plan includes the priority list of the investments to address this low energy access rate issue. The readiness of electricity access expansion is quite high, but there is currently a lack of funding for implementation.

⁵ FSM National & State energy Action Plans, 2012 - <http://www.fsmrd.fm/wp-content/uploads/2015/01/Energy-Policy-Volume-II-Action-Plans-Updated-SK08232011.pdf>

⁶ Energy Division, Department of Resources & Development (DoR&D); Office Environment and Emergency Management (OEEM); the FSM Office of Statistics, Budget & Economic Management, Overseas Development Assistance and Compact Management (SBOC) (Official Development Assistance - ODA); Department of Transportation, Communication and Infrastructure, a State Representative from each State Energy Workgroup, a Representative from the Association of Micronesian Utilities (AMU), a Representative from the College of Micronesia (COM-FSM), and the Government Energy Advisor(s).

⁷ REC is the body under the Micronesian Chief Executives Council (MCEC) composed of energy sector representatives from Micronesia.

⁸ Besides members from FSM, this body includes members from the Republic of the Marshall Islands, Palau, Guam and the Commonwealth of the Northern Mariana Islands.

⁹ SEWs comprise three or four people: one from the state government, one from the utility, the state energy officer (this position only exists in Pohnpei) or an energy expert, and one from the private sector or an NGO.



- **Overdependence of the electricity sector on imported fuels.** FSM is heavily dependent on imported petroleum fuels, making the country highly vulnerable to oil price volatility, including price shocks, resulting in increased electricity prices and uncertainties, including regarding planning. The development and utilization of renewable energy sources and improvements in energy efficiency would contribute to mitigate this risk.
- **Tariffs do not reflect full costs.** Tariffs are relatively high in all four states compared to international standards. For FSM, current average electricity tariffs are as follows; however, they do not allow the state utilities to either fully recover their O&M costs, and/or to finance new investments in power infrastructure:

Table 4. FSM Average Electricity Tariffs, 2018

Average electricity tariffs (USD\$/kWh)	Residential	Commercial & Industrial	Government & Public Authorities
Pohnpei	0.39	0.39	0.39
Chuuk	0.41	0.44	0.46
Yap	0.41	0.49	0.77
Kosrae	0.44	0.48	0.52
FSM	0.43	0.46	0.48

- **Financing constraints for renewable energy investments.** The four utilities are currently expanding renewable energy generation capacity through external assistance from development partners. Extension of main grids via undersea cables to nearby islands is being investigated and is likely to be economically feasible over short-distances for suitable population groups. A longer distance undersea cable within the Chuuk lagoon islands has also been proposed and will require further feasibility assessment. Indeed, CPUC has recently received proposals for distribution expansion using an undersea cable from the Municipalities of Tonoas to Fefan, and from Fefan to Uman. In addition, CPUC would enter into an IPP agreement with Vital (FSM Petroleum Corporation) which would generate power and sell to CPUC who, in turn, would distribute to customers. This system would incorporate grid-connected solar PV. Costs estimates for the undersea cable come from engineering study carried out for CPUC.¹⁰ If this cable is economic for the Chuuk lagoon, it might also be feasible for some of the Pohnpei lagoon islands.
- **Opportunities for economies of scale are scarce.** As previously stated, electricity in FSM is supplied by four small, remote, scattered state-owned utilities making it a major constraint for the sector to benefit from potential economies of scale.
- **Weak technical capacity, high costs, and difficulties mobilizing international consultants.** State utilities do not have professional engineers and lack a sufficiently experienced and trained workforce to manage utility O&M and to plan new investment requirements. There are generally a limited number of highly skilled personnel, in permanent positions, to take on the task of managing energy projects over the near- and long-term. Short-term personnel and project personnel only go some way to addressing this gap. Electricity and energy education at tertiary levels, short-term training, on-the-job training, and job attachments are critical to address the capacity gap. So too is the need to develop innovative ways to retain skilled personnel in the country through appropriate levels of remuneration and other means.
- **Lack of robust energy sector development plans.** At present, the energy sector in the four states and at the

¹⁰ Chuuk State – Whole of State Electrification: Outline Plan - CPUC CEO, Mark Waite, May 2017.



national level lacks a robust technical, economic, financial, environmentally sustainable, and socially acceptable development plan. Utilities lack solid technical studies to provide a detailed overview of the states’ infrastructure needs to cope with projected demand, based on population growth, suppressed demand, and policy targets, analysis of investment alternatives, criteria for prioritizing investments in the sector, etc. These issues are addressed in the FSM Energy Master Plan recently delivered to the Government of FSM and will contribute to building the SEDAP.

- **“Build–neglect–replace” paradigm.** The above weaknesses, combined with the lack of spare parts inventory and asset management systems, proper cost accounting, recurrent budget planning and allocations for regular maintenance, have resulted in a “build–neglect–replace” paradigm, in which generation infrastructure is inadequately maintained and must be replaced before the end of its normal operating life. In addition, the relative abundance of donor financing for new capital purchases relative to recurrent costs drives a preference for this approach.

24. The NEP recognizes private-sector participation as an important driver for financing renewable energy development.

However, none of the four states has yet been able to attract private sector investment to develop renewable generation at a reasonable cost. The NEP aims to (i) enhance public-private partnerships and expand private sector participation, investment, ownership, and management for energy supply including electricity generation, transmission, and distribution with job creation in mind; and (ii) establish an enabling and competitive environment for the introduction of independent energy providers where these may provide efficient, reliable, and affordable service to consumers.

25. Many donors are actively supporting FSM’s energy sector development strategy and goals generally through investment projects:

The World Bank, the Japanese International Cooperation Agency (JICA), New Zealand (NZ) Government, the US Government, the European Union (EU), and the Asian Development Bank (ADB) are all active in the energy sector in FSM. It is imperative for the World Bank to maintain a close coordination and consultations with these development partners, ensure coordination and collaboration to avoid overlap and duplication.

26. Private sector participation in energy faces many challenges and is weak in the region. The following table shows the percentage of IPP generation for 22¹¹ utilities in 2015. The proposed project will therefore support also FSM Government to assess and identify challenges that are preventing private sector participation.

Table 5. Percentage of IPP Generation in the PICs

EEC	HECO	GPA	PPL	PUC	EDT	FEA	Others
95%	47%	41%	37%	11%	1%	1%	0%

¹¹ PPA 2017 benchmarking report / KAJUR (Kwajalein Atoll Joint Utility Resources); ASPA (American Samoa Power Authority); MEC (Marshall Energy Company); NUC (Nauru Utilities Corporation); TEC (Tuvalu Electricity Corporation); HECO (Hawaii Electric Company); CUC (Commonwealth Utilities Corporation); EDT (Electricité de Tahiti); GPA (Guam Power Authority); CPUC (Chuuk Public Utility Corporation); YSPSC (Yap State Public Service Corporation); EPC (Electric Power Corporation - Samoa); KUA (Kosrae Utilities Authority); SIEA (Solomon Islands Electricity Authority); TAU (Te Aponga Uira O Tumu-Te-Varovaro/Cook Island); UNELCO (UNELCO Vanuatu Limited); FEA (Fiji Electricity Authority); EEWf (Electricité et Eau de Wallis et Futuna); EEC (Electricité et Eau de Calédonie); PUB (Public Utilities Board (Kiribati); PUC (Pohnpei Utilities Corporation); TPL (Tonga Power Limited); PPUC (Palau Public Utilities Corporation); ENERCAL (Société Néo-Calédonienne D’Energie); NPC (Niue Power Corporation).



Relationship to CPF

- 27. **The project is aligned with the WBG’s FY17-21 RPF for the PIC9, including FSM.** This RPF’s focus areas are: (i) fully exploiting the available economic opportunities; (ii) enhancing access to employment opportunities; (iii) protecting incomes and livelihoods; and (iv) strengthening the enablers of growth and opportunities. Under Objective 4.2 of the RPF: *“Increased access to basic services and improved connective infrastructure,”* the WBG will support increased access to renewable energy in FSM through the installation of solar PV systems and upgrades to electricity generation.
- 28. **The project is consistent with the Pacific Possible Report.**¹² The report explores transformative opportunities that exist for PICs over the next 25 years and identifies the biggest challenges that require urgent action. The proposed project forms an integral part of the Bank’s overall energy sector engagement in the Pacific.
- 29. **The project is also in line with the Bank’s corporate goals to end extreme poverty and promote shared prosperity in a sustainable manner by facilitating FSM’s efforts to improve the energy sector performance and access rate, including through increased use of renewable energy, in the long term.** It will benefit the extreme poor by: (i) improving the energy supply reliability that affects not only households and businesses, but also all goods and services linked to electricity; and (ii) increasing access to electricity after the development of state energy master plans that will assist the utilities to proactively plan for increased electricity access in more remote areas, thereby reaching those currently underserved and experiencing hardship. A strong and lasting correlation exists between access to electricity and core human development measures including poverty reduction, improved health and education. Electricity is also an important enabler in terms of driving gender equity.

C. Proposed Development Objective(s)

- 30. The Project Development Objectives is to improve PUC's operational performance, expand access to electricity, and increase the share of renewable energy in the Recipient’s Territory.

Key Results (From PCN)

- 31. Key results toward achieving the PDO will be further defined during project preparation. A set of actions should clearly be identified and monitored to ensure that sustainability can be effective and measured, however it will most likely include the following indicators:

Table 6. Proposed PDO Indicators

PDO indicators:	Unit of measure
PUC Performance Verification Index (PVI) ¹³ (Pohnpei)	%
PUC System Average Interruption Duration Index (SAIDI) (Pohnpei)	Minutes
People provided with access to electricity by household connections – Grid/Off-grid/mini-grid in Chuuk	# of people
Share of renewable energy in the Recipient’s territory	%

¹² Report No. ACS22308, August 2017.

¹³ PVI (in percentage terms) is the ratio of “revenue collected (US\$) from sales” and “energy units received in the distribution system (kWh) adjusted to the average end user retail tariff (US\$)”. Increase in the PVI would indicate efficiency improvement both through reduction in losses and improvement of commercial performance. PVI = Revenues Collected (US\$) / Energy Distributed (kWh) x Average tariff (US\$).



Intermediate indicators	Unit of Measure
Generation Capacity of energy constructed or rehabilitated	MW
Thermal (conventional) power generation capacity constructed	MW
Generation Capacity of Renewable Energy (other than hydropower) constructed	MW
Performance contract in effect for PUC	Y/N
Number of outer islands provided with mini-grid systems	#

D. Concept Description

32. The World Bank is one of the key partners supporting the FSM Government in its efforts to establish conditions for sustainable and reliable energy provision for economic growth and poverty alleviation. The FSM Government expressed its desire for the Bank to remain engaged in the energy sector with a follow-on project to ESDP.
33. The country requested a US\$25-million grant to support the SEDAP. Based on the sector’s most acute issues, the project will focus on:
- Improving PUC performance, including solutions for the thermal power plant and implementation of grid enhancement in the state of Pohnpei. PUC is currently in desperate need of new diesel generation capacity as a transient solution to stabilize the power system and pave way for more renewable energy integration (more efficient thermal generation units will complement low efficient engines in Pohnpei);
 - Increasing access, particularly in the state of Chuuk;
 - Technical assistance and support for improving the sector governance, regulatory framework, accountability and financial performance, facilitation of private sector participation, and development of potential pipeline access and renewable energy projects in Yap and Kosrae.
34. The Bank is willing to support the country in its long-term sector goals and in the implementation of the priorities currently being identified by the Energy Master Plan under preparation through the ESDP. The Inception report and the first draft of the Master Plan were made available in October 2017 and December 2017 respectively. The Master Plan will not only inform the FSM Government and the World Bank, but also all the donors present in FSM. Besides the Master Plan, the project design will also benefit from the Pohnpei Energy Assessment study, financed by the ESDP and just completed, which is looking on solutions to improve PUC’s operation and maintenance practice: one of the main recommendation is to increase PUC’s generation capacity, including medium speed engines¹⁴, to cater to longer-term needs.
35. Out of the four States of FSM, Pohnpei has the largest economy, is second in population, the highest rate of electrification but PUC is struggling to meet the demand, and Chuuk has the largest population share, is second in economy, but the lowest electrification rate (27 percent). Hence the focus of the SEDAP on Pohnpei and Chuuk to improve electricity supply and reliability in Pohnpei and increase energy access in Chuuk.

Supporting PUC to improve operational performance and quality of service in Pohnpei

¹⁴ PUC currently relies only on high speed gensets for generation.



36. While all four states' electricity utilities struggle to some degree to ensure full cost recovery, sustain sound O&M, and implement investment strategies that will foster economic development in FSM, PUC, in the capital, faces these challenges most acutely. The Graduate School USA's Pacific Islands Training Initiative recently supported a management and operation review study the State of Pohnpei: The *Capitalization, Recovery and Institutional Strengthening Program* (CRISP¹⁵). The CRISP study has been endorsed by the state of Pohnpei and, based on the study, the PUC Board initiated the *Framework for a Multi-Donor Funded Capitalization, Recovery and Institutional Strengthening Program* Concept Note made available to the donor community. The CRISP approach includes three major axes: (i) Capitalization – investment in Power, Water and Sewage infrastructure at US\$24 million costed and more than US\$60 million uncoded; (ii) Recovery – rehabilitate existing facilities, enhance operation at US\$5.8 million; and (iii) Institutional Strengthening – fund for two to three years for a Supplemental Management and Operation team (SMO) at US\$2.65 million.
37. PUC has been operating since 2009 under an official declaration of emergency. While there have been brief periods of respite, the entire operations of PUC in providing power, water, and sewer services to the people of Pohnpei are at risk of extended periods of service disruption. The injection of approximately US\$10.8 million of capital contributions from FY12-15 and subsidies in excess of US\$2.8 million from FY09-FY15 have not resulted in an improvement in the financial status of PUC. The net position of PUC has declined by over US\$1.7 million during the period since FY09.
38. The unrestricted net position of PUC fell into deficit in FY15 for the first time since FY07; the ratio of current assets to current liabilities has deteriorated to its worst level as well, with PUC holding just 0.62 in current assets for every US\$1.00 of current liabilities, a sign of severe illiquidity. Bad debt allowances have also peaked with 78 percent of PUC's accounts receivable deemed uncollectible.
39. On the power production side, load shedding is required whenever even one of the eight operational generators is down for maintenance or due to a fault. Pohnpei's residential and commercial power consumers that had once relied upon nearly fault-free and continuous power are now subject to frequent planned and unplanned outages, reducing total demand and creating knock-on expenses that typically remain uncompensated.
40. From an institutional perspective, it is noted that a return to true best practice in the areas of overall management, financial management, power generation installation and management, water supply, sewer rehabilitation and expansion may be best achieved through the temporary use of some externally-sourced, highly skilled and experienced professionals (SMO project).
41. The project will support the implementation of the CRISP, knowing that the ESDP covers part of the recovery axis and ADB intends to fund the SMO project.

Supporting CPUC to improve electricity access in Chuuk

42. Chuuk state has the lowest electricity coverage ratio of all four FSM States, with only 27 percent of the population receiving electricity service. CPUC currently only provides grid service on the main island of Weno. CPUC also manages standalone solar systems on 12 schools within the State, however these only provide power for schools and not for communities. The total installed capacity of stand-alone systems is 90.5 kW.

¹⁵ This Initiative previously supported the state of Chuuk to improve CPUC's management and operation performances, www.econmap.org



43. Given the scale of the electricity expansion challenge, Chuuk State identified some years ago, that it requires support in the preparation of a comprehensive investment Master Plan that will map out effective technologies and implementation methodologies to ensure sustainability of the systems into the future. The Investment Master Plan will also include a funding plan looking at sourcing development partner and private sector funding.
44. The Chuuk State Energy Working Group (CSEWG) has already identified priority projects to be implemented in expanding service in advance of the Master Plan's completion. The Group has also identified a few different technological approaches to electricity expansion that will address the targets in the State and National Energy Master Plan. These approaches include: (i) hybrid solar PV/battery storage/diesel systems – advocated for municipalities with more than 50 households; (ii) solar home systems (SHS), advocated for municipalities with less than 50 households and provision should also be made for solar community systems (SCS) or standalone systems for schools and dispensaries; (iii) diesel/solar grid systems; and (iv) an interconnecting submarine electrical network around the Chuuk lagoon.

Supporting FSM Energy Sector-wide studies

45. FSM's energy sector will benefit from various studies to improve governance, including possibly: (i) electricity tariffs; (ii) renewable energy and energy efficiency policy framework; (iii) feed-in-tariff policy on wind, solar, and hydro; (iv) prospective strategy on medium- to long-term private sector participation. These studies will inform FSM utilities strategies progress toward more efficient and self-supporting entities and pave the way for private sector participation in the energy sector.
46. The proposed project will include the following four components:
- **Component 1: Improving Electricity Supply and Reliability in Pohnpei (US\$[12] million)**
47. ***Sub-Component 1.1: Supply and Installation of Genset(s) in Pohnpei.*** This sub-component will address the challenges of PUC with insufficient generation capacity to cover peak demand, unscheduled shutdowns of power supply, and lack of a proper asset maintenance strategy. It may finance gensets (type based on studies) and associated grid facilities in Pohnpei to improve the operational performance and increase the generation capacity of PUC.
48. ***Sub-Component 1.2: Power System Upgrade in Pohnpei.*** This sub-component will focus on urgent investments in PUC's power system to meet demand, reduce losses, and improve reliability and quality of supply. It may finance electromechanical and electronic equipment, such as a power system SCADA, measuring, monitoring, and protection devices, and convertors to help PUC improve its operational performance.
49. ***Sub-Component 1.3: Improvement of PUC Management.*** This sub-component will finance PUC's management structure and capacity to enhance efficient energy planning, project implementation, O&M, corporate functions, and improve financial sustainability. A Performance Management Contract (PMC) will be developed, agreed upon by relevant parties, implemented, and monitored based on the recommendations provided by the US Graduates School report.
- **Component 2: Improving Energy Access in Chuuk (US\$[9] million)**



50. This component will support investments in multiple options for access expansion to electricity tailored to geographical locations, potential level of electricity demand, and distance from the existing grid. Specifically, it will: (i) extend networks to places where economically viable; (ii) develop new mini-grids to supply isolated communities (outer islands); and (iii) supply SHS to remote areas with low-density population.
51. Solutions to increase access will necessarily integrate Chuuk energy mix objectives. This component will explore such options and solutions will be based on the final recommendations of the Master Plan.
52. Energy access expansion in Chuuk will be achieved through the installation of mini-grids systems fed by hybrid systems in the outer islands. This will in turn increase the share of RE in Chuuk and thus FSM.
- **Component 3: Enhancing Energy Sector Governance and Financial Performance (US\$[2] million)**
53. Sector governance and financial performance will determine its ability to finance and develop new electricity infrastructure. The project will support FSM to advance appropriate solutions through analytical work and technical assistance for relevant reforms and capacity building to create an institutional, legal, and regulatory framework conducive to a self-sustained sector and attracting private sector resources to meet the growing absorptive capacity of the sector.
54. This component will also support utilities' financial recovery plan, such as self-recovery electricity tariffs, to increase revenues and reduce operational losses. It will also finance specific studies related to improving access and renewable energy penetration (prefeasibility/feasibility)). The ultimate objective is to help FSM achieve a sustainable energy sector relying on self-supporting utilities and more private sector participation to cover infrastructure investment and rehabilitation needs.
55. The component will finance the recruitment of a full-time energy adviser to assist and support the Secretary of Research and Development on energy sector policy matters and development strategy.
- **Component 4: Technical Assistance and Project Management (US\$[2] million)**
56. This component will mainly support PUC and CPUC to set up project implementation units to manage project implementation, including provision of support on project coordination, monitoring and evaluation, reporting, and technical operation.
57. The component will also finance capacity building on utility operation, planning, and development strategy.

SAFEGUARDS

A. Project location and salient physical characteristics relevant to the safeguard analysis (if known)

The physical investments will be located in the States of Pohnpei and Chuuk. In Pohnpei, diesel gen sets and supporting hardware and software will be installed in the existing power plant, located in the urban environment of Paliker. Grid improvements will involve replacements and upgrades to existing pole-mounted transformers, wires and other existing infrastructure. No new sites or grid extensions are proposed.



In Chuuk the investments will be to extend the network on the main island of Weno, and install mini-grids and / or stand-alone systems on small islands within the large Chuuk lagoon. The targeted islands do not have existing networked electricity. Some islands have stand-alone systems for schools. Electricity network poles and wires will use road reserves where possible.

Land ownership in Chuuk is mostly held in private title, including land in the smaller islands. The CPUC Act enables CPUC to access land to install poles and cables under notification, but does not require land owner permission. For land access for permanent infrastructure such as generation plants CPUC use land leases. The law allows for eminent domain, but this has not been needed to date in CPUC operations.

The technical assistance is focused on institutional strengthening and does not have any components that may lead to downstream physical investments.

B. Borrower’s Institutional Capacity for Safeguard Policies

The project implementing agencies are PUC and CPUC. PUC and CPUC have had some experience with World Bank safeguards from the implementation of the first World Bank energy project in FSM, the FSM ESDP. They have attended workshops and have implemented ESMP for their respective investments under the ESDP. Neither agency has a safeguards advisor on their staff and will require support to implement safeguards for the SEDAP.

The FSM DoFA is setting up a Centralised Project Implementation Unit, which will include a full time safeguards advisor to support all World Bank funded projects. This safeguards person should be recruited by the time this project is effective, and they will manage the safeguards implementation and be responsible for ongoing awareness raising and training with PUC and CPUC staff and consultants / contractors. This person will be based in Pohnpei but will travel regularly to Chuuk and other States.

For project preparation, DoFA will recruit a short term safeguards specialist consultant to prepare the safeguards instruments and support PUC and CPUC to undertake consultations. The task team will assist in preparing the TOR.

C. Environmental and Social Safeguards Specialists on the Team

- Penelope Ruth Ferguson, Environmental Safeguards Specialist
- Ross James Butler, Social Safeguards Specialist
- Nathalie Suzanna Noella Staelens, Environmental Safeguards Specialist

D. Policies that might apply

Safeguard Policies	Triggered?	Explanation (Optional)
Environmental Assessment OP/BP 4.01	Yes	Minor impacts readily avoided or mitigated. ESMP to cover off on standard stuff around mini-grids, diesel / solar hybrids and diesel gen sets. The project typologies include grid equipment upgrades (cables, pole-mounted transformers, software, computer hardware etc.), grid extensions



(poles and cables), new / replacement of diesel generation sets, solar/diesel hybrid mini-grids (including distribution), stand alone systems and solar home systems.

The environmental and social impacts may include the potential for: health and safety and community safety issues during construction, including the potential for harassment or abuse of local women from imported labor; fuel management; waste management; protocols for removing and disposing old equipment; avoiding physical cultural resources and natural habitats through good site selection; and management of waste and stormwater run off from civil works. The benefits include electrification and more reliable electricity supply and renewable energy generation. OP4.01 is triggered. The project is screened as Category B as the impacts are considered minor and readily prevented and mitigated. An environmental assessment will be undertaken and an ESMP prepared to cover physical investments. The locations will not be known at project appraisal, but the key mitigation measures are generally based on Good International Industry Practice regardless of location. An ESMP will provide more certainty of mitigation obligations at appraisal than an ESMF. Site specific mitigation measures can be screened during implementation. The technical assistance is focused on institutional strengthening and screening indicates that it will not influence downstream physical investments.

Performance Standards for Private Sector Activities OP/BP 4.03	No	
Natural Habitats OP/BP 4.04	No	Small areas of land will be required in Chuuk, and the location of infrastructure is flexible. The site selection process will allow CPUC to avoid disturbances and other impacts on natural habitats. The ESMP will contain a process for site selection and additional measures to avoid impacts in the design, construction and operation of the investments. The policy is not triggered.
Forests OP/BP 4.36	No	The project will not impact on the management of forest resources and will not degrade or destroy forests.
Pest Management OP 4.09	No	This policy is not triggered because the project does not involve the control or management of pests nor the purchase and use of pesticides.



Physical Cultural Resources OP/BP 4.11	TBD	<p>Small areas of land will be required in Chuuk, and the location of infrastructure is flexible. The site selection process will allow CPUC to avoid disturbances and other impacts on physical cultural resources. The EA will identify whether there will be significant earthworks or whether works are likely to be in a location where PCR are known, and therefore confirm whether the policy is triggered or not. The ESMP will contain a process for site selection and additional measures to avoid PCR impacts in the design, construction and operation of the investments. A chance find procedure will be included in the ESMP.</p>
Indigenous Peoples OP/BP 4.10	Yes	<p>Almost the entire population of each state is indigenous (Chuukese, Mehn Pohnpei). To ensure that the principles of the policy are addressed: The EA will include a social assessment and a consultation process to enable participation in project planning. It will undertake an assessment of the particular issues for local communities and assess the impacts and benefits on vulnerable and poor. A Stakeholder Engagement and Consultation Plan (SECP) will be prepared for implementation throughout the project. It will incorporate all elements of an Indigenous Peoples Policy Framework, reflecting a Free, Prior and Informed Consultation approach that addresses the needs of vulnerable people and women. Sub-project design and the ESMP will integrate the elements of an IPP. The SECP will form part of the ESMP and will be consulted and publicly disclosed.</p>
Involuntary Resettlement OP/BP 4.12	Yes	<p>Small areas of land will be required for generation infrastructure, battery storage and distribution systems (poles and cables) on Government, church and / or private land in Chuuk. Voluntary land negotiations and land leases will be used. There will be no involuntary land acquisition or resettlement. Compensation for lost assets will be paid where damage or loss is unavoidable on private land as a result of pole and cable installation. Site selection is flexible and sensitive locations can be avoided. There is no expectation that livelihoods will be adversely affected by the project.</p> <p>No new land will be required in Pohnpei. The works will be carried out within the existing PUC compound and on the existing grid network.</p> <p>A Resettlement Policy Framework will be prepared to document the voluntary land acquisition and land</p>



lease arrangements, and the compensation arrangements.

Safety of Dams OP/BP 4.37

No

The project will not fund the construction of a dam or investments that rely on the safe operation of an existing dam.

Projects on International Waterways
OP/BP 7.50

No

Projects in Disputed Areas OP/BP 7.60

No

E. Safeguard Preparation Plan

Tentative target date for preparing the Appraisal Stage PID/ISDS

Aug 30, 2018

Time frame for launching and completing the safeguard-related studies that may be needed. The specific studies and their timing should be specified in the Appraisal Stage PID/ISDS

A Terms of Reference for the ESMP, SECP and RPF will be prepared. The recruitment of a safeguards consultant will be completed by June 30, 2018.

The ESMP, SECP and Involuntary Resettlement Instruments will be completed, disclosed and consulted by August 10, 2018.

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APPROVAL

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