



RESOLUTION NO. 2020-01

AUTHORIZING MANAGEMENT TO REQUIRE ALL FUTURE UTILITY-SCALE AND NET ENERGY METERING SOLAR PHOTOVOLTAIC (PV) AND WIND TURBINE SYSTEMS TO HAVE FREQUENCY CONTROL CAPABILITY OR ENERGY STORAGE SYSTEM (ESS) IN ORDER TO BE TIED INTO ISLAND POWER GRID

WHEREAS, Guam Public Law 27-132 (December 2004) created Net Energy Metering (NEM) for Guam and assigned the Guam Public Utilities Commission (PUC) the responsibility for setting the Net Metering Rate for excess renewable energy fed into GPA's Distribution System; and

WHEREAS, NEM customers receive services from the grid subsidized by non-NEM customers including but not limited to:

- 1) Use of the grid to sell power (get credit at full retail rate for excess production);
- 2) Use of the grid to energize their homes at night, but credited back from their production (uses Island power grid as storage);
- 3) Frequency regulation absorbed by grid for intermittencies;
- 4) Reactive power supply;
- 5) Voltage regulation;
- 6) Stand-by power on overcast days that cannot produce sufficient power generation; and

WHEREAS, on February 9, 2020, GPA conducted a stakeholder outreach meeting concerning this proposed Resolution; and

WHEREAS, Exhibit A illustrates the intermittency of solar photovoltaic (PV) production and highlights that an Energy Storage System (ESS), such as a battery, or Frequency Control Capability is necessary to provide smooth energy into the customer premise or power grid; and

WHEREAS, a 25 MW utility-scale solar PV farm and an estimated 24 MW of net metering capacity are currently tied into the grid without ESS or Frequency Control Capability, resulting in significant intermittency which degrades the reliability of the island wide power system; and

WHEREAS, production graphs of the utility-scale Dandan solar PV farm (Exhibit B) during several consecutive weeks of rainy weather, aptly illustrates that solar PV production is inconsistent and requires substantial battery storage reserves; and

WHEREAS, Exhibit C illustrates the number of automatic under-frequency load shedding events have increased substantially over the past few years due to intermittency of solar PV systems tied into the island's power grid. As of October 31, 2019, GPA customers experienced 27 feeder trips or outages due to solar PV systems without ESS or Frequency Control Capabilities. Although the pending utility-scale 40 MW ESS will

34 control system frequencies and decrease these outages, the addition of more intermittent energy into the grid
35 will continue to degrade system reliability; and

36 **WHEREAS**, the customers paying for the system grid are non-NEM customers who have been
37 experiencing substantial outages due to solar PV intermittency; and

38 **WHEREAS**, GPA completed its Joint Renewable Integration Study (JRIS) with the United States Navy in
39 July 2018, and made the following observations: (1) all PV added with and after Phase II Renewables project
40 require additional ESS support during transient events; (2) all PV added with and after Phase II Renewables
41 project require additional Short-Circuit Ratio (SCR) support supplied by GPA; (3) all ESS should have frequency
42 droop control modes available; and (4) the PV systems and the energy storage should share the same DC bus
43 configuration behind one inverter system to reduce the SCR burden on GPA and reduce the PV ramping effects
44 due to intermittent solar irradiation; and

45 **WHEREAS**, JRIS recommends current and future projects, including the new flexible generation power
46 plant, help ameliorate the above effects; and

47 **WHEREAS**, GPA cannot continue to add intermittent energy production into the grid without requiring
48 all future customer owned solar PV and wind turbine systems to have Frequency Control Capability or Energy
49 Storage System (ESS). Thus, GPA recommends that all new NEM customers must have Frequency Control
50 Capability or Energy Storage System (ESS) after **June 01, 2020**.

51 **WHEREAS**, GPA could provide Energy Storage System (ESS) into the grid at low cost due to its
52 opportunities through economies of scale.

53 **WHEREAS**, GPA will petition the PUC to create an Energy Storage Rate Schedule, a new NEM customer
54 may select the new Rate Schedule in lieu of providing ESS or Frequency Control Capability. GPA recommends
55 the initial Energy Storage Rate Schedule be set at \$2.43 per kW per month, as installed.

56 **WHEREAS**, these moves will actually continue to promote the development of renewable energy on
57 Guam and gives choices and flexibility to the individual in a way that is in their best economical interest.

58

59 **NOW, THEREFORE, BE IT RESOLVED**, by the CONSOLIDATED COMMISSION ON UTILITIES as follows:

- 60 1. The General Manager has determined that the number of automatic under-frequency load
61 shedding due to solar PV systems has increased substantially over the past few years and
62 uncontrolled solar PV energy has significantly degraded system reliability. Those whose
63 reliability is impacted substantially are the non-NEM customers, which expect to have improved
64 reliability when the 40 MW Energy Storage System (ESS) is completed.
65
- 66 2. GPA's existing policy is to have all future utility-scale solar PV or wind turbine systems, beginning
67 with GPA's Phase II Renewables projects, be equipped with ESS in order to improve reliability.
68
- 69 3. GPA cannot continue to add intermittent energy production into the grid without requiring all
70 future customer owned solar PV and wind turbine systems to also have frequency control
71 capability or ESS.
72

- 73 4. After June 01, 2020, all new utility-scale, and NEM solar PV and wind turbine systems must have
 74 Frequency Control Capability or ESS in order to be tied in to island power grid.
 75
 76 5. GPA is authorized to petition the PUC to create an Energy Storage Rate Schedule, a new NEM
 77 customer may select the new Rate Schedule in lieu of providing ESS or Frequency Control
 78 Capability. GPA recommends the initial Energy Storage Rate Schedule be set at \$2.43 per kW
 79 per month, as installed.
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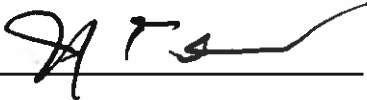
81 **RESOLVED**, that the Chairman of the Commission certifies and the Secretary of the Commission attests
 82 the adoption of this Resolution.
 83

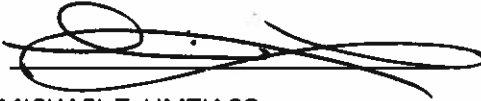
84 **DULY and REGULARY ADOPTED and APPROVED THIS 21st DAY OF FEBRUARY, 2020.**
 85

86 Certified by:

Attested by:

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88 
 89 _____



90 JOSEPH T. DUENAS

MICHAEL T. LIMTIACO

91 Chairperson

Secretary

92 Consolidated Commission on Utilities

Consolidated Commission on Utilities

93

94 I, Michael T. Limtiaco, Secretary for the Consolidated Commission on Utilities (CCU), as evidenced by my
 95 signature above do certify as follows:

96 The foregoing is a full, true, and accurate copy of the resolution duly adopted at a regular meeting of the
 97 members of Guam Consolidated Commission on Utilities, duly and legally held at a place properly noticed and
 98 advertised at which meeting a quorum was present and the members who were present voted as follows:

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100 Ayes: 5
 101 Nays: 0
 102 Absent: 0
 103 Abstain: 0
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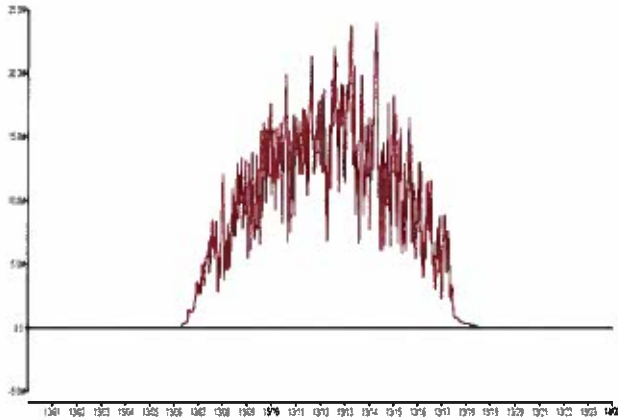
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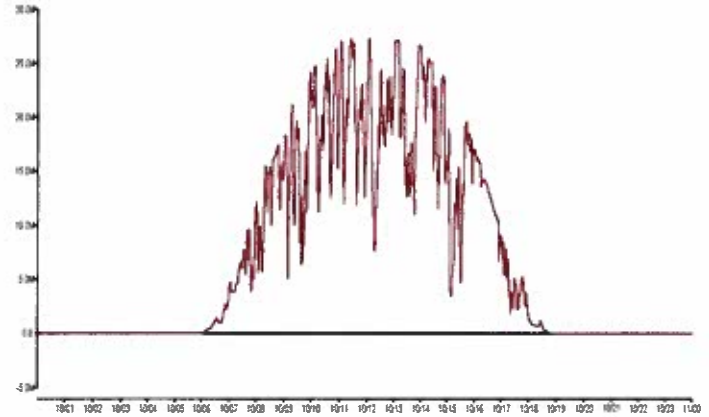
Exhibit A

**NEM (SOLAR PV) CUSTOMER PROFILE
INTERMITTENCY**

**Peak Output
26.5 MW**

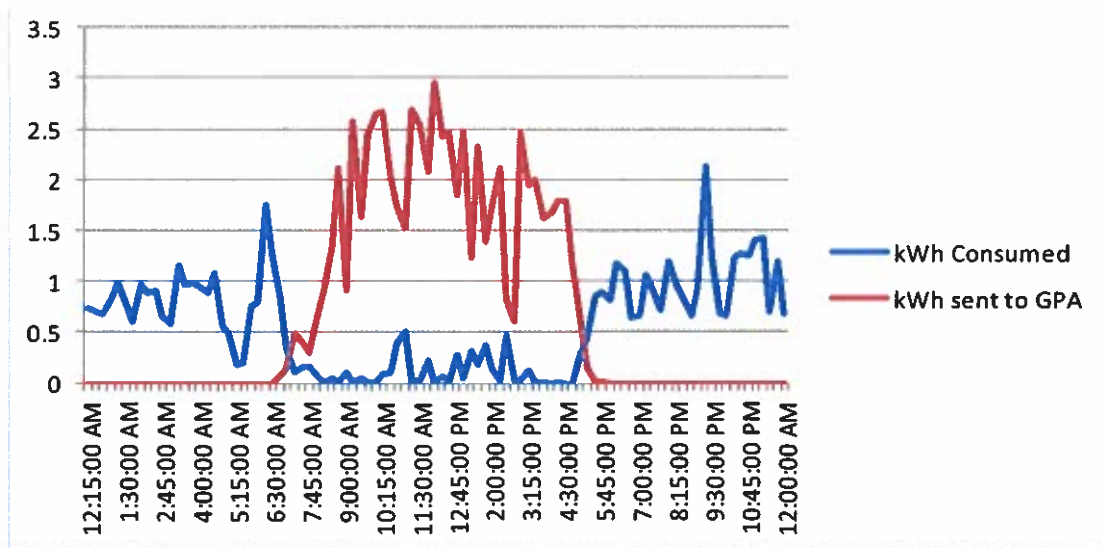


**Peak Output
23 MW**



Residential NEM Solar PV System Size = 24.70 kW

TIME OF DAY	kWh	
	GPA → NEM	GPA ← NEM
0000 – 0700	22.56	-
0700 – 1800	7.44	69.35
1800 – 0000 (Evening Peak)	24.67	
Net GPA	-14.68	



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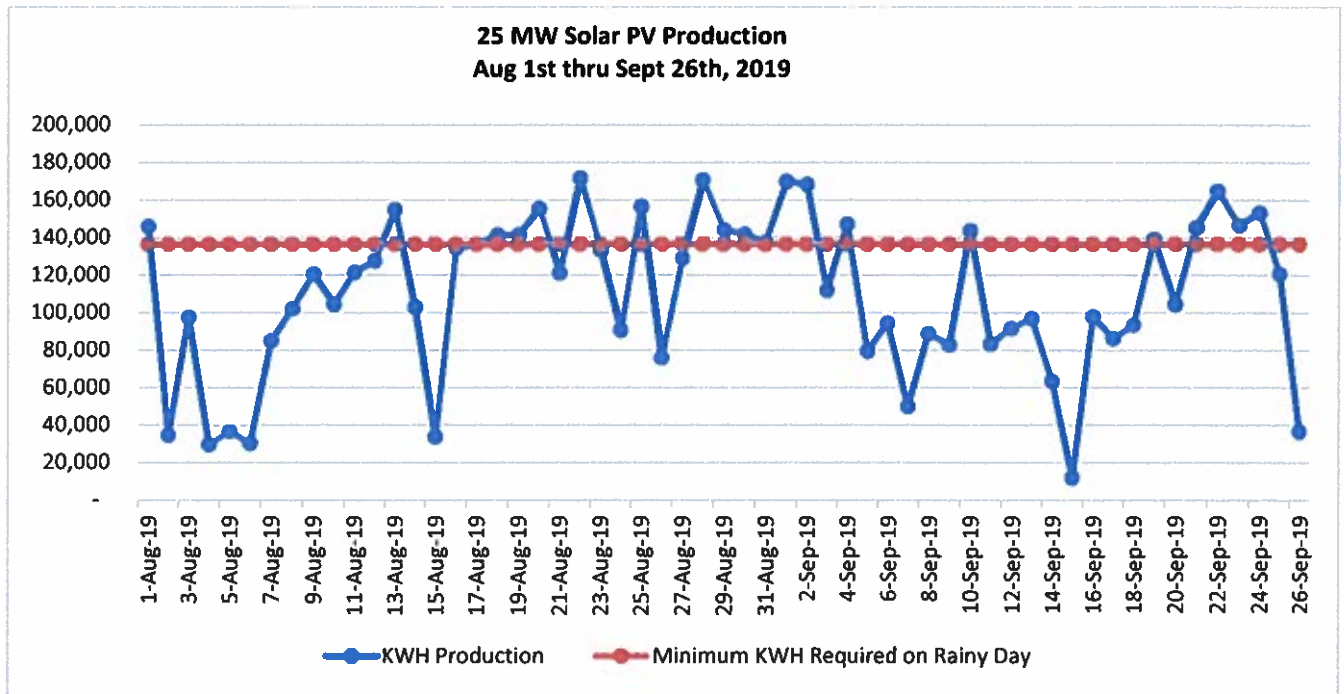
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Exhibit B

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Solar PV Production is Inconsistent and Requires Substantial Battery Reserves



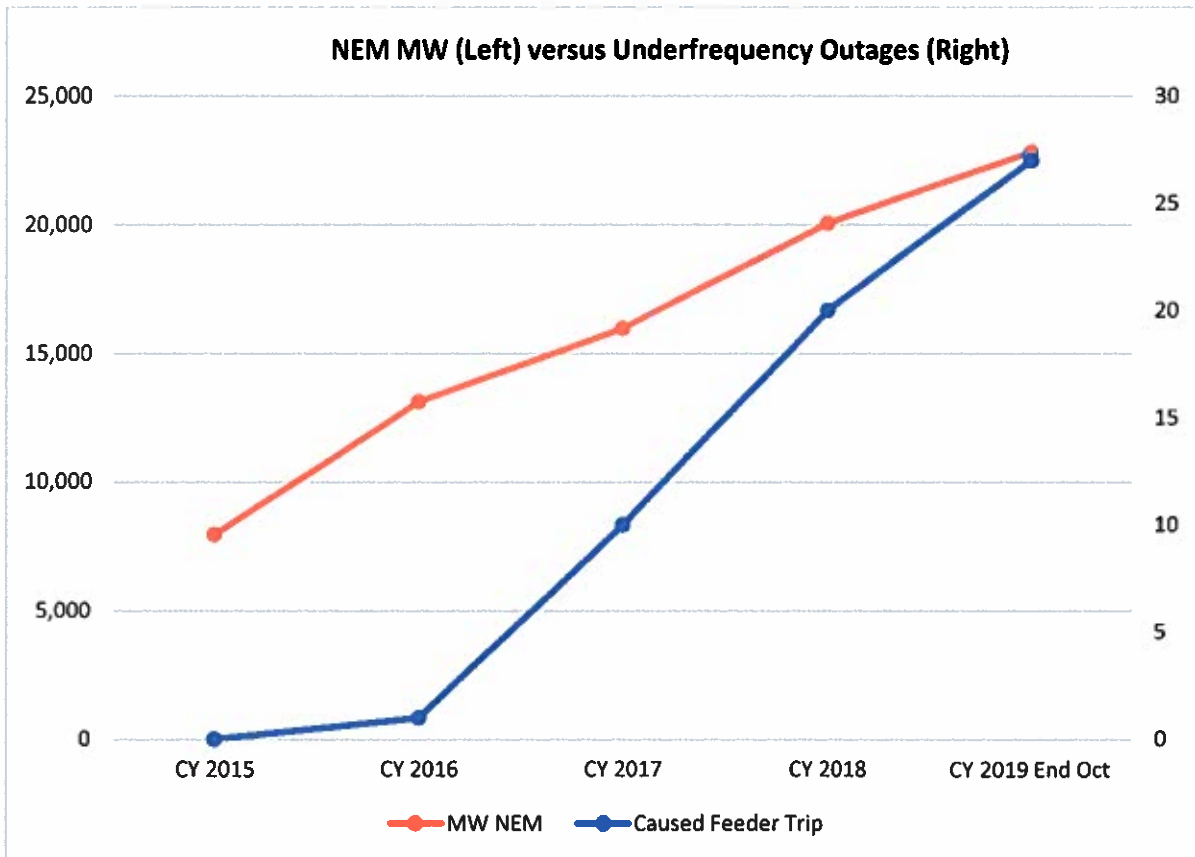
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Exhibit C

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