

Plan de Expansión del Sistema Interconectado
Nacional
2019 – 2033

Tomo I
Estudios Básicos

Anexo Tomo I - 3
Cuadros Soporte & Detalles de
Cálculo.

ANEXO I -3

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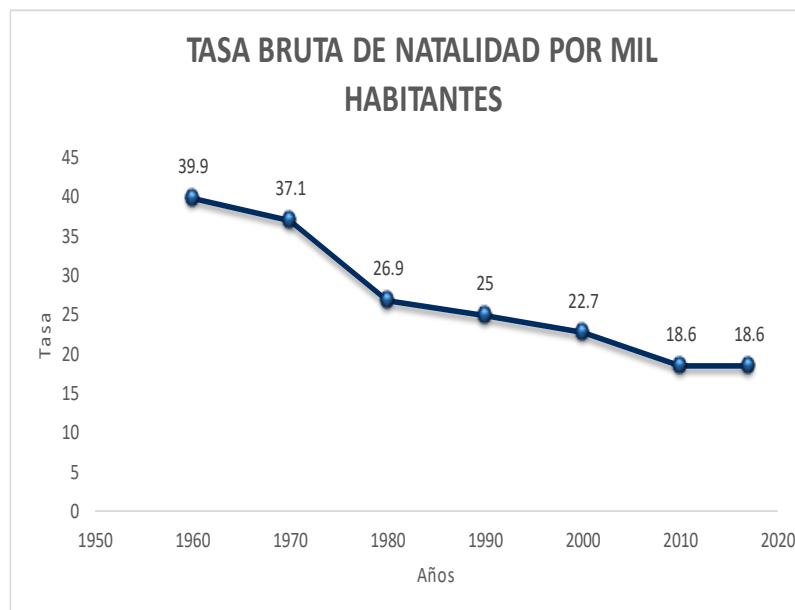
Cuadro No.14: Demanda máxima de generación, por participante y por barra, 2019-2033(MW).

Cuadro No.14 - A: Demanda máxima de generación, por participante y por barra, 2019-2033(MW). Continuación.

Cuadro No.1: Tasa de natalidad por mil habitantes.

TASA BRUTA DE NATALIDAD Y TASA DE MORTALIDAD FETAL EN LA REPÚBLICA: AÑOS 1960, 1970, 1980, 1990, 2000, 2010 Y 2017

Años	Tasa Bruta de natalidad por mil habitantes
1960	39.9
1970	37.1
1980	26.9
1990	25
2000	22.7
2010	18.6
2017	18.6



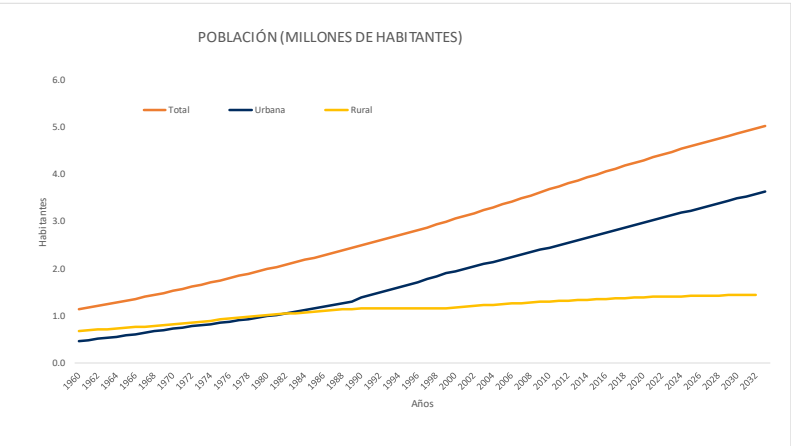
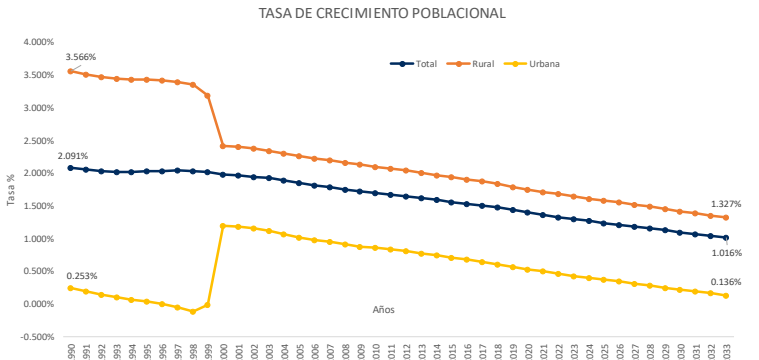
Fuente:

https://www.contraloria.gob.pa/inec/Publicaciones/Publicaciones.aspx?ID_SUBCATEGORIA=6&ID_PUBLICACION=902&ID_IDIOMA=1&ID_CATEGORIA=3

Cuadro No.2: Estimación y proyecciones de la población a largo plazo.1950 -2100.

Panamá
ESTIMACIONES Y PROYECCIONES DE POBLACIÓN A LARGO PLAZO. 1950-2100
Revisión 2017 / The 2017 Revision
Fuente: CELADE - División de Población de la CEPAL. Revisión 2017
Source: CELADE - Population Division of ECLAC. 2017 Revision

Año	Poblacion Totales (Millones)	Tasa de Crecimiento Poblacional	Año	PoblacionUrbana	Tasa de Crecimiento Poblacional Urbana	Poblcion Rural	Tasa de Crecimiento Poblacional Rural
1950	0.85966		1950	0.329368		0.530292	
1951	0.881596	2.488%	1951	0.340517	3.274%	0.541079	1.994%
1952	0.904836	2.568%	1952	0.352301	3.345%	0.552535	2.073%
1953	0.929351	2.638%	1953	0.364725	3.406%	0.564626	2.141%
1954	0.955115	2.697%	1954	0.377796	3.460%	0.577319	2.199%
1955	0.982104	2.748%	1955	0.391516	3.504%	0.590588	2.247%
1956	1.010333	2.794%	1956	0.405898	3.543%	0.604435	2.291%
1957	1.039818	2.836%	1957	0.420971	3.581%	0.618847	2.329%
1958	1.07054	2.870%	1958	0.43672	3.606%	0.63382	2.362%
1959	1.10246	2.895%	1959	0.453156	3.627%	0.649304	2.385%
Año	PoblacionTotales (Millones)	Tasa de Crecimiento Poblacional	1960	0.470282	3.642%	0.665282	2.402%
1960	1.135564	2.915%	1961	0.490334	4.089%	0.679621	2.110%
1961	1.169955	2.940%	1962	0.513095	4.436%	0.692556	1.868%
1962	1.205651	2.961%	1963	0.536818	4.419%	0.705673	1.859%
1963	1.242491	2.965%	1964	0.561445	4.386%	0.718866	1.835%
1964	1.280311	2.954%	1965	0.586919	4.340%	0.732026	1.798%
1965	1.318945	2.929%	1966	0.61328	4.298%	0.745146	1.761%
1966	1.358426	2.906%	1967	0.640582	4.262%	0.758277	1.732%
1967	1.398859	2.890%	1968	0.66883	4.223%	0.771372	1.698%
1968	1.440202	2.871%	1969	0.698025	4.183%	0.78439	1.660%
1969	1.482415	2.848%	1970	0.727234	4.016%	0.79822	1.733%
1970	1.525454	2.821%	1971	0.751601	3.242%	0.817933	2.410%
1971	1.569534	2.808%	1972	0.776675	3.228%	0.838016	2.396%
1972	1.614691	2.797%	1973	0.8023	3.194%	0.858292	2.362%
1973	1.660592	2.764%	1974	0.828328	3.142%	0.878582	2.309%
1974	1.70691	2.714%	1975	0.854603	3.075%	0.898729	2.242%
1975	1.753332	2.648%	1976	0.881138	3.011%	0.918724	2.176%
1976	1.799862	2.585%	1977	0.908028	2.961%	0.938678	2.126%
1977	1.846706	2.537%	1978	0.93528	2.914%	0.958591	2.077%
1978	1.893871	2.490%	1979	0.962877	2.866%	0.978455	2.030%
1979	1.941332	2.445%	1980	0.99133	2.870%	0.997749	1.934%
1980	1.989079	2.400%	1981	1.023474	3.141%	1.013587	1.563%
1981	2.037061	2.355%	1982	1.056119	3.091%	1.029165	1.514%
1982	2.085284	2.313%	1983	1.089321	3.048%	1.044511	1.469%
1983	2.133832	2.275%	1984	1.123122	3.010%	1.059657	1.429%
1984	2.182779	2.242%	1985	1.157576	2.976%	1.074641	1.394%
1985	2.232217	2.215%	1986	1.192658	2.941%	1.089405	1.355%
1986	2.282063	2.184%	1987	1.228339	2.905%	1.103922	1.315%
1987	2.332261	2.152%	1988	1.264676	2.873%	1.118254	1.282%
1988	2.38293	2.126%	1989	1.301731	2.847%	1.132456	1.254%
1989	2.434187	2.106%	1990	1.340988	2.927%	1.145173	1.110%
Año	Poblacion Totales (Millones)	Tasa de Crecimiento Poblacional	1991	1.390583	3.566%	1.148075	0.253%
1990	2.486161	2.091%	1992	1.441287	3.518%	1.150304	0.194%
1991	2.538658	2.068%	1993	1.493292	3.483%	1.151962	0.144%
1992	2.591591	2.042%	1994	1.546766	3.457%	1.153151	0.103%
1993	2.645254	2.029%	1995	1.601926	3.443%	1.15394	0.068%
1994	2.699917	2.025%	1996	1.658912	3.435%	1.154405	0.040%
1995	2.755866	2.030%	1997	1.717665	3.421%	1.154418	0.001%
1996	2.813317	2.042%	1998	1.778004	3.394%	1.153837	-0.050%
1997	2.872083	2.046%	1999	1.83974	3.356%	1.152507	-0.115%
1998	2.931841	2.038%	2000	1.900542	3.199%	1.15244	-0.006%
1999	2.992247	2.019%	2001	1.947726	2.423%	1.166514	1.207%
2000	3.052982	1.989%	2002	1.995731	2.405%	1.180516	1.186%
2001	3.11424	1.967%	2003	2.044376	2.379%	1.19432	1.156%
2002	3.176247	1.952%	2004	2.093478	2.345%	1.207813	1.117%
2003	3.238696	1.928%	2005	2.142854	2.304%	1.220884	1.071%
2004	3.301291	1.896%	2006	2.192491	2.264%	1.23353	1.025%
2005	3.363738	1.856%	2007	2.242517	2.231%	1.245818	0.986%
2006	3.426021	1.818%	2008	2.292942	2.199%	1.257764	0.950%
2007	3.488335	1.786%	2009	2.343777	2.169%	1.269366	0.914%
2008	3.550706	1.757%	2010	2.395001	2.139%	1.280667	0.882%
2009	3.613143	1.728%	2011	2.446495	2.105%	1.291915	0.871%
2010	3.675668	1.701%	2012	2.498431	2.079%	1.30293	0.845%
2011	3.73841	1.678%	2013	2.550677	2.048%	1.313648	0.816%
2012	3.801361	1.656%	2014	2.603088	2.013%	1.324	0.782%
2013	3.864325	1.629%	2015	2.655531	1.975%	1.333928	0.744%
2014	3.927088	1.598%	2016	2.708097	1.941%	1.343484	0.711%
2015	3.989459	1.563%	2017	2.760869	1.911%	1.352724	0.683%
2016	4.051581	1.533%	2018	2.81369	1.877%	1.361577	0.650%
2017	4.113593	1.507%	2019	2.866399	1.839%	1.369984	0.614%
2018	4.175267	1.477%	2020	2.918856	1.797%	1.377876	0.573%
2019	4.236383	1.443%	2021	2.971028	1.756%	1.385274	0.534%
2020	4.296732	1.405%	2022	3.023017	1.720%	1.392229	0.500%
2021	4.356302	1.367%	2023	3.074806	1.684%	1.398751	0.466%
2022	4.415246	1.335%	2024	3.1264	1.650%	1.404844	0.434%
2023	4.473557	1.303%	2025	3.17779	1.617%	1.410519	0.402%
2024	4.531244	1.273%	2026	3.229016	1.586%	1.415819	0.374%
2025	4.588309	1.244%	2027	3.280076	1.557%	1.420744	0.347%



Fuente: CELADE – División de la Población CEPAL. Revisión 2017.

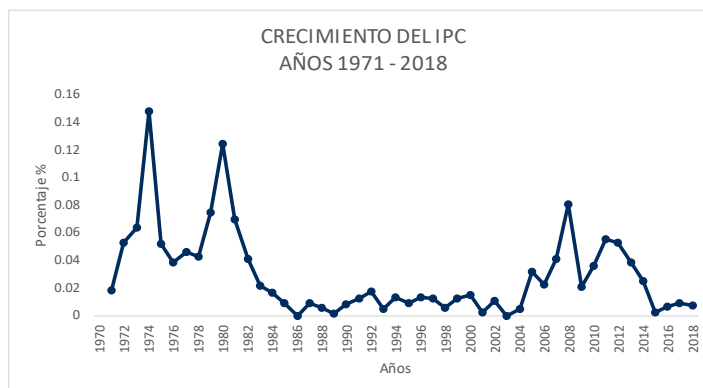
Cuadro No.2 - A: Estimación y proyecciones de la población a largo plazo.1950 -2100. Continuación.

2026	4.644835	1.217%	2028	3.330874	1.525%	1.425268	0.317%
2027	4.70082	1.191%	2029	3.381303	1.491%	1.429355	0.286%
2028	4.756142	1.163%	2030	3.431251	1.456%	1.432985	0.253%
2029	4.810658	1.133%	2031	3.480743	1.422%	1.436181	0.223%
2030	4.864236	1.101%	2032	3.529845	1.391%	1.438976	0.194%
2031	4.916924	1.072%	2033	3.578486	1.359%	1.441355	0.165%
2032	4.968821	1.044%	2034	3.6266	1.327%	1.443314	0.136%
2033	5.019841	1.016%	2035	3.674126	1.294%	1.44484	0.106%
2034	5.069914	0.988%	2036	3.721199	1.265%	1.446002	0.080%
2035	5.118966	0.958%	2037	3.767845	1.238%	1.446823	0.057%
2036	5.167201	0.933%	2038	3.813834	1.206%	1.447226	0.028%
2037	5.214668	0.910%	2039	3.858933	1.169%	1.447142	-0.006%
2038	5.26106	0.882%	2040	3.902919	1.127%	1.446485	-0.045%
2039	5.306075	0.848%	2041	3.945812	1.087%	1.445306	-0.082%
2040	5.349404	0.810%	2042	3.987766	1.052%	1.443664	-0.114%
2041	5.391118	0.774%	2043	4.028674	1.015%	1.441543	-0.147%
2042	5.43143	0.742%	2044	4.068438	0.977%	1.438945	-0.181%
2043	5.470217	0.709%	2045	4.106971	0.938%	1.435848	-0.216%
2044	5.507383	0.675%	2046	4.144164	0.897%	1.432239	-0.252%
2045	5.542819	0.639%	2047	4.180056	0.859%	1.42815	-0.286%
2046	5.576403	0.602%	2048	4.214773	0.824%	1.423633	-0.317%
2047	5.608206	0.567%	2049	4.248438	0.792%	1.418757	-0.344%
2048	5.638406	0.536%	2050	4.28118	0.765%	1.413569	-0.367%
2049	5.667195	0.508%	2051	4.312955	0.737%	1.408068	-0.391%
2050	5.694749	0.484%	2052	4.343652	0.707%	1.402239	-0.416%
2051	5.721023	0.459%	2053	4.373325	0.678%	1.396107	-0.439%
2052	5.745891	0.433%	2054	4.402015	0.652%	1.389693	-0.462%
2053	5.769432	0.408%	2055	4.429772	0.627%	1.383025	-0.482%
2054	5.791708	0.385%	2056	4.456521	0.600%	1.376099	-0.503%
2055	5.812797	0.363%	2057	4.482232	0.574%	1.368909	-0.525%
2056	5.83262	0.340%	2058	4.506971	0.549%	1.361484	-0.545%
2057	5.851141	0.317%	2059	4.530809	0.526%	1.353868	-0.563%
2058	5.868455	0.295%	2060	4.553821	0.505%	1.346088	-0.578%
2059	5.884677	0.276%	2061	4.575964	0.484%	1.338133	-0.594%
2060	5.899909	0.258%	2062	4.597183	0.462%	1.330002	-0.611%
2061	5.914097	0.240%	2063	4.617513	0.440%	1.321715	-0.627%
2062	5.927185	0.221%	2064	4.637039	0.421%	1.313296	-0.641%
2063	5.939228	0.203%	2065	4.655804	0.403%	1.304775	-0.653%
2064	5.950335	0.187%	2066	4.673801	0.385%	1.296149	-0.666%
2065	5.960579	0.172%	2067	4.690987	0.366%	1.287405	-0.679%
2066	5.96995	0.157%	2068	4.707358	0.348%	1.278569	-0.691%
2067	5.978392	0.141%	2069	4.722935	0.330%	1.26963	-0.704%
2068	5.985927	0.126%	2070	4.737724	0.312%	1.260617	-0.715%
2069	5.992565	0.111%	2071	4.751699	0.294%	1.251506	-0.728%
2070	5.998341	0.096%	2072	4.764823	0.275%	1.242311	-0.740%
2071	6.003205	0.081%	2073	4.777161	0.258%	1.233049	-0.751%
2072	6.007134	0.065%	2074	4.788754	0.242%	1.223725	-0.762%
2073	6.01021	0.051%	2075	4.799649	0.227%	1.214367	-0.771%
2074	6.012479	0.038%	2076	4.809789	0.211%	1.204967	-0.780%
2075	6.014016	0.026%	2077	4.819143	0.194%	1.195513	-0.791%
2076	6.014756	0.012%	2078	4.827781	0.179%	1.186024	-0.800%
2077	6.014656	-0.002%	2079	4.835769	0.165%	1.176532	-0.807%
2078	6.013805	-0.014%	2080	4.843178	0.153%	1.167045	-0.813%
2079	6.012301	-0.025%	2081	4.849981	0.140%	1.15757	-0.819%
2080	6.010223	-0.035%	2082	4.856135	0.127%	1.148078	-0.827%
2081	6.007551	-0.044%	2083	4.86167	0.114%	1.138595	-0.833%
2082	6.004213	-0.056%	2084	4.86661	0.102%	1.129135	-0.838%
2083	6.000265	-0.066%	2085	4.870992	0.090%	1.119691	-0.843%
2084	5.995745	-0.075%	2086	4.874785	0.078%	1.110273	-0.848%
2085	5.990683	-0.084%	2087	4.87797	0.065%	1.100862	-0.855%
2086	5.985058	-0.094%	2088	4.880581	0.053%	1.091483	-0.859%
2087	5.978832	-0.104%	2089	4.88267	0.043%	1.082138	-0.864%
2088	5.972064	-0.113%	2090	4.884277	0.033%	1.072843	-0.866%
2089	5.964808	-0.122%	2091	4.88535	0.022%	1.063582	-0.871%
2090	5.95712	-0.129%	2092	4.885875	0.011%	1.054353	-0.875%
2091	5.948932	-0.138%	2093	4.885895	0.000%	1.045176	-0.878%
2092	5.940228	-0.147%	2094	4.885501	-0.008%	1.036057	-0.880%
2093	5.931071	-0.154%	2095	4.884749	-0.015%	1.027016	-0.880%
2094	5.921558	-0.161%	2096	4.883593	-0.024%	1.018042	-0.881%
2095	5.911765	-0.166%	2097	4.881996	-0.033%	1.009123	-0.884%
2096	5.901635	-0.172%	2098	4.880022	-0.040%	1.000276	-0.884%
2097	5.891119	-0.179%	2099	4.877737	-0.047%	0.991517	-0.883%
2098	5.880298	-0.184%	2100	4.875221	-0.052%	0.98285	-0.882%
2099	5.869254	-0.188%					
2100	5.858071	-0.191%					

Fuente: CELADE – División de la Población CEPAL. Revisión 2017.

Cuadro No.3: Índice de Precios al Consumidor.

Años	Crecimiento del IPC	IPC 2013=100
1970		24.64
1971	1.86%	25.10
1972	5.29%	26.51
1973	6.39%	28.32
1974	14.76%	33.22
1975	5.17%	35.03
1976	3.85%	36.43
1977	4.59%	38.18
1978	4.25%	39.87
1979	7.45%	43.09
1980	12.46%	49.22
1981	6.95%	52.89
1982	4.13%	55.17
1983	2.17%	56.40
1984	1.63%	57.33
1985	0.91%	57.86
1986	0.00%	57.86
1987	0.90%	58.38
1988	0.60%	58.73
1989	0.10%	58.79
1990	0.79%	59.26
1991	1.26%	60.02
1992	1.72%	61.07
1993	0.48%	61.36
1994	1.31%	62.18
1995	0.93%	62.76
1996	1.29%	63.58
1997	1.27%	64.40
1998	0.54%	64.75
1999	1.25%	65.56
2000	1.49%	66.56
2001	0.26%	66.73
2002	1.04%	67.43
2003	0.00%	67.43
2004	0.50%	67.77
2005	3.18%	69.99
2006	2.26%	71.61
2007	4.07%	74.65
2008	8.06%	81.19
2009	2.11%	82.94
2010	3.61%	86.04
2011	5.55%	91.10
2012	5.26%	96.16
2013	3.84%	100.00
2014	2.53%	102.60
2015	0.19%	102.80
2016	0.68%	103.50
2017	0.89%	104.43
2018	0.76%	105.228675

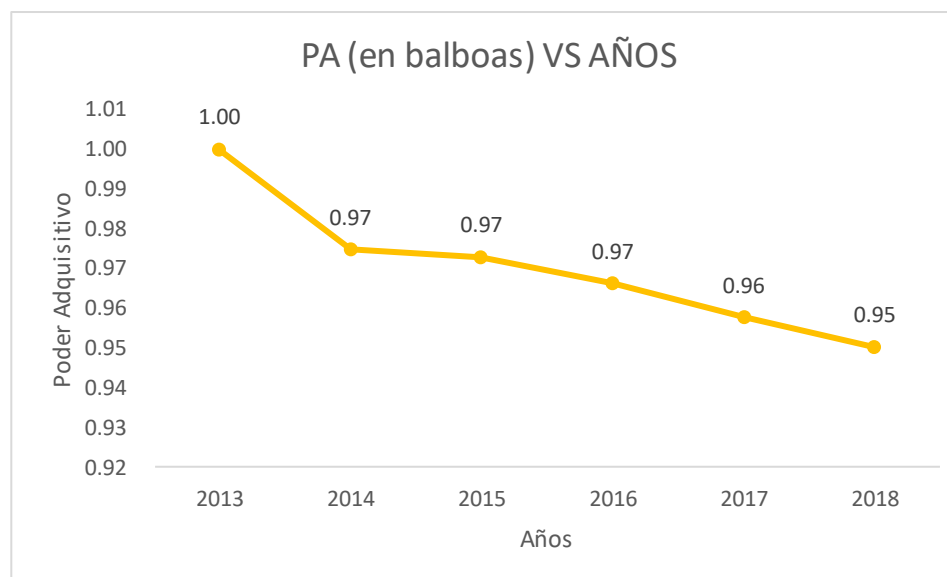


Fuente:

https://www.contraloria.gob.pa/inec/Avance/Avance.aspx?ID_CATEGORIA=2&ID_CIFRAS=10

Cuadro No.4: Poder Adquisitivo.

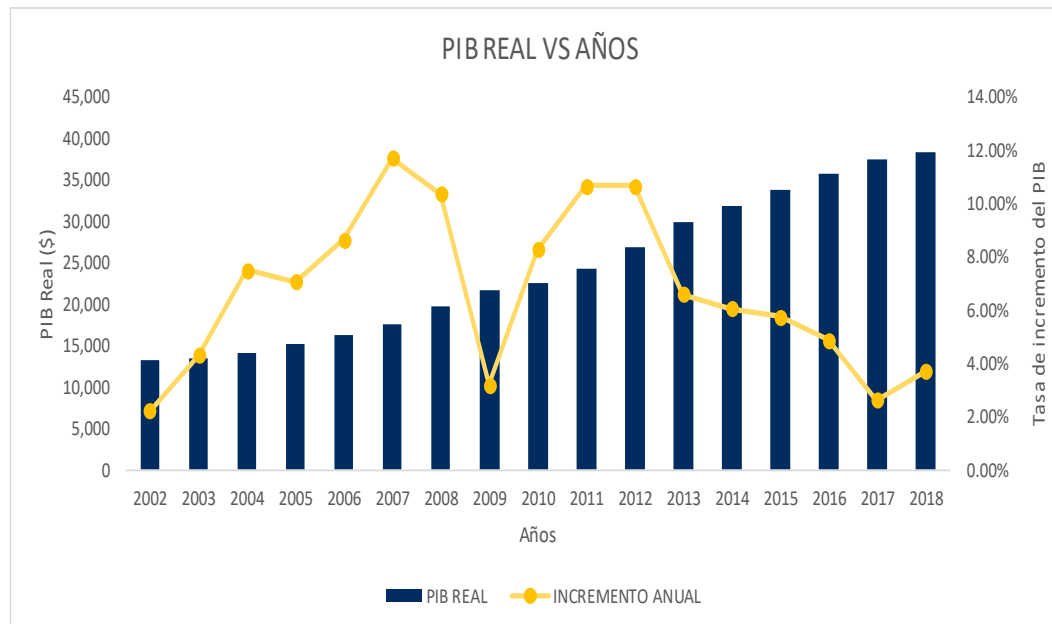
Años	PA (en balboas)
2013	1.00
2014	0.97
2015	0.97
2016	0.97
2017	0.96
2018	0.95



Fuente: https://www.contraloria.gob.pa/inec/Avance/Avance.aspx?ID_CATEGORIA=2&ID_CIFRAS=10

Cuadro No.5: Producto Interno Bruto 2001-2018.

AÑO	PIB REAL	INCREMENTO ANUAL
2001	13266.09	
2002	13561.92	2.23%
2003	14147.48	4.32%
2004	15210.95	7.52%
2005	16287.64	7.08%
2006	17696.85	8.65%
2007	19771.78	11.72%
2008	21822.64	10.37%
2009	22520.68	3.20%
2010	24389.27	8.30%
2011	26995.3	10.69%
2012	29876.28	10.67%
2013	31851.88	6.61%
2014	33779.92	6.05%
2015	35731.55	5.78%
2016	37471.72	4.87%
2017	38456.83	2.63%
2018	39887.62	3.72%

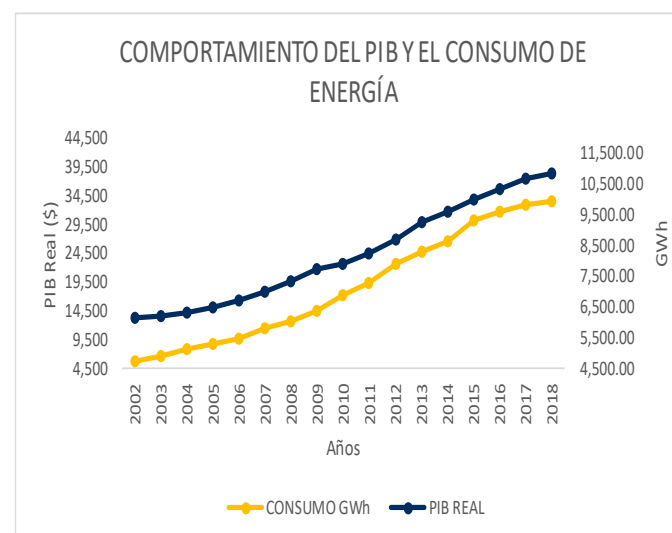


Fuente:

https://www.contraloria.gob.pa/inec/Publicaciones/Publicaciones.aspx?ID_SUBCATEGORIA=26&ID_PUBLICACION=923&ID_IDIOMA=1&ID_CATEGORIA=4

Cuadro No.6: Producto Interno Bruto y Consumo en GWh 2001-2018.

AÑO	PIB REAL	CONSUMO GWh	INCREMENTO ANUAL	INCREMENTO ANUAL PIB
2001	13266.09			
2002	13561.92	4757.313372		2.23%
2003	14147.48	4918.006873	3.38%	4.32%
2004	15210.95	5105.971954	3.82%	7.52%
2005	16287.64	5274.14329	3.29%	7.08%
2006	17696.85	5495.325114	4.19%	8.65%
2007	19771.78	5826.41679	6.02%	11.72%
2008	21822.64	6017.948701	3.29%	10.37%
2009	22520.68	6376.160163	5.95%	3.20%
2010	24389.27	6885.594484	7.99%	8.30%
2011	26995.3	7300.859511	6.03%	10.69%
2012	29876.28	7926.02306	8.56%	10.67%
2013	31851.88	8280.919119	4.48%	6.61%
2014	33779.92	8651.202054	4.47%	6.05%
2015	35731.55	9336.859604	7.93%	5.78%
2016	37471.72	9611.190328	2.94%	4.87%
2017	38456.83	9848.73009	2.47%	2.63%
2018	39887.62	9954.956821	1.08%	3.72%



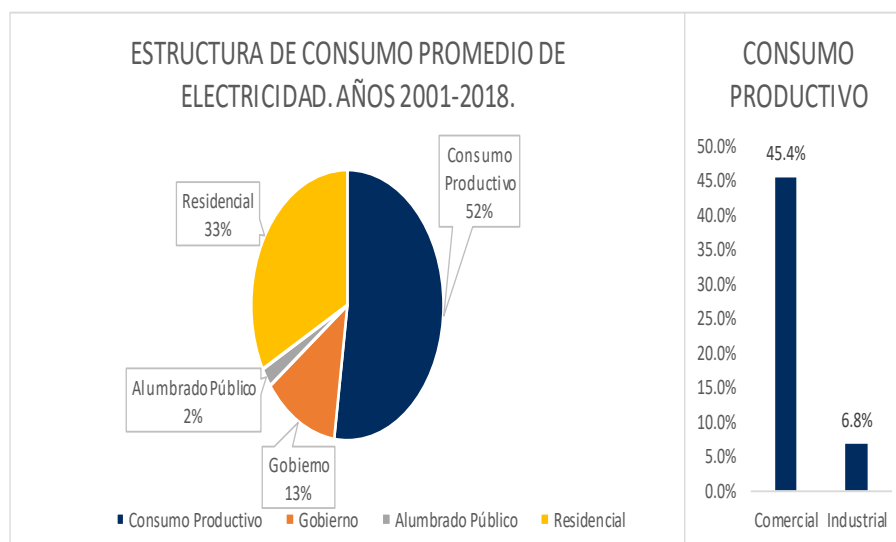
Fuente:

https://www.contraloria.gob.pa/inec/Publicaciones/Publicaciones.aspx?ID_SUBCATEGORIA=26&ID_PUBLICACION=923&ID_IDIOMA=1&ID_CATEGORIA=4

Cuadro No.7: Consumo por sector residencial, comercial, industrial y alumbrado.

	CRES	CCOM	CIND	CGOB	CALP
ENSA	72739.9711	83012.9221	18535.901	25888.4593	3958.38667
EDEMET	76763.1881	128261.17	12297.8201	33360.0786	5670.76733
EDECHI	16333.5259	17882.288	3721.35945	4714.13378	1994.02021
	165836.685	229156.38	34555.0806	63962.6717	11623.1742
%=	32.8%	45.4%	6.8%	12.7%	2.3%

Comercial	Industrial	Consumo Productivo	Gobierno	Alumbrado Público	Residencial
45.4%	6.8%	52.2%	12.7%	2.3%	32.8%

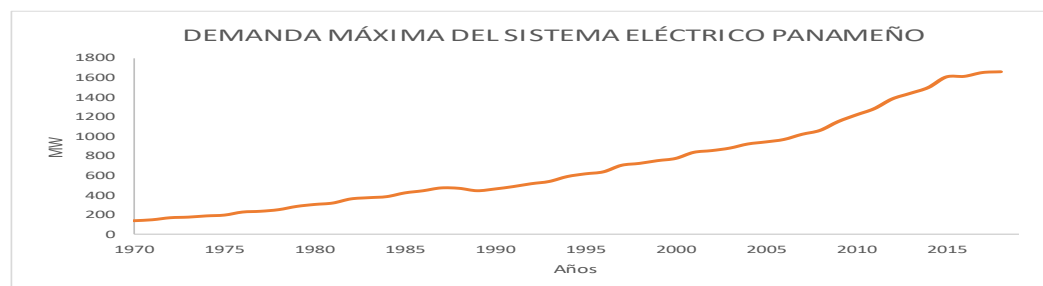


Fuente: https://www.asep.gob.pa/?page_id=12922

Cuadro No.8: Demanda Máxima del Sistema Eléctrico Panameño.

Años	DMG
1970	138.9
1971	148.6
1972	169.6
1973	175.7
1974	188.3
1975	196.6
1976	227.6
1977	235.7
1978	252.1
1979	285.4
1980	305.5
1981	319.9
1982	362.2
1983	375
1984	385.8
1985	424
1986	445.9
1987	474.8
1988	470.9
1989	446.2
1990	464.4
1991	488.5
1992	518
1993	541.2
1994	591.5
1995	619.2
1996	639.9
1997	706.6
1998	726.4
1999	754.5
2000	777
2001	839.3
2002	857.35
2003	882.86
2004	924.96
2005	946.28
2006	971.34
2007	1024
2008	1064.25
2009	1153.99
2010	1222.4
2011	1286.46
2012	1386.27
2013	1443.94
2014	1503.46
2015	1612
2016	1618
2017	1657
2018	1665

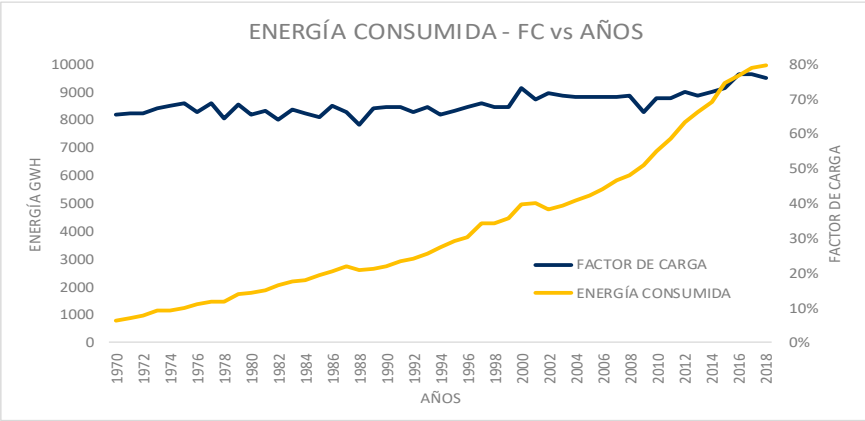
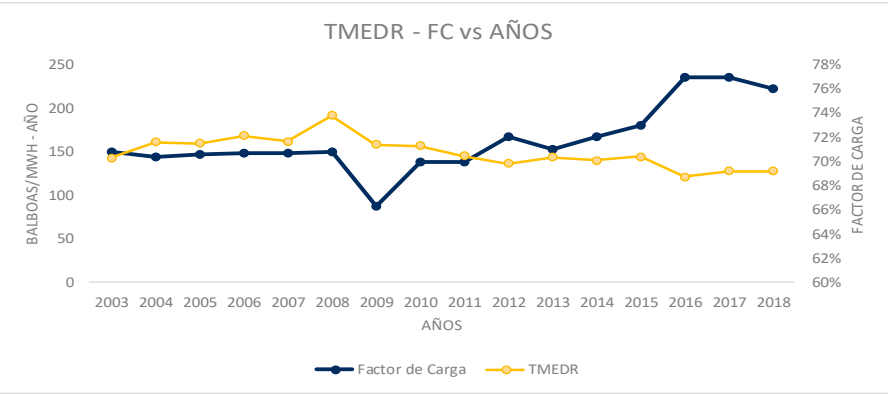
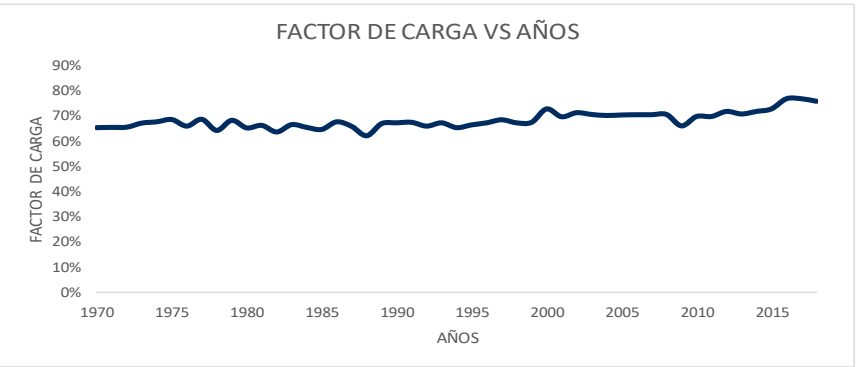
Demanda Máxima del Sistema Eléctrico Panameño				
Periodos	Max (MW)	Total (MW)	Incremento	
			Promedio (MW)	Anual (%)
1970 - 1979	285.4	147	16	8.33%
1980 - 1989	474.8	141	16	4.30%
1990 - 1999	754.5	290	32	5.54%
2000 - 2009	1153.99	377	42	4.49%
2010 - 2018	1665	443	49	3.94%



Fuente: http://www.cnd.com.pa/informes.php?tipo_informe=43&cat=5

Cuadro No.9: Factor de Carga, Energía Consumida y Tarifa Media de Distribuidoras Real.

Año	TMEDR	Año	Factor de Carga		Año	Energía consumida en GWh
2003	143.092828	1970	66%		1970	801.7
2004	161.100709	1971	66%	0%	1971	859.4
2005	159.750597	1972	66%	0%	1972	980.4
2006	168.539419	1973	67%	2%	1973	1139.9
2007	161.602082	1974	68%	1%	1974	1148
2008	191.232846	1975	69%	1%	1975	1214.3
2009	157.989866	1976	66%	-4%	1976	1348.7
2010	156.947304	1977	69%	4%	1977	1450.3
2011	144.867581	1978	65%	-7%	1978	1469.1
2012	136.795025	1979	69%	6%	1979	1724
2013	143.622778	1980	66%	-5%	1980	1756.5
2014	140.059801	1981	67%	2%	1981	1863.5
2015	144.36575	1982	64%	-4%	1982	2030.5
2016	121.62317	1983	67%	4%	1983	2193.5
2017	127.50341	1984	66%	-2%	1984	2225.9
2018	127.541515	1985	65%	-1%	1985	2412.9
		1986	68%	4%	1986	2565.7
		1987	66%	-3%	1987	2748.3
		1988	62%	-6%	1988	2579.9
		1989	67%	7%	1989	2624.7
		1990	68%	0%	1990	2746.1
		1991	68%	0%	1991	2896.6
		1992	66%	-2%	1992	3011.6
		1993	68%	2%	1993	3199.1
		1994	66%	-3%	1994	3400
		1995	67%	2%	1995	3619.4
		1996	68%	1%	1996	3795.8
		1997	69%	2%	1997	4254.4
		1998	68%	-2%	1998	4295.8
		1999	68%	0%	1999	4474.5
		2000	73%	7%	2000	4967.5
		2001	70%	-4%	2001	4999.9
		2002	72%	2%	2002	4757.313372
		2003	71%	-1%	2003	4918.006873
		2004	70%	-1%	2004	5105.971954
		2005	71%	0%	2005	5274.14329
		2006	71%	0%	2006	5495.325114
		2007	71%	0%	2007	5826.41679
		2008	71%	0%	2008	6017.948701
		2009	66%	-7%	2009	6376.160163
		2010	70%	5%	2010	6885.594484
		2011	70%	0%	2011	7300.859511
		2012	72%	3%	2012	7926.02306
		2013	71%	-1%	2013	8280.919119
		2014	72%	1%	2014	8651.202054
		2015	73%	1%	2015	9336.859604
		2016	77%	5%	2016	9611.190328
		2017	77%	0%	2017	9848.73009
		2018	76%	-1%	2018	9954.956821

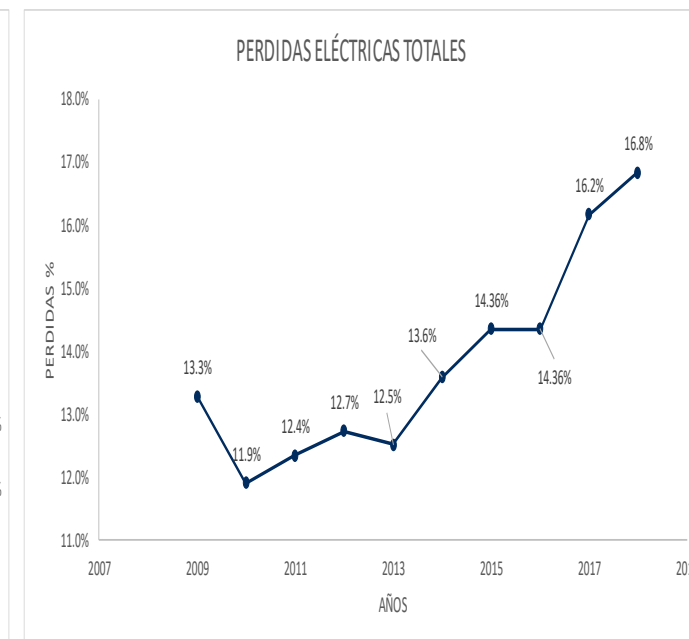
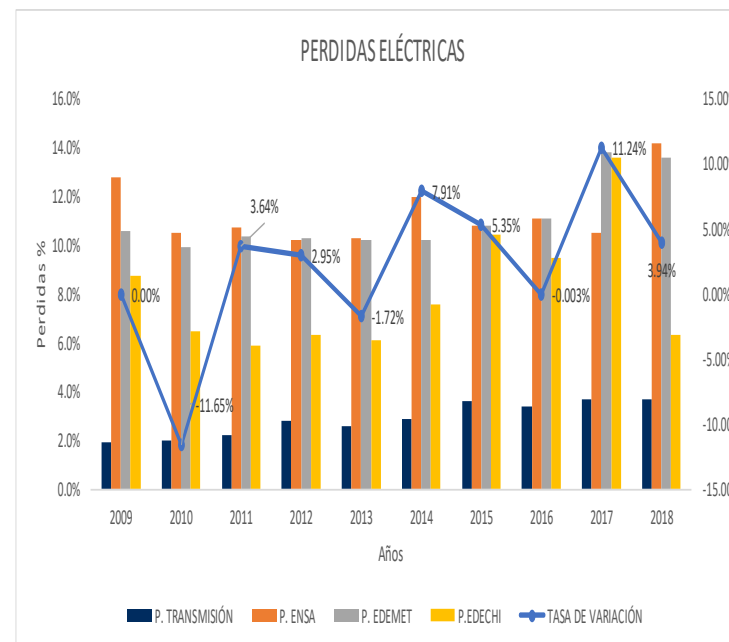


Fuente: http://www.cnd.com.pa/informes.php?tipo_informe=43&cat=5

Cuadro No.10: Perdidas por distribuidora.

Perdidas de distribución por distribuidora.

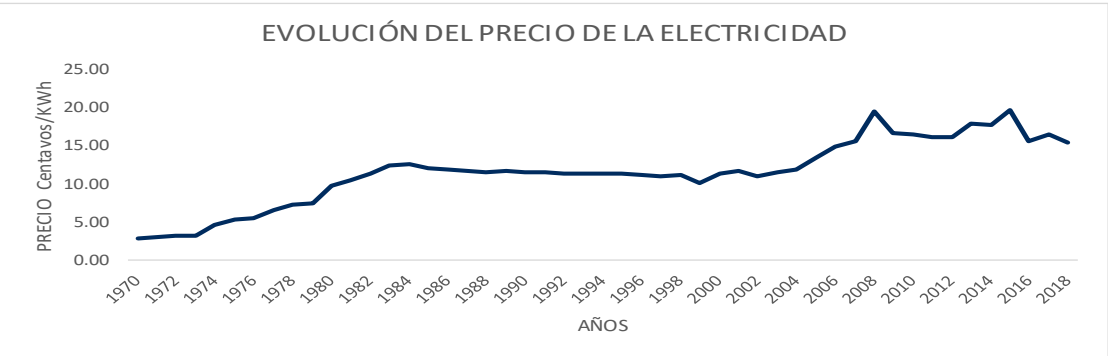
Años	P. TRANSMISIÓN	P. ENSA	P. EDEMET	P. EDECHI	P. DISTRIBUCIÓN	TOTAL	TASA DE VARIACIÓN
2009	1.9%	12.8%	10.6%	8.7%	11.4%	13.3%	0.00%
2010	2.0%	10.6%	9.9%	6.5%	9.9%	11.9%	-11.65%
2011	2.2%	10.7%	10.4%	5.9%	10.2%	12.4%	3.64%
2012	2.8%	10.3%	10.3%	6.4%	9.9%	12.7%	2.95%
2013	2.6%	10.3%	10.3%	6.2%	9.9%	12.5%	-1.72%
2014	2.9%	12.0%	10.2%	7.6%	10.7%	13.6%	7.91%
2015	3.6%	10.8%	10.8%	10.4%	10.8%	14.36%	5.35%
2016	3.4%	11.1%	11.1%	9.5%	11.0%	14.36%	-0.003%
2017	3.7%	10.6%	13.8%	13.6%	12.5%	16.2%	11.24%
2018	3.7%	14.2%	13.6%	6.4%	13.2%	16.8%	3.94%



Fuente: ASEP, Informes Semestrales.

Cuadro No.11: Demanda Máxima del Sistema Eléctrico Panameño.

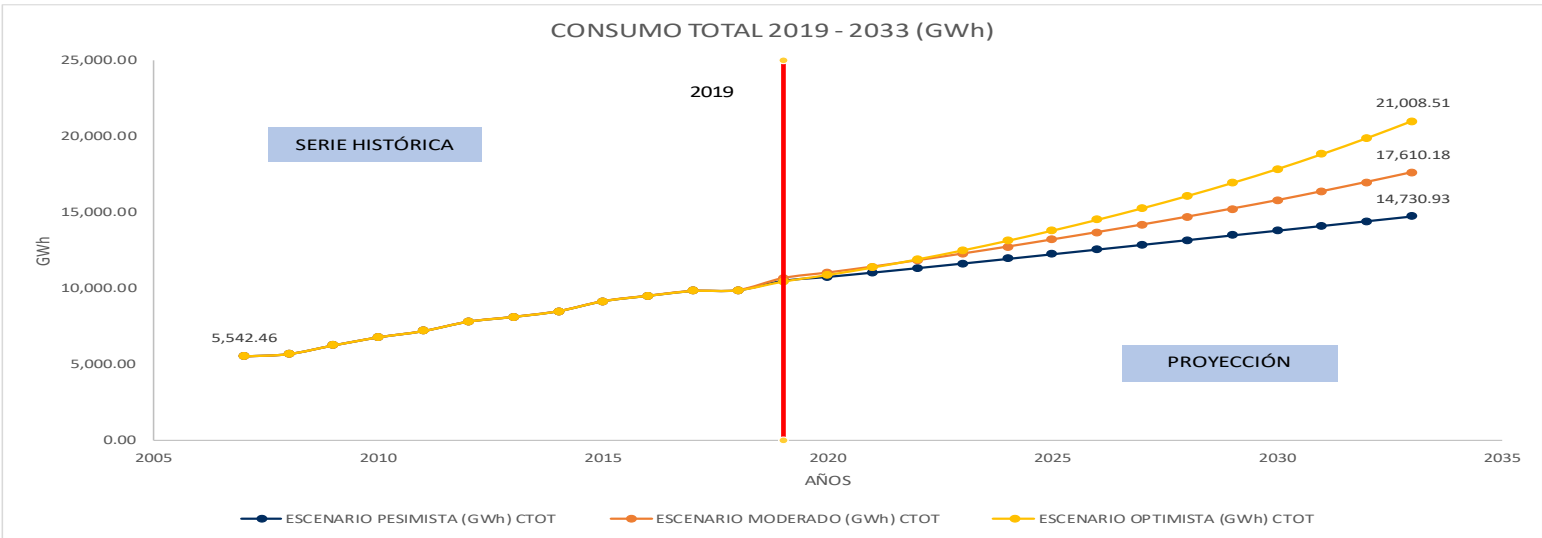
AÑO	FACTOT	GWHTOT	Precio de la energía eléctrica	
	Facturación Millones B/.	Ventas Totales GWh		Centavos/KWh
1970	20.8	710.3	▲	2.93
1971	24.4	775.4	▲	3.15
1972	28.4	869.8	▲	3.27
1973	31.6	984.0	▲	3.21
1974	45.6	980.7	▲	4.65
1975	56.4	1,041.0	▲	5.42
1976	63	1,143.1	▲	5.51
1977	83.7	1,260.1	▲	6.64
1978	92.5	1,268.2	▲	7.29
1979	111.1	1,480.9	▲	7.50
1980	143.4	1,472.3	▲	9.74
1981	164.3	1,554.3	▲	10.57
1982	191.7	1,674.8	▲	11.45
1983	230.3	1,850.6	▲	12.44
1984	228.4	1,816.5	▲	12.57
1985	235.1	1,944.1	▲	12.09
1986	242	2,045.1	▲	11.83
1987	255.2	2,191.1	▲	11.65
1988	238.3	2,063.1	▲	11.55
1989	231.8	1,983.6	▲	11.69
1990	238.8	2,053.0	▲	11.63
1991	254	2,185.9	▲	11.62
1992	263.8	2,311.4	▲	11.41
1993	281.7	2,486.2	▲	11.33
1994	304.2	2,671.9	▲	11.39
1995	324.3	2,869.6	▲	11.30
1996	333.9	2,984.0	▲	11.19
1997	362.9	3,302.1	▲	10.99
1998	377.3	3,392.3	▲	11.12
1999	362.8	3,578.0	▲	10.14
2000	429.4	3,801.1	▲	11.30
2001	459.9	3,933.9	▲	11.69
2002	450.2	4,113.0	▲	10.95
2003	499.2	4,306.8	▲	11.59
2004	544.3	4,594.6	▲	11.85
2005	643.28098	4,781.1	▲	13.45
2006	735.902737	4,933.5	▲	14.92
2007	826.547345	5,297.9	▲	15.60
2008	1061.132	5,462.1	▲	19.43
2009	955.46	5,737.9	▲	16.65
2010	1027.3649	6,232.7	▲	16.48
2011	1066.6	6,599.6	▲	16.16
2012	1162.395	7,170.1	▲	16.21
2013	1338.825363	7,501.7	▲	17.85
2014	1391.348562	7,822.5	▲	17.79
2015	1641.654558	8,368.7	▲	19.62
2016	1349.090993	8,588.5	▲	15.71
2017	1465.948298	8,894.7	▲	16.48
2018	1494.216639	9625.77	▲	15.52



Fuente: PESIN 2018 y ASEP, Informes Semestrales.

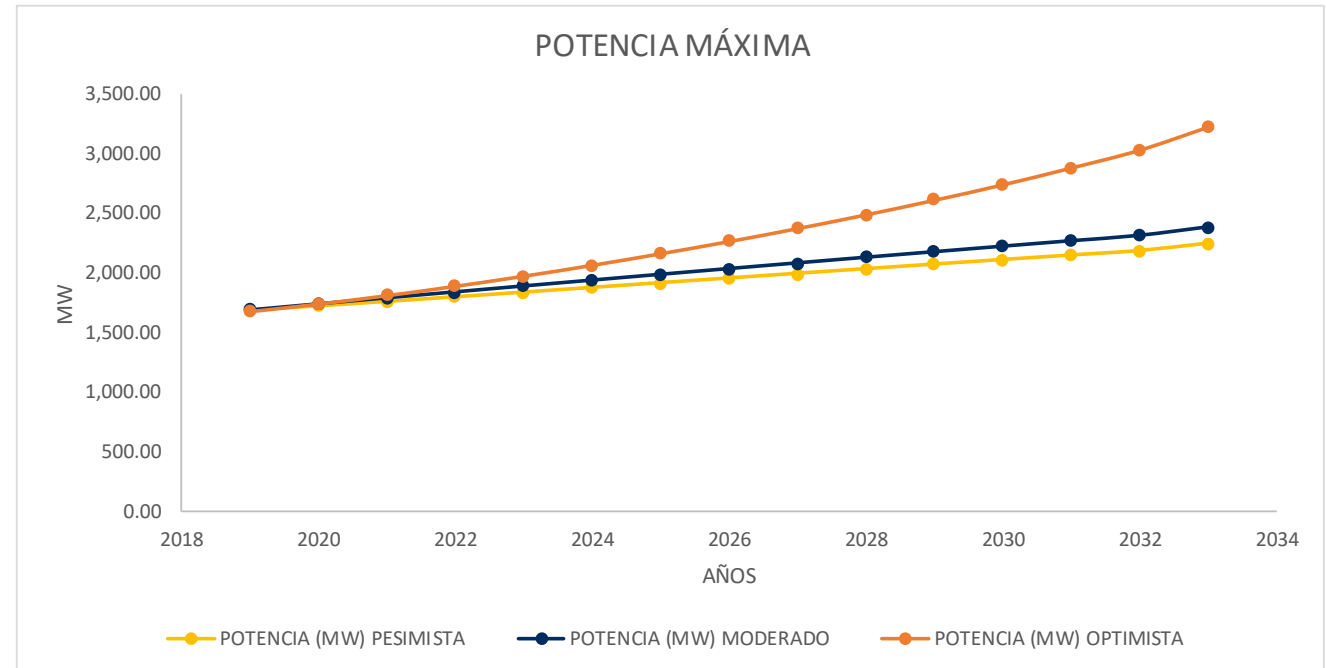
Cuadro No.12: Resultado de proyecciones por escenario del ME – SiProDe (energía).

PROYECCIÓN TOTAL DE LA DEMANDA ELÉCTRICA 2019 - 2033	AÑO	ESCENARIO PESIMISTA (GWh)					ESCENARIO MODERADO (GWh)					ESCENARIO OPTIMISTA (GWh)				
		EDECHI	EDEMET	ENSA	GU	CTOT	EDECHI	EDEMET	ENSA	GU	CTOT	EDECHI	EDEMET	ENSA	GU	CTOT
	2007	460.56	2,902.78	2,179.12		5,542.46	460.56	2,902.78	2,179.12		5,542.46	460.56	2,902.78	2,179.12		5,542.46
2008	474.40	2,967.83	2,249.72			5,691.95	474.40	2,967.83	2,249.72		5,691.95	474.40	2,967.83	2,249.72		5,691.95
2009	500.33	3,148.07	2,614.04			6,262.44	500.33	3,148.07	2,614.04		6,262.44	500.33	3,148.07	2,614.04		6,262.44
2010	548.70	3,328.06	2,695.49	219.15		6,791.40	548.70	3,328.06	2,695.49	219.15	6,791.40	548.70	3,328.06	2,695.49	219.15	6,791.40
2011	591.40	3,526.34	2,814.23	270.71		7,202.68	591.40	3,526.34	2,814.23	270.71	7,202.68	591.40	3,526.34	2,814.23	270.71	7,202.68
2012	648.03	3,833.24	3,034.67	301.75		7,817.69	648.03	3,833.24	3,034.67	301.75	7,817.69	648.03	3,833.24	3,034.67	301.75	7,817.69
2013	668.30	3,982.24	3,158.85	324.68		8,134.07	668.30	3,982.24	3,158.85	324.68	8,134.07	668.30	3,982.24	3,158.85	324.68	8,134.07
2014	702.76	4,168.73	3,289.97	343.15		8,504.62	702.76	4,168.73	3,289.97	343.15	8,504.62	702.76	4,168.73	3,289.97	343.15	8,504.62
2015	825.89	4,508.41	3,572.25	256.68		9,163.23	825.89	4,508.41	3,572.25	256.68	9,163.23	825.89	4,508.41	3,572.25	256.68	9,163.23
2016	889.10	4,633.19	3,720.86	275.89		9,519.04	889.10	4,633.19	3,720.86	275.89	9,519.04	889.10	4,633.19	3,720.86	275.89	9,519.04
2017	944.21	4,678.21	3,776.39	437.70		9,836.50	944.21	4,678.21	3,776.39	437.70	9,836.50	944.21	4,678.21	3,776.39	437.70	9,836.50
2018	882.31	4,599.44	3,657.18	745.50		9,884.43	882.31	4,599.44	3,657.18	745.50	9,884.43	882.31	4,599.44	3,657.18	745.50	9,884.43
2019	885.97	5,050.42	3,596.70	1,014.48		10,499.97	1,002.15	5,036.10	3,620.60	1,010.49	10,669.35	988.02	4,799.62	3,655.11	1,014.48	10,451.97
2020	924.95	5,168.17	3,663.04	1,087.68		10,763.22	1,041.99	5,181.72	3,737.10	1,075.96	11,036.78	1,045.63	4,987.48	3,784.46	1,087.68	10,890.94
2021	965.86	5,299.15	3,738.82	1,143.26		11,045.60	1,088.79	5,346.30	3,869.05	1,123.40	11,427.54	1,115.84	5,212.13	3,935.62	1,143.26	11,379.58
2022	1,008.62	5,438.93	3,820.57	1,193.98		11,338.89	1,140.83	5,525.01	4,012.40	1,165.50	11,843.73	1,197.38	5,466.55	4,103.78	1,193.98	11,919.25
2023	1,053.17	5,584.58	3,906.02	1,241.01		11,638.88	1,197.08	5,715.01	4,165.06	1,203.33	12,280.48	1,289.80	5,747.37	4,286.45	1,241.01	12,504.99
2024	1,099.46	5,734.09	3,993.70	1,285.40		11,943.01	1,256.93	5,914.49	4,326.03	1,237.85	12,735.29	1,393.19	6,052.88	4,482.36	1,285.40	13,134.75
2025	1,147.46	5,886.08	4,082.56	1,328.00		12,249.59	1,320.02	6,122.29	4,494.81	1,269.82	13,206.92	1,507.93	6,382.28	4,690.88	1,328.00	13,808.21
2026	1,197.15	6,039.61	4,172.05	1,361.83		12,557.75	1,386.15	6,337.70	4,671.23	1,292.13	13,687.21	1,634.70	6,735.46	4,911.82	1,361.83	14,518.50
2027	1,248.50	6,194.03	4,261.64	1,395.27		12,866.79	1,455.22	6,560.33	4,855.35	1,313.06	14,183.96	1,774.38	7,112.75	5,145.25	1,395.27	15,275.00
2028	1,301.52	6,348.90	4,351.15	1,428.85		13,176.48	1,527.21	6,790.00	5,047.33	1,332.99	14,697.53	1,928.06	7,514.83	5,391.40	1,428.85	16,079.96
2029	1,356.21	6,503.90	4,440.32	1,463.03		13,486.60	1,602.16	7,026.68	5,247.42	1,352.26	15,228.52	2,096.98	7,942.66	5,650.65	1,463.03	16,936.12
2030	1,412.58	6,658.83	4,529.07	1,498.25		13,797.08	1,680.12	7,270.46	5,455.96	1,371.12	15,777.66	2,282.59	8,397.41	5,923.46	1,498.25	17,846.61
2031	1,470.65	6,813.55	4,617.35	1,557.29		14,107.96	1,761.18	7,521.52	5,673.32	1,412.18	16,368.20	2,486.50	8,880.47	6,210.38	1,557.29	18,837.41
2032	1,530.44	6,967.97	4,705.08	1,618.11		14,419.23	1,845.47	7,780.09	5,899.95	1,453.20	16,978.70	2,710.52	9,393.34	6,512.03	1,618.11	19,889.95
2033	1,591.98	7,122.04	4,792.23	1,681.06		14,730.93	1,933.11	8,046.46	6,136.31	1,494.31	17,610.18	2,956.65	9,937.73	6,829.09	1,681.06	21,008.51



Cuadro No.13: Resultado de proyecciones por escenario del ME – SiProDe (potencia).

POTENCIA (MW)			
AÑO	PESIMISTA	MODERADO	OPTIMISTA
2019	1,684.91	1,687.49	1,677.64
2020	1,719.28	1,738.35	1,741.00
2021	1,756.35	1,788.70	1,811.78
2022	1,794.76	1,838.57	1,890.09
2023	1,833.85	1,887.94	1,975.05
2024	1,873.20	1,936.82	2,066.27
2025	1,912.53	1,985.22	2,163.61
2026	1,951.70	2,033.14	2,265.94
2027	1,990.62	2,080.58	2,374.65
2028	2,029.24	2,127.54	2,490.01
2029	2,067.53	2,174.04	2,612.38
2030	2,105.49	2,220.06	2,742.15
2031	2,143.12	2,265.62	2,883.19
2032	2,180.42	2,310.72	3,032.56
2033	2,241.54	2,380.99	3,225.55



Cuadro No.14: Demanda máxima de generación, por participante y por barra, 2019-2033(MW).

REPARTICIÓN DE CARGA EN EL SISTEMA INTERCONECTADO NACIONAL 2019-2033 (MW)																
PRONÓSTICO MODERADO		2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
CARGA DEL SISTEMA (MW)		1687.49	1738.35	1788.70	1838.57	1887.94	1936.82	1985.22	2033.14	2080.58	2127.54	2174.04	2220.06	2265.62	2310.72	2380.99
CARGA DEL SISTEMA + MINERA + ACP (MW)		1951.49	2002.35	2052.70	2102.57	2151.94	2200.82	2249.22	2297.14	2344.58	2391.54	2438.04	2484.06	2529.62	2574.72	2644.99
ENSA	COD.	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Tocumen	TOC	77.58	83.87	86.72	88.95	90.96	87.57	89.31	90.68	91.74	92.93	94.02	97.95	98.92	99.87	100.83
Cerro Viento	CVI	83.43	88.77	91.36	94.00	96.50	87.61	92.82	93.26	93.08	95.02	97.47	98.55	95.85	96.22	97.41
Llano Bonito	LBO13	20.05	22.57	24.66	27.01	29.61	32.50	36.51	40.30	46.10	48.79	50.74	52.96	55.93	59.71	62.27
Santa María	SMA	90.63	94.76	97.70	100.93	104.24	106.47	108.62	110.73	113.08	116.92	119.25	121.45	123.69	125.63	128.26
Monte Oscuro	MOS	49.30	46.57	44.41	44.06	44.19	44.51	44.65	45.12	45.95	47.03	48.12	49.21	50.29	51.38	52.47
Tinajitas	TIN	63.88	66.28	68.78	71.40	73.82	58.99	59.64	60.25	60.82	61.35	61.83	62.27	62.65	62.98	63.24
Geehan	PAC	20.29	21.34	22.11	23.08	24.32	24.99	25.75	26.58	27.62	28.99	29.61	30.29	30.64	29.96	30.25
Chilibre (incluye el IDAAN)	CHI115	38.90	39.58	33.56	34.06	34.56	35.05	35.55	36.05	36.54	37.04	37.54	38.03	38.53	39.03	39.52
Calzada Larga	CLA13.8	10.32	10.90	11.36	11.81	12.26	12.72	13.17	13.63	14.08	14.53	14.99	15.44	15.90	16.35	16.81
France Field	FF13.8	60.60	73.24	76.52	77.45	67.10	67.73	68.11	68.58	69.00	69.42	69.86	70.14	70.61	71.07	71.46
Bahía Las Minas	L.M.13B	24.75	25.62	28.40	29.16	29.92	30.68	31.45	32.21	32.97	33.73	34.49	35.25	36.01	36.77	37.53
Bahía Las Minas 44 kV (anillo 44 kV: carga SE COL+ SE MH)	MHOPE	32.71	33.50	34.28	30.17	26.63	27.30	27.96	28.65	29.33	30.00	30.69	31.31	32.00	32.70	33.37
24 de Diciembre	24DIC13	41.28	44.87	49.64	52.30	54.92	57.73	60.39	61.74	62.80	63.83	64.98	66.04	67.15	68.09	69.02
Nueva S/E Costa del Este	CDE13A	40.78	45.73	49.99	52.00	53.40	54.57	55.96	56.96	57.50	57.71	57.93	58.15	58.37	58.59	58.80
Nueva S/E Santa Rita	STR13.8			5.38	5.43	5.47	5.51	5.56	5.60	5.65	5.69	5.74	5.78	5.83	5.87	5.91
Nueva S/E Argos	ARG			6.38	6.56	6.74	6.92	7.11	7.29	7.47	7.65	7.83	8.01	8.19	8.37	8.55
Nueva S/E Cativá	CAT513					13.68	14.05	14.44	14.72	15.06	15.41	15.73	16.23	16.52	16.80	17.14
Nueva S/E Gonzalillo	GON13						26.77	28.95	31.36	34.45	38.77	40.19	41.90	34.10	35.68	37.87
Nueva S/E Brisas del Golf	BGO													16.84	17.16	17.45
TOTAL ENSA		654.49	697.62	731.25	748.37	768.32	781.70	805.96	823.71	843.23	864.82	880.99	898.97	918.01	932.22	948.17
EDOMET		2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Llano Sánchez 115 KV	LSA115	149.12	152.34	155.53	139.04	128.25	130.50	132.81	135.11	137.31	139.72	142.19	144.79	147.44	150.25	152.93
Llano Sánchez 34.5 KV	LSA34	1.46	1.49	1.52	1.54	1.56	1.59	1.62	1.64	1.67	1.70	1.73	1.76	1.79	1.83	1.86
El Higo	EHIG34	49.75	50.83	51.89	52.56	46.67	47.48	48.33	49.16	49.96	50.84	51.74	52.68	53.65	54.67	55.64
Chorrera	CHO34	77.34	79.03	80.89	81.92	82.88	84.38	85.88	87.38	88.79	90.32	91.93	93.60	95.30	97.12	98.85
San Francisco	SFR	119.04	121.24	119.78	118.31	119.75	121.74	123.75	125.74	127.64	129.69	131.84	134.06	136.33	138.71	141.00
Locería	LOC	106.53	108.50	100.77	99.46	100.42	101.87	103.31	104.72	106.03	107.45	108.94	110.48	112.04	113.67	115.20
Marañón	MAR	91.89	93.60	85.56	84.42	85.18	86.36	87.53	88.66	89.71	90.85	92.05	93.28	94.52	95.82	97.03
Centro Bancario	CBA	78.44	79.89	77.56	76.59	77.47	78.71	79.96	81.19	82.36	83.62	84.95	86.32	87.71	89.17	90.58
Nueva S/E Burunga	BUR34	42.71	43.60	44.16	56.58	57.33	58.36	59.39	60.42	61.41	62.47	63.59	64.75	65.94	67.18	68.39
Nueva S/E El Torno	TOR	24.25	24.76	25.07	25.41	25.86	26.32	26.77	27.21	27.69	28.18	28.69	29.22	29.77	30.31	30.88
Nueva S/E Bella Vista	BVI13			28.00	28.00	29.40	30.87	32.41	34.03	35.74	37.52	39.40	41.37	43.44	45.61	47.89
Nueva S/E La Floresta	LAF13				10.20	10.33	10.52	10.70	10.89	11.07	11.26	11.46	11.67	11.88	12.11	12.32
Nueva S/E Santiago 2	STG234				18.49	18.74	19.07	19.41	19.74	20.07	20.42	20.78	21.16	21.55	21.96	22.35
El Coco (Penonomé)	PEN2					19.21	19.63	19.97	20.30	20.67	21.00	21.41	21.79	22.19	22.56	23.02
TOTAL EDEMET		740.51	755.26	770.74	792.52	803.07	817.40	831.86	846.21	860.12	875.04	890.69	906.91	923.54	940.98	957.95

Cuadro No.14 - A: Demanda máxima de generación, por participante y por barra, 2019-2033(MW). Continuación.

EDEMET (SERVICIO B)		2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Miraflores	MIR44	18.65	18.99	19.39	7.22	7.32	7.45	7.58	7.71	7.84	7.98	8.12	8.27	8.42	8.58	8.73
Balboa	BAL44	21.46	21.86	22.32	22.60	22.91	23.31	23.73	24.13	24.53	24.96	25.40	25.87	26.34	26.84	27.32
Summit	SUM44	1.10	1.12	1.14	1.16	1.17	1.19	1.22	1.24	1.26	1.28	1.30	1.33	1.35	1.38	1.40
Gamboa	GAM2	1.13	1.15	1.18	1.19	1.21	1.23	1.25	1.27	1.29	1.32	1.34	1.36	1.39	1.41	1.44
Howard	HOW12	14.86	15.14	15.45	3.23	3.28	3.33	3.39	3.45	3.51	3.57	3.63	3.70	3.77	3.84	3.91
Nueva S/E Howard 115 KV	HOW115				12.42	12.59	12.81	13.04	13.26	13.48	13.71	13.96	14.21	14.47	14.75	15.01
Áreas Revertidas		58.46	59.57	61.17	50.10	50.77	51.68	52.59	53.50	54.38	55.32	56.31	57.33	58.39	59.49	60.56
TOTAL SERVICIO B		57.20	58.26	59.48	47.83	48.47	49.33	50.20	51.07	51.91	52.81	53.75	54.73	55.74	56.79	57.81
EDECHI		2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Caldera 115 KV	CAL115	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07
Progreso 34.5 KV	PRO34	7.72	7.84	8.01	8.13	8.27	8.44	8.61	8.77	8.95	9.13	9.32	9.51	9.71	9.93	10.14
Progreso 115 KV	PRO115	1.32	1.34	1.37	1.39	1.42	1.45	1.47	1.50	1.53	1.56	1.60	1.63	1.66	1.70	1.74
Mata de Nance 34.5 KV	MDN34	70.06	71.21	69.10	70.13	71.33	72.87	74.24	75.69	77.18	78.77	80.39	82.08	83.83	85.68	87.53
San Cristobal	SAC34	20.22	20.55	20.98	21.31	21.67	22.13	22.55	22.99	23.44	23.92	24.41	24.92	25.45	26.01	26.57
Cañazas (PTP)	CAN34	17.57	17.86	18.24	18.53	18.79	19.24	19.61	19.99	20.39	20.81	21.25	21.70	22.17	22.66	23.16
Isla Colon - Changuinola	CHA34	13.92	14.15	14.45	14.68	14.93	18.80	19.16	19.53	19.91	20.32	20.74	21.18	21.62	22.10	22.58
Boquerón III	BOQ34	9.74	9.90	10.06	10.27	10.43	10.61	10.83								
Boquerón IV	BOQ4								11.04	11.25	11.47	11.71	11.95	12.20	12.46	12.73
Veladero	VEL34			3.65	3.71	3.77	3.85	3.92	4.00	4.08	4.16	4.25	4.33	4.43	4.52	4.62
TOTAL EDECHI		140.59	142.90	145.91	148.21	150.65	157.44	160.44	163.57	166.78	170.21	173.73	177.37	181.14	185.13	189.14
GRANDES CLIENTES (DEMANDA MÁXIMA COINCIDENTE EN (MW))																
Grandes Clientes		2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Argos	CPA115	7.94	7.94	7.94	7.94	7.94	7.94	7.94	7.94	11.77	11.77	11.77	11.77	11.77	11.77	11.77
Cemex	CEMEX	21.56	21.56	21.56	21.56	21.56	21.56	21.56	21.56	21.56	21.56	21.56	21.56	21.56	21.56	21.56
Manzanillo International Terminal	MIT	8.15	8.15	8.15	8.15	8.15	8.15	8.15	8.15	8.15	8.15	8.15	8.15	8.15	8.15	8.15
Minera Panama	BOT34	239.00	239.00	239.00	239.00	239.00	239.00	239.00	239.00	239.00	239.00	239.00	239.00	239.00	239.00	239.00
ACP	ACP	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00
TOTAL Grandes Clientes (Sin Minera)		51.55	51.76	51.77	51.79	51.77	51.77	51.79	51.81	55.65	55.67	55.69	55.70	55.72	55.74	55.91
TOTAL Grandes Clientes Conectados el SPT		29.50	29.50	29.50	29.50	29.50	29.50	29.50	29.50	33.33	33.33	33.33	33.33	33.33	33.33	33.33
Pronostico de Carga del SIN		2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Demanda Maxima		1,951.49	2,002.35	2,052.70	2,102.57	2,151.94	2,200.82	2,249.22	2,297.14	2,344.58	2,391.54	2,438.04	2,484.06	2,529.62	2,574.72	2,644.99
Demanda Media		1,679.14	1,721.79	1,764.02	1,805.83	1,847.24	1,888.23	1,928.82	1,969.00	2,008.78	2,048.17	2,087.16	2,125.76	2,163.96	2,201.78	2,260.71
Demanda Minima		1,346.61	1,379.23	1,411.54	1,443.53	1,475.20	1,506.57	1,537.62	1,568.36	1,598.79	1,628.92	1,658.75	1,688.28	1,717.51	1,746.44	1,791.52