



## Fossil fuel abatement for Diesel-based Power Systems

An Action to meeting SDG 13 through Sustainable Electricity

### 1. Context and Rationale

This proposal is a concerted effort as a Contribution Action in achieving “SDG-Goal 13: Climate Action - Take urgent action to combat climate change and its impacts by regulating emissions and promoting developments in renewable energy”.

These projects will:

- (i). Meet peak loads in each of the centres.
- (ii). Lower overall cost of electricity production and supply.
- (iii). Minimise the use of the fossil fuels, hence, reduce GHG emissions.

No.	Centre/ System	Electricity Generation Source	Installed Capacity (MW)	Plant Utilisation Factor	Plant Capacity Factor	Minimum Demand (MW)	Maximum Demand (MW)
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- (iv). Assist PNG in meeting NDCs set under the Paris Agreement.
- (v). Offer a host of important socio-economic benefits including employment, roads, electrification, schools, aidposts, community centres, etc.

The Plan outlines the planned actions by the Government of Papua New Guinea that will be rolled out to all the provinces that are still using diesel to meet its goal to be 100% Renewable Energy by 2050. The Demand Focus sets out the potential areas of different renewable energy sources and the same be rolled out in other small island developing countries.

### 2. An Overview of the Contribution

Electricity is more than just energy. It is intrinsically linked to environmental, social and economic dimensions of sustainable development. However, the electricity sector is faced with the key challenges to providing reliable and secure electricity supplies, reduce environmental impacts and provide access to electricity to people currently without it. It is envisaged that the Centres and/or Systems identified in Table 1 would be able to meet the challenges faced by the sector when Renewable Energy sources are introduced.

						Week Day	Weekend	Week Day	Weekend
1	Daru	Diesel	2.406	40 %	31 %	0.380	0.200	0.840	0.700
2	Kerema	Diesel	1.173	33 %	22 %	0.272	0.094	0.482	0.405
3	Alotau	Diesel	7.40	36 %	23 %	1.05	0.20	2.70	2.00
4	Wewak	Diesel	11.6	39 %	26 %	1.55	0.64	4.13	3.81
5	Maprik	Diesel	1.096	48 %	55 %	0.219	0.030	0.647	0.377
6	Vanimo	Diesel	3.0	17 %	0 %	0.440	0.110	1.532	1.236
7	Aitape	Diesel	1.095	19 %	15 %	0.114	0.042	0.230	0.145
8	Lombrum	Diesel	6.51	22 %	15 %	0.727	0.540	1.639	0.819
9	Kimbe	Diesel/Hydro	8.9	1 %	1 %	1.71	0.420	4.36	3.39
10	Bialla	Diesel/Hydro	3.41	23 %	34 %	0.107	0.020	0.815	0.432
11	Buka	Diesel	6.44	27 %	16 %	0.870	0.710	2.040	1.800
12	Arawa	Diesel	4.64	19 %	7 %	0.366	0.161	0.882	0.766
13	Finschaffan	Diesel	0.477	31 %	20 %	0.097	0.047	0.180	0.147
14	Samarai	Diesel	0.160	15 %	11 %	0.014	0.008	0.034	0.028
15	Kavieng	Diesel	7.216	24 %	17 %	0.92	0.72	1.93	1.77
16	Tari	Diesel	1.450	10%	5%	0.163	0.160	0.600	0.547

**Table 1 – Diesel-based Power Systems<sup>1</sup>**

<sup>1</sup> PNG Power Ltd -15 Year Least Cost Development Plant 2019 – 2033 (Draft)

#### 4. Proposed Renewable Energy Projects identified for the Contribution

Though there are significant potentials for large scale hydropower project, biomass, wind, tidal and geothermal energy projects, the identified projects as “low hanging fruits” and which expected to contribute significantly to sustainable electricity. This proposal is focused on micro-mini hydropower projects, solar photovoltaic projects with storage and solar photovoltaic hybrid systems.

No.	Project/Source	Capacity	Timing	Centre /System
1	Solar PV <sup>2</sup> + ESS <sup>3</sup>	1.0 MW <sub>ac</sub> + 500 kWh Storage	2020	Daru
2	Solar PV + ESS	500 kW <sub>ac</sub> + 250 kWh Storage	2020	Kerema
3	Murua Hydro	3.0 MW	2023	
4	Solar PV + ESS	1.0 MW <sub>ac</sub> + 500 kWh Storage	2020	Alotau
5	Gumini Hydro	2.25 MW	2023	
6	Solar-Diesel Hybrid	160 kW <sub>ac</sub>	2020	Samarai
7	Lower Lake Hargy Hydro	2.0 MW	2022	Kimbe-Bialla
8	Ru Creek 2 Hydro	2.0 MW	2022	
9	Saussia Solar PV	10.0 MW	2021	Wewak -Maprik
10	Damar/Mabam Hydro	3.0 MW	2023	
11	Daundo Hydro	1.5 MW	2020	Vanimu
12	Solar-PV + ESS	250 kW <sub>ac</sub> +125 kWh Storage	2020	Aitape
13	Solar PV + ESS	1.0 MW <sub>ac</sub> + 500 kWh Storage	2020	Lombrum
14	Lauis Hydro	2.0 MW	2026	
15	Ramazon Hydro	3.0 MW	2020	Buka
16	Kereu 1 Hydro	600 kW	2021	Arawa
17	Kereu 2 Hydro	900 kW	2023	
18	Solar PV + ESS	300 kW <sub>ac</sub> + 150 kWh Storage	2022	Finschaffen
19	Song Hydro	250 kW	2026	
20	Solar PV + ESS	1.0 MW <sub>ac</sub> + 500 kWh Storage	2020	Kavieng
21	Kimadan Hydro	1.5 MW	2026	
22	Dauli Mini-Hydro <sup>4</sup>	400 kW	2020	Tari

**In Table 1 – Proposed Renewable Energy Projects<sup>5</sup>**

<sup>2</sup> PV - Photovoltaic

<sup>3</sup> ESS – Energy Storage System

<sup>4</sup> Rehabilitation project

<sup>5</sup> Projects identification based on the 15 Year Least Cost Power Development Plan 2019 – 2033 (draft), unsolicited proposals and the Utility’s Renewable Energy Inventory

## **5.0 Projects Implementation, Stakeholder Engagement & Communications Strategy**

The projects will be implemented in an environmentally and socially responsible manner based on international benchmarks for good practice on infrastructure development projects. International Finance Corporation (IFC) Policies, Standards and Guidelines is one of such which has become the international benchmark for good practices on infrastructure projects.

The following IFC procedures, policies and practice manuals are relevant to developing the Communication Strategy:

- (i). *Good Practice Manual in Effective Public Consultation & Disclosure (1998)* outlines issues to consider while undertaking public consultation and disclosure.
- (ii). *The Stakeholder Engagement Good Practice Handbook for Companies doing Business in Emerging Markets (2007)* confirms the shift to a broader, more inclusive and continuous process of engagement between companies and stakeholders, particularly project affected persons, which encompasses a range of approaches, throughout the entire life of the Project.
- (iii). *The key relevant standard is PS1: Assessment and Management of Environmental and Social Risks and Impacts.* This includes Stakeholder engagement is an ongoing process that may involve, in varying degrees, the following elements: stakeholder analysis and planning, disclosure and dissemination of information, consultation and participation, grievance mechanism, and ongoing reporting to Affected Communities.

## **6.0 Expected Outcomes from Projects Implementation**

No.	Project	Installed Capacity (MW <sub>ac</sub> )	Annual Energy Generation (MWh)	Energy Storage (MWh)	Annual Energy Generation (MWh)	Total Annual Energy Generation (MWh)	Annual Baseline Emission Reduction (tCO <sub>2</sub> )	Centre/System
1	Solar PV + ESS	1.000	8,760.00	0.500	4,380	13,140.00	10,512.00	Daru
2	Solar PV + ESS	0.500	4,380.00	0.250	2,190	6,570.00	5,256.00	Kerema
3	Murua Hydro	3.000	26,280.00		-	26,280.00	21,024.00	
4	Solar PV + ESS	1.000	8,760.00	0.500	4,380	13,140.00	10,512.00	Alotau
5	Gumini Hydro	2.250	19,710.00		-	19,710.00	15,768.00	
6	Solar-Diesel Hybrid	0.160	1,401.60		-	1,401.60	1,121.28	Samarai
7	Lower Lake Hargy Hydro	2.000	17,520.00		-	17,520.00	14,016.00	Kimbe-Bialla
8	Ru Creek 2 Hydro	2.000	17,520.00		-	17,520.00	14,016.00	
9	Saussia Solar PV	10.000	87,600.00		-	87,600.00	70,080.00	Wewak -Maprik
10	Damar/Mabam Hydro	3.000	26,280.00		-	26,280.00	21,024.00	
11	Daundo Hydro	1.500	13,140.00		-	13,140.00	10,512.00	Vanimo
12	Solar-PV + ESS	0.250	2,190.00	0.125	1,095	3,285.00	2,628.00	Aitape
13	Solar PV + ESS	1.000	8,760.00	0.500	4,380	13,140.00	10,512.00	Lombrum
14	Lauis Hydro	2.000	17,520.00		-	17,520.00	14,016.00	
15	Ramazon Hydro	2.000	17,520.00		-	17,520.00	14,016.00	Buka
16	Kereu 1 Hydro	0.600	5,256.00		-	5,256.00	4,204.80	Arawa
17	Kereu 2 Hydro	0.900	7,884.00		-	7,884.00	6,307.20	
18	Solar PV + ESS	0.300	2,628.00	0.150	1,314	3,942.00	3,153.60	Finschaffien
19	Song Hydro	0.250	2,190.00		-	2,190.00	1,752.00	
20	Solar PV + ESS	1.000	8,760.00	0.500	4,380	13,140.00	10,512.00	Kavieng
21	Kimadan Hydro	1.500	13,140.00		-	13,140.00	10,512.00	
22	Dauli Mini-Hydro	0.400	3,504.00		-	3,504.00	2,803.20	Tari
	<b>Total</b>	<b>36.610</b>	<b>320,703.60</b>	<b>2.525</b>	<b>22,119.00</b>	<b>342,822.60</b>	<b>274,258.08</b>	