

POWER SUPPLY PROCUREMENT PLAN

LA UNION ELECTRIC COOPERATIVE POWER SUPPLY PROCUREMENT PLAN

In compliance with the Department of Energy's (DOE) Department Circular No. DC 2018-02-0003, "Adopting and Prescribing the Policy for the Competitive Selection Process in the Procurement by the Distribution Utilities of Power Supply Agreement for the Captive Market" or the Competitive Selection process (CSP) Policy, the Power Supply Procurement Plan (PSPP) Report is hereby created, pursuant to the Section 4 of the said Circular.

The PSPP refers to the DUs' plan for the acquisition of a variety of demand-side and supply-side resources to cost-effectively meet the electricity needs of its customers. The PSPP is an integral part of the Distribution Utilities' Distribution Development Plan (DDP) and must be submitted to the Department of Energy with supported Board Resolution and/or notarized Secretary's Certificate.

The Third-Party Bids and Awards Committee (TPBAC), Joint TPBAC or Third Party Auctioneer (TPA) shall submit to the DOE and in the case of Electric Cooperatives (ECs), through the National Electrification Administration (NEA) the following:

- a. Power Supply Procurement Plan;
- b. Distribution Impact Study/ Load Flow Analysis conducted that served as the basis of the Terms of Reference; and
- c. Due diligence report of the existing generation plant

All Distribution Utilities' shall follow and submit the attached report to the Department of Energy for posting on the DOE CSP Portal. For ECs such reports shall be submitted to DOE and NEA. The NEA shall review the submitted report within ten (10) working days upon receipt prior to its submission to DOE for posting at the DOE CSP Portal.

The content of the PSPP shall be consistent with the DDP. The tables and graph format to be use on the PSPP report is provided on the following sheets. Further, the PSPP shall contain the following sections:

- I. Table of Contents
- II. Introduction
- III. Energy and Demand Forecast (10 year historical and forecast)
- IV. Energy Sales and Purchase
- V. Daily Load Profile and Load Duration Curve
- VI. Existing Contracts & Existing GenCos due diligence report
- VII. Currently approved SAGR for Off-Grid ECs to be passed-on to consumers;
- VIII. DU's Current Supply and Demand
- IX. Distribution Impact Study
- X. Schedule of Power Supply Procurement
- XI. Timeline of the CSP

For inquiries, you may send it at doe.csp@gmail.com or you may contact us through telephone numbers (02) 840-2173 and (02) 479-2900 local 202.

TABLE OF CONTENTS

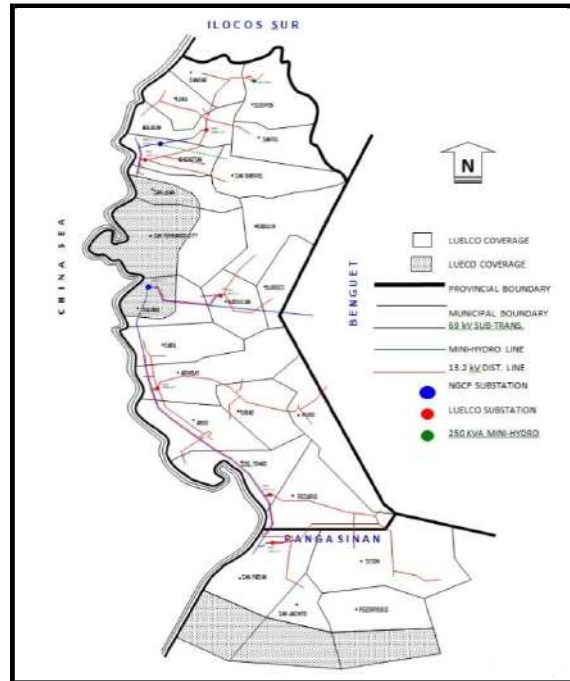
	Page
I. Introduction	3
II. Energy Sales and Purchase	5
III. Demand	7
IV. LOAD PROFILE AND LOAD DURATION CURVE	9
V. MIXSUPPLY VS DEMAND AND THE OPTIMAL SUPPLY	10
VI. Existing PowerSupplyContracts	11
VII. DISTRIBUTION IMPACT STUDY	12
VIII. SCHEDULE OF COMPETITIVE SELECTION PROCESS (CSP)	13
ANNEX A. 10 YEAR MONTHLY FORECASTED DATA	14

INTRODUCTION

DISTRIBUTION UTILITIES PROFILE

The province of La Union is supplied with power by the La Union Electric Cooperative, Inc. (LUELCO) and the La Union Electric Company, a private electric franchise. Before LUELCO came into existence, power has already been supplied to few towns of La Union by Private Electric Franchises like Milo Electric System in Aringay, the AELAPs in Agoo and several others.

LUELCO, which was founded in August 7, 1971, now under GM Ramon C. Posadas, Ph.D., has a total potential household connections of One Hundred Fifty Eight Thousand Eight Hundred Ninety Six (158,896) and an actual household connection of One Hundred Fifty Two Thousand Eight Hundred Thirteenth (152,813) as of December 31, 2018. These members come from the 23 Municipalities and 1 City (19 municipalities and 1 city in La Union and 4 municipalities in Pangasinan) served by LUELCO.



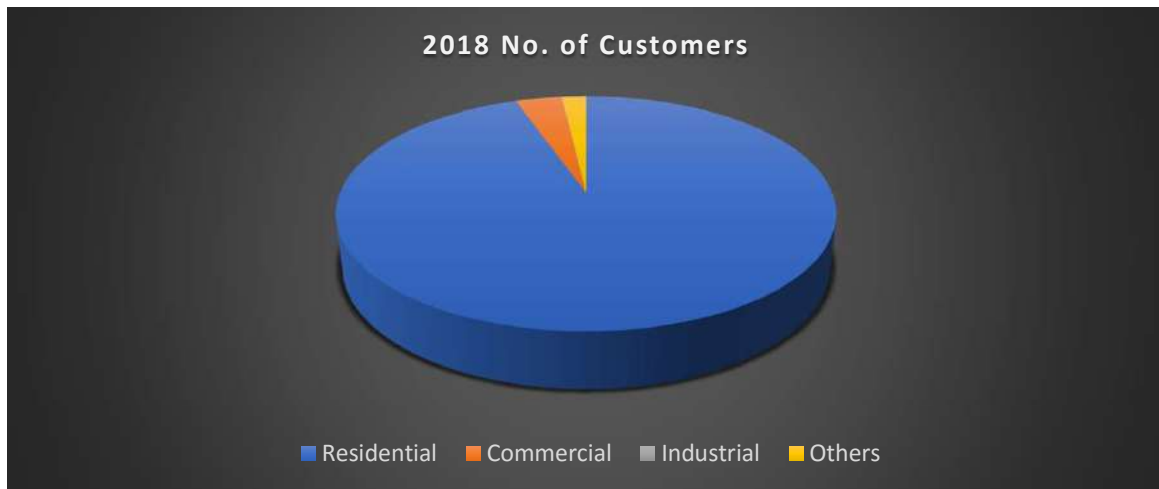
LUELCO, at present, has 6 Area Offices located at Aringay, Agoo, Rosario, Naguilian, Bacnotan and Bangar and 8 Collection Offices situated at the Municipalities of Luna, Balaoan, Santol, San Juan-San Gabriel, Tubao, Sto. Tomas, Pugo, La Union and at Sison, Pangasinan.

There are seven (7) Substations which supply the power requirement of the coverage area which are strategically located in Naguilian (10 MVA S/S), Damortis (10 MVA S/S), Balaoan (15 MVA S/S), Aringay (15 MVA S/S), Agoo (15 MVA S/S), Bacnotan (10 MVA), and in San Fabian, Pangasinan (10 MVA S/S). All these are manned/operated/maintained by the coop's 297 employees.

The customer profile as of December 31, 2018 shows that residential customers are dominant in LUELCO at 135,327 (94.56%) of the total customer population followed by commercial customers at 5,035 (3.52%). In terms of energy share per customer, still residential customers have the biggest piece of the total energy at 130,403 MWh (65.74%). LUELCO's system coincident peak demand registered a high 41.34 MW in 2017 compared to 40.28 MW in 2016.

POWER SUPPLY PROCUREMENT PLAN

Number of Customer	ACTUAL	FORECAST									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Residential	135327	142427	149745	157193	164710	172256	179799	187320	194801	202232	209606
Commercial	5035	5305	5613	5940	6281	6632	6991	7355	7722	8092	8462
Industrial	108	115	123	132	140	149	158	166	174	182	190
Others	2635	2737	2826	2918	3009	3100	3193	3283	3375	3466	3557
Contestable Customers served by RES	1	2	2	2	2	2	2	2	2	2	2
Total (Captive Customers)	143105	150584	158307	166183	174140	182137	190140	198124	206073	213972	221815

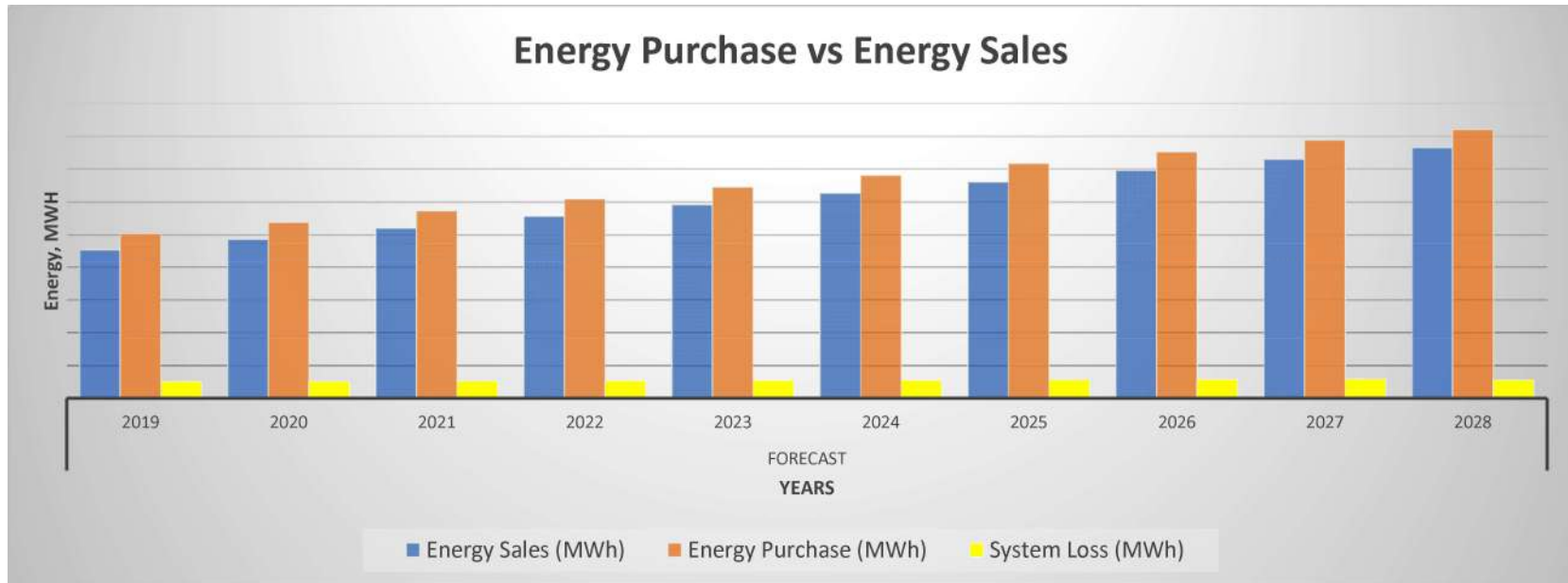


The GN Power Mariveles Coal Plant (GMCP), Ltd. Supplies the baseload requirements of LUELCO for 15 years which started on Dec. 26, 2012 and it will end Dec. 25, 2027. LUELCO contracted a baseload of 27,000 kW with a monthly average of 6,527,250 kWh equivalents. The remaining requirements both for kW Demand & Energy Demand will be sourced from the Renewable Energy Sources, e.g Tubao Mini-Hydro Plant (1.2 MW) and SurePep Biomass Plant (350 kW) and from Solar PV proponents (i.e. Solar Pacific, Sol-Tierra, AirEnergy, etc.) and from the Spot Market (WESM). LUELCO contracted another 8,000 kW from AES, Phils. (MPPCL) for 20 years starting December 26, 2018. The Number of Customers will have an average annual growth rate (AAGR) of 4.5% for the next ten (10) years, 2019 - 2028.

ENERGY SALES AND PURCHASE

ENERGY SALES AND PURCHASE	HISTORICAL									
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Energy Sales (MWh)	121723	134182	135170	143050	153718	154887	165785	183161	198371	211396
Energy Purchase (MWh)	140287	153816	154088	163402	171028	175177	186124	207444	222514	236611
System Loss (MWh)	17733	19617	19032	19161	17309	20291	20339	24283	24144	25215

ENERGY SALES AND PURCHASE	FORECAST									
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Energy Sales (MWh)	226461	242820	259908	277562	295087	312956	330144	347445	364875	382449
Energy Purchase (MWh)	251561	268470	286004	304278	322092	340028	358041	375762	393700	410177
System Loss (MWh)	25100	25650	26095	26715	27005	27071	27897	28317	28825	27728

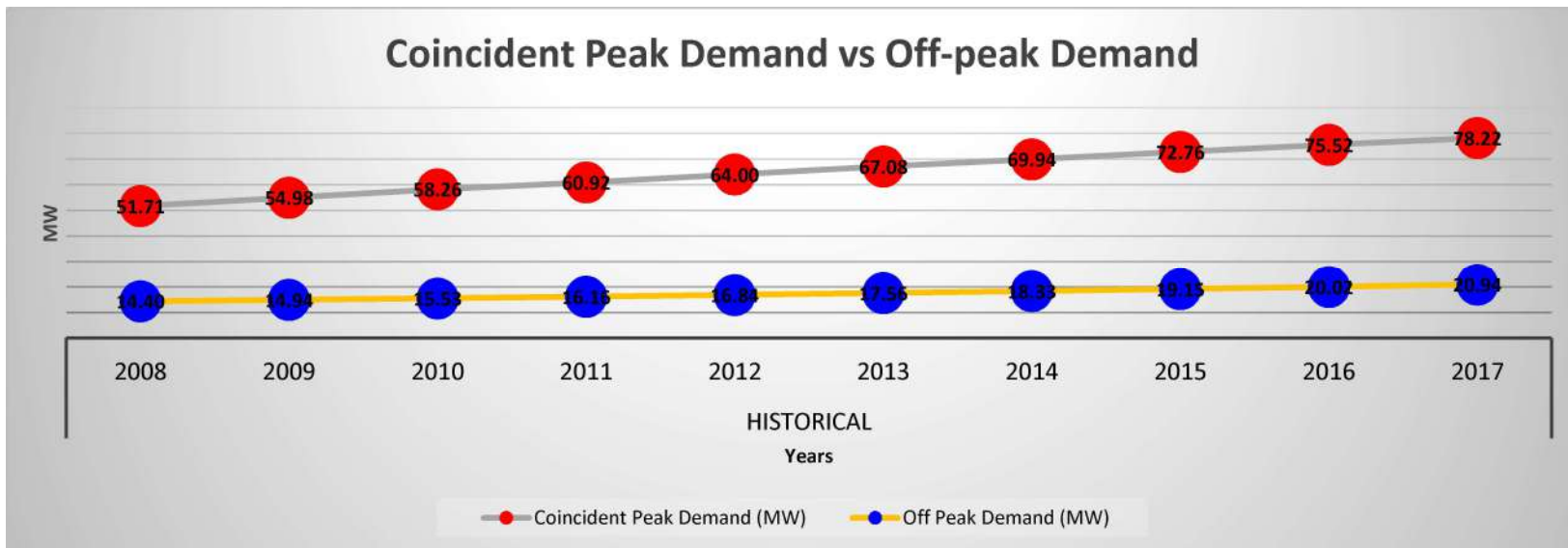


The Gn Power Mariveles Coal Plant (GMCP), Ltd. Supplies the baseload requirements of LUELCO for 15 years which started on February 26, 2014 and it will end February 25, 2029. LUELCO contracted a baseload of 27,000 kW with a monthly average of 6,527,250 kWh equivalent. The remaining requirements both for kW Demand & Energy Demand will be sourced from the Spot Market (WESM). LUELCO contracted another 8,000 kW from AES, Phils. (MPPCL) for 20 years starting December 26, 2018. The kWh Sales and kWh Purchased will have an average annual growth rate (AAGR) of 6.1% and 5.7%, respectively. The forecasting model used for the MWh Sales and Purchased is $Y = at^3 + bt^2 + c$, it is a Cubic Trend with 2 Variables.

DEMAND

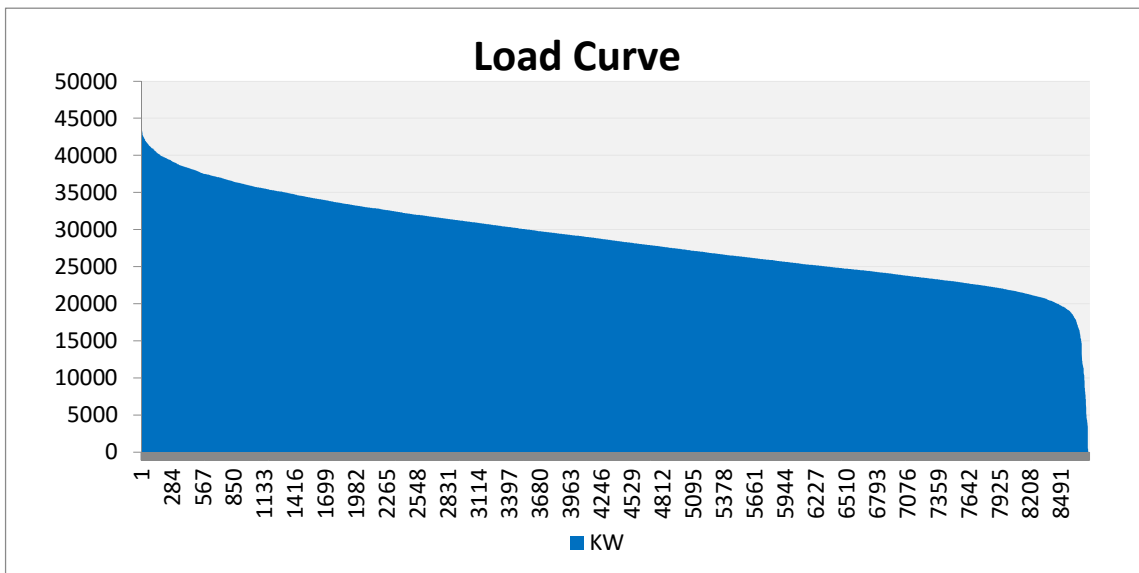
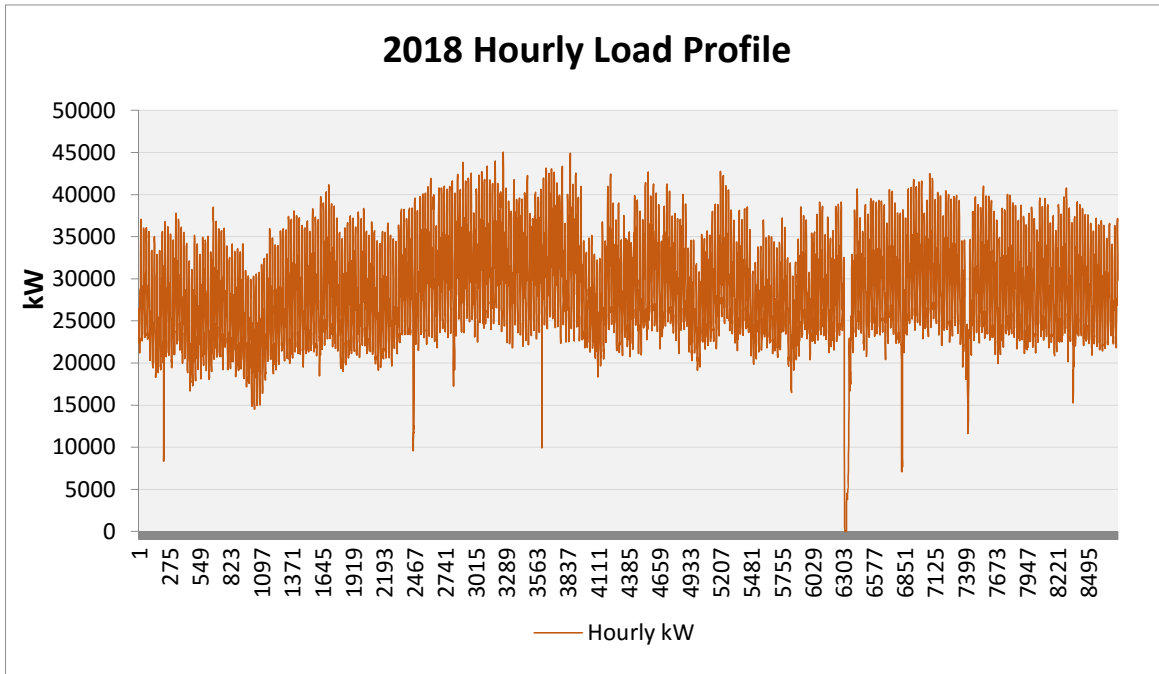
Demand	HISTORICAL									
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Coincident Peak Demand (MW)	28.10	30.86	30.49	31.98	34.30	34.85	37.02	40.28	41.34	45.05
Off Peak Demand (MW)	8.04	8.31	9.18	9.74	10.41	10.5	10.16	11.72	12.52	14.23

Demand	FORECAST									
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Coincident Peak Demand (MW)	51.71	54.98	58.26	60.92	64.00	67.08	69.94	72.76	75.52	78.22
Off Peak Demand (MW)	14.40	14.94	15.53	16.16	16.84	17.56	18.33	19.15	20.02	20.94



The coincident peak demand for the year 2009 is 28.10 MW and in year 2019 is 51.71 MW which means an increase of 23.61 MW in ten years with an Average Annual Growth Rate (AAGR) of 6.38%. The forecasting model used for the Peak Demand for 2019 to 2028 is $Y = a \ln t^2 + b \ln t + c t^{-1} + d$, it is a Quadratic & Logarithmic Trend with Smoothing & Horizon.

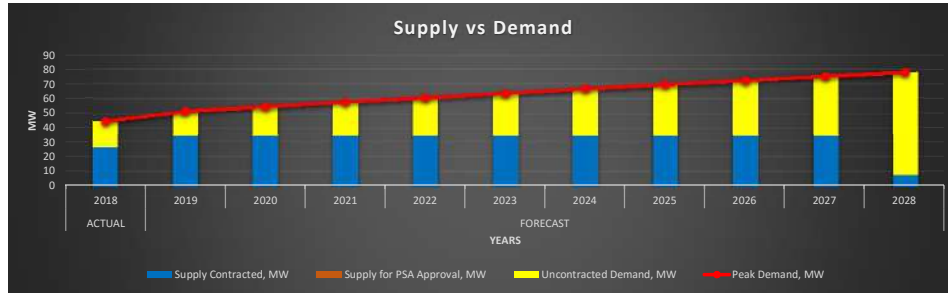
LOAD PROFILE AND LOAD DURATION CURVE



Based on the load duration curve the Base load is 77.58% which is equal to 40.11 MW and a Peaking of 22.42% equal to 11.59 MW. LUELCO also has an uncontracted base capacity of 13.11 MW because of its contracted base capacity of 27 MW. The percent capacity factor is equal to 15.47% which is the intersection between coal and diesel based on their annual levelized cost.

MIXSUPPLY VS DEMAND AND THE OPTIMAL SUPPLY

Supply Demand	ACTUAL	FORECAST									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Peak Demand, MW	45.05	51.708	54.982	58.258	60.92	64.001	67.078	69.944	72.761	75.518	78.215
Supply Contracted, MW	27	35	35	35	35	35	35	35	35	35	8
GN Power Mariveles, Ltd.	27	27	27	27	27	27	27	27	27	27	0
AES, Phils. (MPPCL)		8	8	8	8	8	8	8	8	8	8
Supply for PSA Approval, MW	0	0	0	0	0	0	0	0	0	0	0
Uncontracted Demand, MW	18.047	16.708	19.982	23.258	25.92	29.001	32.078	34.944	37.761	40.518	70.215



List of Existing Contracts and Details

Supply Contracted	Plant Owner/ Operator	Capacity Factor	PSA Effectivity (MM/YR)	PSA Expiration (MM/YR)	Contracted Capacity, MW	Contracted Energy, MWH	Base / Mid-merit / Peaking	Embedded/ Grid Connected	Utility-owned/ NPC/ IPP/ NPC-IPP	Status	Fuel Type	Installed Capacity (MW)	Net Dependable Capacity (MW)
GN Mariveles Coal Power Plant (GMCP)	GNPower; Ltd. Co.		12/2012	12/2027	27	236520	Baseload	Grid Connected	IPP	Running	Coal	600	
AES, Phils. (MPPCL)	AES, Phils. (MPPCL)		12/2018	12/2033	8	70080	Baseload	Grid Connected	IPP	Running	Coal	600	

The demand for 2018 is equal to 45.05 MW with an uncontracted demand of 18.04 MW which is purchased from the WESM or Spot Market. LUELCO will start to bid/look for an additional PSA under the CSP because their will be a high deficit or uncontracted demand for year 2020 to 2028.



DISTRIBUTION IMPACT STUDY

All relevant data from the Distribution System Loss (DSL) – ERC template was modelled and then load flow is prepared for each feeder. The load flow provided information such as percent conductor loading to its capacity, calculated distribution losses, injected current to transformers, line currents, voltage profile and voltage unbalances. Recommendation and project ideas were then made and based on these results. Load flow analysis is conducted monthly per feeder on the base year and conducted the analysis only on the peak month of the forecast year and then allocated the results monthly based on the base year results.

The voltage variation in the distribution system should not exceed +10% of the nominal voltage or equivalent to not less than 0.9 per unit and not more than 1.1 per unit of the nominal value.

For voltage unbalance, it should not exceed 2.5% during normal operation which is computed by dividing the maximum deviation from the average of the three-phase voltages to the average of the three phase voltages.

The Substation capacity loading criteria is compared based on the 100% of ONAN (Natural Oil and Natural Air) rated capacity (MVA) of the power transformer to the forecasted demand (MW) at a power factor of 90% - 98%.

Maximum Short circuit current is computed at fault impedance equivalent to zero and for minimum short circuit current 30 ohms fault impedance is used. The bolted fault current or fault current at zero impedance is used in determining the margin of safety of the equipment with its rated interrupting capacity, a 10% or above margin if safety is acceptable and 10% below is considered unsafe. The minimum fault current is used to compare the setting of the protective devices in the system. If the minimum short circuit currents are below the settings of the upstream protective devices it is considered unsafe.

For system reliability, the criteria is based on the Distribution Code with the System Average Interruption Frequency Index (SAIFI) should not be more 20 hours-interruptions per customer per year and the System Average Interruption Duration Index (SAIDI) should not exceed 45 hours-interruptions per customer per year.

10 Year Monthly Data

Year	Forecast			Contracted and For PSA Approval Demand and Energy		Contracted Demand and Energy		Committed for CSP	
	Coincident Peak Demand (MW)	Off Peak Demand (MW)	Energy Requirement (MWh)	Demand (MW)	Energy (MWh)	Uncontracted Demand (MW)	Uncontracted Energy (MWh)	Demand (MW)	Energy (MWh)
2019									
Jan	44.00	16.50	19,003	36.35	23,659	7.65	-	-	-
Feb	42.67	14.40	18,379	36.35	23,659	6.32	-	-	-
Mar	46.28	18.16	18,216	36.35	21,370	9.93	-	-	-
Apr	50.00	18.16	22,482	36.35	26,040	13.65	-	-	-
May	51.71	19.29	23,237	36.35	25,200	15.36	-	-	-
Jun	50.87	19.94	23,068	36.35	26,040	14.52	-	-	-
Jul	49.04	18.33	21,146	36.35	25,200	12.69	-	-	-
Aug	49.60	17.65	21,852	36.35	26,040	13.25	-	-	-
Sep	47.71	18.24	21,249	36.35	26,040	11.36	-	-	-
Oct	47.95	14.41	20,633	36.35	25,200	11.60	-	-	-
Nov	47.08	19.19	21,679	36.35	26,040	10.73	-	-	-
Dec	47.20	19.57	20,616	36.35	25,200	10.85	-	-	-
2020									
Jan	46.85	17.11	20,316	41.55	29,760	5.30	-	-	-
Feb	45.42	14.94	19,642	41.55	29,760	3.87	-	-	-
Mar	49.25	18.84	19,462	41.55	27,840	7.70	-	-	-
Apr	53.19	18.85	24,012	41.55	29,760	11.64	-	-	-
May	54.98	20.02	24,811	41.55	28,920	13.43	-	-	-
Jun	54.07	20.70	24,623	41.55	29,760	12.52	-	-	-
Jul	52.11	19.03	22,564	41.55	28,800	10.56	-	-	-
Aug	52.69	18.33	23,311	41.55	29,760	11.14	-	-	-
Sep	50.67	18.94	22,660	41.55	29,760	9.12	-	-	-
Oct	50.90	14.96	21,997	41.55	28,800	9.35	-	-	-
Nov	49.97	19.93	23,105	41.55	29,760	8.42	-	-	-
Dec	50.08	20.33	21,966	41.55	28,800	8.53	-	-	-
2021									
Jan	49.70	17.77	21,676	41.55	29,760	8.15	-	-	-
Feb	48.17	15.53	20,951	41.55	29,760	6.62	-	-	-
Mar	52.21	19.58	20,754	41.55	26,880	10.66	-	-	-
Apr	56.37	19.59	25,598	41.55	29,760	14.82	-	-	-
May	58.26	20.81	26,442	41.55	28,920	16.71	-	-	-
Jun	57.28	21.52	26,235	41.55	29,760	15.73	-	-	-
Jul	55.19	19.78	24,035	41.55	28,800	13.64	-	-	-
Aug	55.78	19.06	24,824	41.55	29,760	14.23	-	-	-
Sep	53.63	19.69	24,124	41.55	29,760	12.08	-	-	-
Oct	53.86	15.56	23,412	41.55	28,800	12.31	-	-	-
Nov	52.86	20.74	24,585	41.55	29,760	11.31	-	-	-
Dec	52.96	21.15	23,367	41.55	28,800	11.41	-	-	-

POWER SUPPLY PROCUREMENT PLAN

2022									
Jan	52.02	18.50	22,800	41.55	29,760	10.47	-	-	-
Feb	50.41	16.16	22,032	41.55	29,760	8.86	-	-	-
Mar	54.62	20.37	21,818	41.55	26,880	13.07	-	-	-
Apr	58.96	20.39	26,904	41.55	29,760	17.41	-	-	-
May	60.92	21.66	27,785	41.55	28,920	19.37	-	-	-
Jun	59.88	22.41	27,560	41.55	29,760	18.33	-	-	-
Jul	57.68	20.60	25,243	41.55	28,800	16.13	-	-	-
Aug	58.29	19.85	26,065	41.55	29,760	16.74	-	-	-
Sep	56.02	20.51	25,325	41.55	29,760	14.47	-	-	-
Oct	56.25	16.21	24,571	41.55	28,800	14.70	-	-	-
Nov	55.19	21.60	25,796	41.55	29,760	13.64	-	-	-
Dec	55.28	22.04	24,512	41.55	28,800	13.73	-	-	-
2023									
Jan	54.70	19.27	24,029	41.55	29,760	13.15	-	-	-
Feb	52.99	16.84	23,214	41.55	29,760	11.44	-	-	-
Mar	57.41	21.23	22,984	41.55	26,880	15.86	-	-	-
Apr	61.96	21.25	28,336	41.55	29,760	20.41	-	-	-
May	64.00	22.58	29,256	41.55	28,920	22.45	336.29	-	-
Jun	62.90	23.36	29,013	41.55	29,760	21.35	-	-	-
Jul	60.57	21.47	26,568	41.55	28,800	19.02	-	-	-
Aug	61.19	20.69	27,427	41.55	29,760	19.64	-	-	-
Sep	58.80	21.39	26,643	41.55	29,760	17.25	-	-	-
Oct	59.03	16.90	25,845	41.55	28,800	17.48	-	-	-
Nov	57.91	22.53	27,127	41.55	29,760	16.36	-	-	-
Dec	57.99	22.98	25,772	41.55	28,800	16.44	-	-	-
2024									
Jan	57.38	20.10	25,258	41.55	29,760	15.83	-	-	-
Feb	55.57	17.56	24,397	41.55	29,760	14.02	-	-	-
Mar	60.20	22.15	24,150	41.55	27,840	18.65	-	-	-
Apr	64.95	22.17	29,767	41.55	29,760	23.40	6.77	-	-
May	67.08	23.56	30,728	41.55	28,920	25.53	1,807.80	-	-
Jun	65.91	24.37	30,466	41.55	29,760	24.36	706.31	-	-
Jul	63.46	22.41	27,893	41.55	28,800	21.91	-	-	-
Aug	64.10	21.60	28,790	41.55	29,760	22.55	-	-	-
Sep	61.58	22.32	27,961	41.55	29,760	20.03	-	-	-
Oct	61.81	17.64	27,118	41.55	28,800	20.26	-	-	-
Nov	60.62	23.51	28,458	41.55	29,760	19.07	-	-	-
Dec	60.69	23.99	27,031	41.55	28,800	19.14	-	-	-
2025									
Jan	59.88	20.98	26,487	41.55	29,760	18.33	-	-	-
Feb	57.98	18.33	25,579	41.55	29,760	16.43	-	-	-
Mar	62.79	23.13	25,316	41.55	26,880	21.24	-	-	-
Apr	67.74	23.15	31,198	41.55	29,760	26.19	1,437.97	-	-
May	69.94	24.60	32,199	41.55	28,920	28.39	3,279.31	-	-
Jun	68.71	25.45	31,919	41.55	29,760	27.16	2,159.50	-	-
Jul	66.14	23.40	29,219	41.55	28,800	24.59	418.58	-	-
Aug	66.80	22.56	30,152	41.55	29,760	25.25	391.96	-	-

POWER SUPPLY PROCUREMENT PLAN

Sep	64.16	23.31	29,279	41.55	29,760	22.61	-	-	-
Oct	64.39	18.43	28,391	41.55	28,800	22.84	-	-	-
Nov	63.14	24.56	29,789	41.55	29,760	21.59	28.54	-	-
Dec	63.21	25.06	28,290	41.55	28,800	21.66	-	-	-
2026									
Jan	62.33	21.92	27,717	41.55	29,760	20.78	-	-	-
Feb	60.35	19.15	26,762	41.55	29,760	18.80	-	-	-
Mar	65.35	24.16	26,482	41.55	26,880	23.80	-	-	-
Apr	70.48	24.19	32,629	41.55	29,760	28.93	2,869.17	-	-
May	72.76	25.70	33,671	41.55	28,920	31.21	4,750.82	-	-
Jun	71.47	26.59	33,373	41.55	29,760	29.92	3,612.69	-	-
Jul	68.78	24.46	30,544	41.55	28,800	27.23	1,743.78	-	-
Aug	69.45	23.57	31,514	41.55	29,760	27.90	1,754.34	-	-
Sep	66.70	24.36	30,597	41.55	29,760	25.15	836.55	-	-
Oct	66.93	19.26	29,664	41.55	28,800	25.38	864.18	-	-
Nov	65.62	25.67	31,119	41.55	29,760	24.07	1,359.47	-	-
Dec	65.67	26.20	29,550	41.55	28,800	24.12	749.67	-	-
2027									
Jan	64.73	22.91	28,946	41.55	29,760	23.18	-	-	-
Feb	62.66	20.02	27,944	41.55	29,760	21.11	-	-	-
Mar	67.84	25.26	27,647	41.55	26,880	26.29	767.43	-	-
Apr	73.16	25.28	34,060	41.55	29,760	31.61	4,300.37	-	-
May	75.52	26.87	35,142	41.55	28,920	33.97	6,222.33	-	-
Jun	74.16	27.80	34,826	41.55	29,760	32.61	5,065.88	-	-
Jul	71.37	25.57	31,869	41.55	28,800	29.82	3,068.98	-	-
Aug	72.05	24.64	32,877	41.55	29,760	30.50	3,116.72	-	-
Sep	69.19	25.47	31,915	41.55	29,760	27.64	2,154.50	-	-
Oct	69.41	20.14	30,937	41.55	28,800	27.86	2,137.40	-	-
Nov	68.04	26.84	32,450	41.55	29,760	26.49	2,690.40	-	-
Dec	68.09	27.39	30,809	41.55	28,800	26.54	2,008.97	-	-
2028									
Jan	67.08	23.96	30,175	14.55	9,672	52.53	20,502.99	-	-
Feb	64.93	20.94	29,127	14.55	9,672	50.38	19,454.65	-	-
Mar	70.29	26.41	28,813	14.55	9,048	55.74	19,765.24	-	-
Apr	75.79	26.44	35,492	14.55	9,672	61.24	25,819.57	-	-
May	78.22	28.10	36,614	14.55	9,480	63.67	27,133.84	-	-
Jun	76.80	29.08	36,279	14.55	9,672	62.25	26,607.07	-	-
Jul	73.90	26.74	33,194	14.55	9,360	59.35	23,834.18	-	-
Aug	74.59	25.77	34,239	14.55	9,672	60.04	24,567.10	-	-
Sep	71.62	26.64	33,232	14.55	9,672	57.07	23,560.46	-	-
Oct	71.84	21.06	32,211	14.55	9,360	57.29	22,850.63	-	-
Nov	70.41	28.07	33,781	14.55	9,672	55.86	24,109.32	-	-
Dec	70.45	28.65	32,068	14.55	9,360	55.90	22,708.27	-	-