

COVER SLIDE – WELCOMING & RECOGNITION [Delivered by Assistant Secretary for Energy Faustino Yarofaisug]

Good morning and I would like to recognize and pay my respect to HE David Panuelo, President of the FSM, Hon. Gov. Narruhn and his Cabinet, the honorable members of the House and the Senate, Traditional Leaders, the Mayors from all of the Chuuk Regions, the State Delegations who have traveled here, and my colleagues from the national government.

I am Faustino Yarofaisug, the Assistant Secretary of the Energy Division at the FSM Department of R&D and I am our moderator for today.

Today the FSM Division of Energy and the State Energy Implementing Partners will present an overview of recent, current and upcoming energy projects in the FSM. In presenting, we will highlight where we are at in terms of our progress to achieving the energy targets and goals and where we aspire to be, and how we can continue to utilize the latest proven technologies that will provide clean, affordable and sustainable access to electricity. This will enhance growth and improvement to all other sectors, from tourism to infrastructure to health to transportation, and provide the basis for equitable and sustained economic growth and opportunity.

In a larger context, these collective efforts in the energy sector also represent FSM progress on achieving its international commitments to the UN Sustainable Development Goals and in this case, Goal Number 7: Affordable and Clean Energy.

Our overview today represents our partnership and continued efforts to work with the major development partners who have been active in the energy sector. These include the European Union, the United States, Japan, the Asian Development Bank, the World Bank, the Pacific Community and a number of other governments and regional and international organizations.

The structure of our Energy Sector Presentation will be collaborative. We will start with a brief introduction of the current structure of the energy sector in FSM as it stands, and move into a more detailed discussion on our Energy Master Plan and its overall targets and goals. This will be followed by each of the State Utilities briefly presented some details on the various completed and ongoing projects in their islands. To close, our National Energy Advisor will provide a summary of where we are and what we have done in the first five years of implementation of the Energy Master Plan and where we will be by 2024.

I will be our moderator and time keeper to keep us on track.

Without further due, I now call upon our presenters to start.

**SLIDE 1 – INTRODUCTION & ENERGY TARGETS** [Delivered by ADB REDP National Coordinator Olivier Wortel]

When we talk about energy, we refer to both fossil fuel and renewable energy sources of power. One of the first things that we should ask is: Where are we now in terms of our overall energy mix? And: How and when will the FSM turn from a largely fossil-fuel powered society, to one that is powered by renewable and alternative energy sources? The answer to the first question – according to our most recent data from the State Utilities – is that our current energy mix remains firmly in the fossil fuel era: in 2020, 90% of our energy generation was fossil-fuel based and we remain highly dependent on imported petrochemicals. According to 2018 data from the FSM Division of Statistics, \$30,000,000 was spent on fuel imports, representing about 7.5% of the national GDP, with most of that being used for electricity generation and transportation. Fossils, in other words, still drive and dominate our economy. In 2018, our Utilities burned about four-and-half million gallons of diesel fuel emitting forty-three thousand tons of CO<sub>2</sub> that accounted for approximately forty-five percent of the total Green House Gasses produced by the nation. This is 20% behind our collective national target for 2020, which is 30% of power produced and used from local, renewable energy sources. We must do better.

The answer to the second question is straight forward: We should and we are investing heavily in more efficient and upgraded power infrastructure, including existing generation and distribution networks, and new technologies and renewable power systems everywhere. Over the next 15-20 years through the year 2037, the Energy Master Plan calls for nearly \$300 million in capital investments. The State Energy Master Plans set out a technically feasible, financeable, and implementable pathway for each state to provide a reliable and environmentally sustainable electricity service to all residents. Our proposed investment strategy has five components:

- Some new diesel generation capacity to ensure security of supply.
- A large amount of new solar PV capacity (with battery storage) to reduce reliance on diesel and meet demand growth. This also lowers the cost of generating electricity.
- Re-investment to sustain the distribution network, along with minor expansions to connect new customers.
- Investment to serve unelectrified communities.
- Tapping into new, proven technologies to support innovative energy production in use in all sectors of the nation.

## SLIDE 2 – CURRENT ENERGY INITIATIVES [Delivered by ADB REDP National Coordinator Olivier Wortel]

In 2018 the World Bank funded the development a comprehensive 20-Year Energy Sector Master Plan for the nation. This plan has helped our State Utility Corporations aim for clear five-year targets and has provided a coordinating mechanism for development partners to hone in and support implementation of programs and projects. These include:

- The World Bank Sustainable Energy Development and Access Project (SEDAP) that is a \$30MM program of work to improve the reliability of electricity supply in Pohnpei with new generators, the construction of the first solar-hybrid minigrid system on the island of Satowan and 2 MW of solar power into the power grid of Weno, both in the State of Chuuk, and new battery energy storage systems for Kosrae and Yap.
- The Asian Development Bank Renewable Energy Development Project (REDP) is a \$19.5MM program of work to install 1.9 MW of ground and roof mounted solar in Yap, and 1.2 MWs in Kosrae. It includes the first RE minigrid for Kosrae as well. It supports the PUC Supplemental Management Operations (SMO) technical assistance initiative, and has an additional financing component for Disaster Risk Reduction (DRR) of about \$4MM to be allocated to all four State Utilities.
- The European Union's 11<sup>th</sup> European Development Fund (EDF11) FSM Sustainable Energy (FSM.SE) project is a \$16MM project that will electrify up to 10 new islands in the state of Chuuk with 100% RE minigrid systems. It will also support updating of national and state energy policies and foster new public-private partnerships through Independent Power Producer (IPP) agreements. It also has an NSA component that will focus on SHS.
- The Japan International Cooperation Assistance (JICA) program has provided close to \$13 million since 2017 to support new power plant construction and to provide technical assistance to Utility staff on diesel-solar hybrid O&M training.
- The World Bank Energy Sector Development Project is a recently completed project that funded new generators for the utilities in FSM, spare parts and equipment, bucket trucks to improve distribution networks, solar and LED street lights and a significant amount of new grid-connected PV systems.
- The United States Department of Agriculture Rural Development High Energy Cost Grant. This grant is currently being accessed by two of the four State Utilities, with over \$5 million accessed over the last 24 months.

- The Japan Non-Project Grant Assistance (NPGA) program is a \$2MM revolving fund that the Government of Japan provides to the FSM to support our Utilities with fuel purchases.
- The Global Environment Facility and United Nations Development Program supported Micronesia Public Sector Building Energy Efficiency (MPSBEE) is a \$1.7MM project that addresses our need to begin to make our buildings more energy efficient and to support our effort to adopt more sustainable building codes.

These projects make up the bulk of our major initiatives in the energy sector.

## SLIDE 3 – POHNPEI UTILITY CORPORATION [Delivered by PUC GM Nixon Anson]

Pohnpei has a multitude of energy initiatives moving forward simultaneously. As the largest Utility in the FSM, we provide power to 7,400 customers, have a peak load of 6.4 MW, and an operating revenue of \$ 14.7 million, as of 2020. Some of major projects are:

- **2MW Genset with Spares and Overhauls of Engines.** A World Bank funded project that was completed in 2019. This project included the repair of PUC engine #2 and the complete overhaul of engines #3 and #4. It also included installation of two new 2MW genset and provision of spare parts and equipment, and a new bucket truck. Valued at over \$4 million.
- **MFAT Solar at Pohnlangas.** This is 2019 New Zealand funded project of \_\_\_\_\_kWp of ground-mounted solar that is tied to the PUC grid. Total value of the project is \$2.9 million.
- **The Nanpohnmal 7.5MW New Diesel Power Plant Initiative.** This is a World Bank funded project to bring in three new 2.5 MW medium speed diesel generators by end 2023. This will improve reliability of power on Pohnpei. This project is valued at over \$10 million.
- **The KSEL 2MW PV and BESS Initiative.** PUC October 05, 2018, for KSEL to fund, construct, own and operate a 2MW Solar PV and 2 MWh Battery Energy Storage System, known as a 'BESS'. Commissioning is ongoing this month. and Kepirohi Solar Energy Limited (KSEL) entered into a power purchase agreement (PPA) on
- **The 200 kW Organic Rankine Cycle (ORC) Generator Project.** An ORC generator converts low-grade waste heat from the existing diesel generators into electric power. This is being funded by a USDA High Energy Cost Grant (HECG) and construction is now ongoing. The project has a total value \$2.9 million.
- **The REDP Project Readiness Facility.** An ADB-funded project to support the feasibility studies required for the potential to place a 2.5 MW mini-hydro system on the Lehnmesi River. Will also support a pilot project for RE and access to potable water for one or more of the Pohnpei lagoon islands. Project value is about \$2 million.
- **PUC Supplemental Management Operations Project.** This is an ADB funded project to support PUC with consultants who will work within PUC to improve financial, operational, IT, generation and distribution capability. It is valued at \$1.3 million.
- **The ADB-PUC Disaster Risk Reduction Project.** This is an ADB-funded project. The project will support the purchase of additional equipment and vehicles such as transformers, poles, and bucket trucks. It will also provide support to the Association of Micronesian Utilities (AMU). It is in total valued at \$4 million to be shared by each Utility.

## SLIDE 4 – KOSRAE UTILITY AUTHORITY [Delivered by KUA GM Fred Skilling]

KUA provides power to 1,901 customers, we have a peak load of 1.2 MW, and an operating revenue of \$2.59 million as of 2021. Kosrae has a number of energy initiatives that we have and are currently implementing, including:

- **The Tofol 1.2 MW New Power Plant.** This was completed in 2019 and included the construction of a new plant with two engine units totaling a 1.2 MW rated firm capacity. This project was funded by the Government of Japan through the JICA program and included training and spare parts.
- **Tofol 1.2 MW Grid Tied PV System.** This is an Asian Development Bank funded project and will place both ground and roof mounted PV systems near the sports complex. The project is valued at \$3.7 million and will help Kosrae move to 38% RE penetration in the next two years.
- **2 MW Battery Energy Storage and Information System.** A World Bank project that will install a battery storage and integrated information system that will allow for more uptake of RE into the Kosrae power grid. Valued at \$2.3 million.
- **Walung Minigrid.** This project is funded by the Asian Development Bank and will construct a central solar-diesel hybrid system that will provide power for the first time to a remote, roadless community on the island. Valued at \$1.2 million.
- **The ADB-KUA Disaster Risk Reduction Project.** This is an ADB-funded project. The project will support the purchase of additional equipment and vehicles such as transformers, poles, and bucket trucks. It will also provide support to the Association of Micronesian Utilities (AMU). The share for Kosrae is about \$1 million.
- **New 600 kW Generator.** This is a World Bank funded project that was completed in 2019, with a new generator placed inside the old generator building. The project is valued at \$800 thousand.
- **Additional Ongoing Projects:**
  - Completion of an accounting software system upgrade to sage 2018 to improve financial records and accountability of company funds;
  - Installation of 200 public street lights and yard lights for lighting the public roads;
  - Hybrid power generation system O&M training under a JICA funded program; and,
  - Launching of the Micronesia Public Sector Building Energy Efficiency program.

## SLIDE 5 – YAP STATE PUBLIC SERVICE CORPORATION [Delivered by YSPSC CSM Gideon Moofal]

Yap has been very proactive since 2018 in pursuing its energy targets and we continue to push the envelope for integrating more renewables into our island grids. We provide power to 2,100+ customers, have a peak load of 1.8 MW, and an operating revenue of \$9 million for FY 2020, as audited. Some of the key recent, ongoing and pipeline initiatives are:

- **Kabul Wind Turbines.** This is an Asian Development Bank project completed in 2018 and the first of its kind for FSM. The wind turbines have a total nominal power of 825 kW and along with 500 kWp of PV, advanced integration and control system and associated works have an investment value of \$11 million.
- **Grid Tied PV Systems.** This is another Asian Development Bank project and is ongoing. The total system installed capacity of the PV that will be a combination of roof and ground mounted will be 1.9 MWp and has an investment value of \$5.2 million.
- **100% RE Minigrids for Outer Islands.** This is a USDA High Energy Cost Grant funded project that was approved in 2021. Both of the minigrids will provide a combined 78 kWp power capability and will be constructed on the Outer Islands of Ifalik and Lamotrek, providing these islands with electrical power for the first time. Investment is \$1.8 million.
- **800 kW Battery Energy Storage and Integration Systems.** This is another ADB REDP project that will significantly enhance YSPSCs ability to ramp up its independent power producer base and continue to lower the costs of energy production while increasing RE penetration into the grid. The investment is \$1.7 million.
- **1.6 MW Genset Project.** This was a World Bank funded project and was installed and commissioned in 2019. The project was meant as a redundancy for peak load on the Yap grid. Project investment was \$1.5 million.
- **830 kW High Speed Generator.** This is another World Bank funded project that supports the wind turbines and PV systems function into the grid for Yap. The equipment was delivered in December 2021. Total value is approximately \$1 million.
- **Typhoon Maysak Rehabilitation.** This is an EU funded project to support the rehabilitation of the damaged minigrid systems in Falalop Ulithi and Falalop Woleai from damage caused by Typhoon Maysak. The rehabilitation is budgeted for about \$50,000.

## SLIDE 6 – CHUUK PUBLIC UTILITY CORPORATION [Delivered by CPUC GM Kembo Mida]

Public Law *CSL 3-97-05* mandates that CPUC shall establish, maintain, and improve public utilities on all of Chuuk States' islands. With only 30% access to electricity, and only one of the forty municipalities in Chuuk currently having access to electricity, this is a mandate that we take seriously. CPUC currently provides power to 2,000 customers, has a peak load of 2.5 MW, and an operating revenue of about \$7 million for FY 2020, as audited. Some of our ongoing and completed projects are:

- **The Weno Solar Farm.** This is a World Bank funded project to install 2 MW of PV on an old dredge site near the airport. We have a 25-year lease on the land, and once the project is completed, will provide 80% of Weno Islands' power during the day and save CPUC \$500,000 annually. The overall project is valued at \$6.3 million.
- **100% RE Minigrids for Islands in Chuuk.** An EU-funded project that will help us increase access to electricity services in the State. Potential islands that the Chuuk Energy Working Group selected are Etten, Polle, Fefan, Piis, Houk, Onoun, Nomwin, Mwirine, Nema, Moch and Lukuno. Project is for \$5 million.
- **Grid Connected Solar on Rooftops and Carpark Shading in Weno.** World Bank funded project that included installation of 660 kWp of PV at the airport, Chuuk High School, the water and sanitation office and at the power plant. Valued at about \$2.0 million.
- **Mini-Grid Systems in Udot and Eot.** This is a World Bank project that will put in six connected microgrids on Udot with an installed capacity of 169 kWp. Valued at about \$1.7 million.
- **Solar Hybrid Minigrid on Satowan.** Another World Bank project that will place a 165 kWp minigrid with underground distribution network and backup generator on Satowan in the Mortlocks. Valued at \$1.5 million.
- **The ADB-CPUC Disaster Risk Reduction Project.** An ADB-funded project to support the purchase of additional equipment and vehicles such as transformers, poles, and bucket trucks. Value to Chuuk is just under \$1 million.
- **Solar Home Systems for the Islands of Chuuk.** This is a combination of EU and World Bank funding to provide 500+ off-grid solar home systems to various HHs in Chuuk. The project is expected to provide up to 1.5 kWp per HH at a cost of about \$750 thousand.

SLIDE 7 – EMP PROJECT ACHIEVEMENTS [Delivered by FSM Energy Advisor Dr. Bruce Robins]

So, as you can see in the table provided here, the results of all of these investments are that by 2024 we will have achieved 47% of our installed capacity from renewable energy sources, with an investment of about \$95 million dollars. With additional pipeline proposed projects at this stage for the utilities, we can likely expect an additional potential for up to about 4 MW of RE power into the state utility power grids. As you can see, all new investments are for renewable energy.

Referring back to our Energy Master Plan targets that highlighted previously, we will be very close to achieving our target by 2024.

SLIDE 8 – ISSUES AND CHALLENGES [Delivered by FSM Energy Advisor Dr. Bruce Robins]

As with all of the other sectors, the COVID pandemic has significantly affected the energy sector's ability to achieve the master plan targets. Even though most of the targets are aspirational, the last 24 months have nonetheless hampered our ability to move forward effectively with many of our initiatives, most of which require outside contractors and expertise to fully implement. We should redouble our efforts to get the technical personnel into the country that we need so that we can keep these projects going.

Another key issue for many of these projects that will be situated in remote and outer island communities, are land rights and land access. We have seen in some cases where a minigridded distribution line requires easements difficult to obtain through both cultural and legal means. We must have ongoing dialogue and participation from communities in these matters to arrive at equitable solutions for all stakeholders.

Our capacity to coordinate and implement projects. This is an ongoing concern that can add to delays and must stay on top of this and strengthen our ability to effectively coordinate projects through regular communication and reporting and on-the-ground site assessments.

In addition, climate change in the broadest sense in how it is affecting our islands must be taken into consideration for all energy projects - particularly in low-lying and typhoon zone areas. Many of these energy assets have a significant duration and this must be planned into the projects.

SLIDE 10 – ACHIEVING ENERGY MASTER PLAN TARGETS [Delivered by FSM Energy Advisor Dr. Bruce Robins]

So, with all of these investments and all of these projects, you might ask, why is the cost of electricity not going down? Well, not yet at least. Quite simply, it is because we are early in the process of transitioning our power systems and most of these projects are ongoing and like most other major projects in FSM, severely delayed due to the COVID19 pandemic.

Moreover, our utilities are barely staying above water, and in some cases, are in real terms, not profitable. And that is why we want to reduce the importation of fossil fuels – because they are the largest contributor to utility operating expenses.

In any case, as you can see from slide here, all of the States are very close to achieving a 100% of the power targets, with Yap having exceeded that significantly, both in terms of investment and in power. These tables also show where there are investment gaps and which states need further attention and in what areas. This will be good news for future donors, indicating that if they invest with FSM, they will see a significant return on their investment.

Thank you.