



Gobierno de Reconciliación
y Unidad Nacional

El Pueblo, Presidente!



National Program of Sustainable Electrification and Renewable Energy



Managua, July 2020



INTRODUCTION

The electricity sector in Nicaragua in 2006, faced serious problems such as poor access to electricity (54%), and the energy generation was based 75% on non renewable sources together with a high inefficient use of the energy consumed, at the top of the problems was a daily load shedding for up to 12 hours per day for some specific sectors.

Right after stepping in the Presidency of the Republic, Comandante Daniel Ortega Saavedra (2007), instructed the institutions of the Nicaraguan electricity sector to prepare an immediate diagnosis to overcome the crisis.

The task shall consider key aspects such as the growth of electricity demand, the needs of electrical energy of other sectors (health, education, water and sanitation, agriculture sector and industrial sector as well). All aspects mentioned before were in a very close relationship with the electrification requirements of the municipalities and the immediate solution to the problem of energy load shedding.

As a result of this diagnosis, an action plan was prepared, first objective was to eliminate load shedding and it was achieved in that same year, 2007, the fundamentals for a comprehensive development plan for the Nicaraguan electricity sector were based on 3 drivers:

1. Rural electrification increase (electrical coverage).
2. Diversification of the energy matrix integrating into it renewable energy (wind, biomass, geothermal, hydroelectric and solar energy sources).
3. Energy Efficiency.

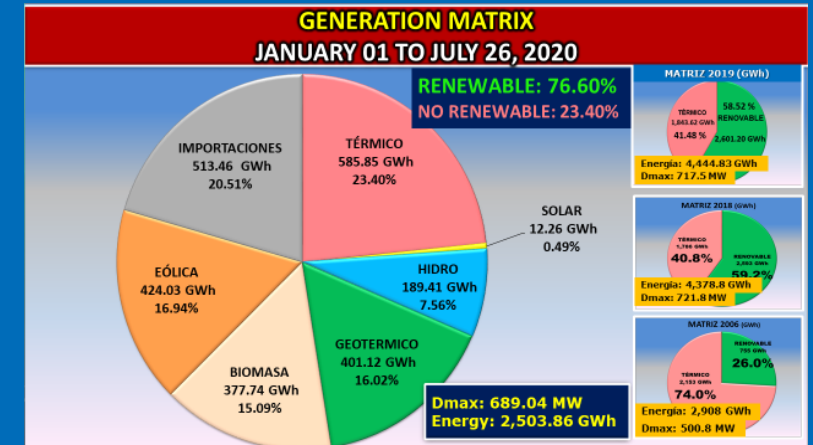
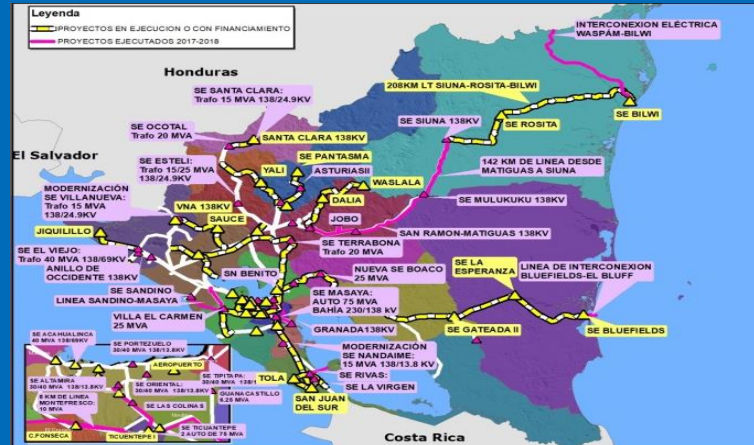
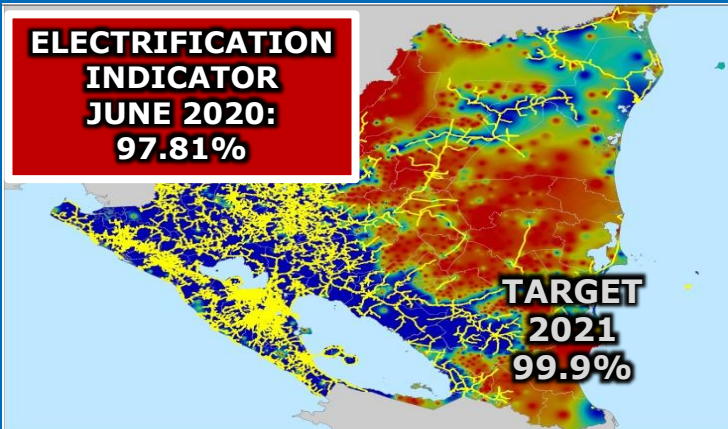


INTRODUCTION

In order to execute the plan, it was envisaged to strengthen and expand the National Interconnected System (SIN). In addition, in 2007, Nicaragua's links with the Electrical Interconnection System of Central American Countries (SIEPAC), both along the southern border (Costa Rica) and the northern border (Honduras), had not been completed so far, leaving Nicaragua without the possibility of energy exchange, unable to use SIEPAC to satisfy its deficit.

Since 2007, the legal and regulatory framework of the Nicaraguan electricity sector has been improved, developed and strengthened, to give greater agility and effectiveness to the plans of the Government of Reconciliation and National Unity (GRUN).

All of the above contrasts with an Indicative Generation Expansion Plan whose generation plant projects have been formulated, evaluated, and studied up to pre-feasibility (geothermal) and feasibility (hydroelectric, wind) levels, ready for execution by the GRUN or any other private investor.



NICARAGUA ELECTRIC SECTOR

Regulators



Comisión Regional
de Interconexión
Eléctrica



Ministerio de
Energía y Minas



Instituto Nicaragüense
de Energía

Market Operators

Ente Operador
Regional



CNDC

Centro Nacional
de Despacho de Carga

Market Agents

Generators



ENEL – Estatal
Generadores Privados

Transmission



Estatal
EPR Privado

Distribution Co.



DN-DS Privados – Pacifico- Centro
ENEL –Estatal Caribe
Sistemas Aislados Areas No Consesionadas

Bulk Consumers



Regional Market



IMPROVEMENT OF THE ELECTRIC SECTOR LEGAL FRAME 2017

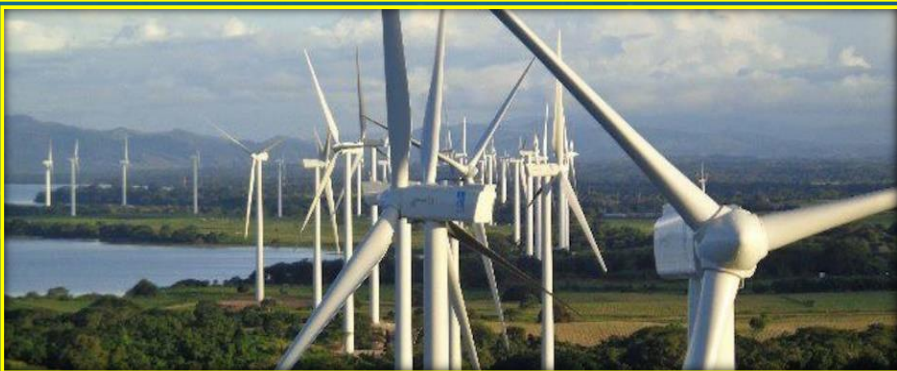


Law (272) y Distributed Egeneration Regulation (Ley 951 - Reform)

Natural or legal persons generating electrical energy will be able to sell surpluses to economic agents dedicated to the distribution of electrical energy

Energy Efficiency Bill (Law 956)

To promote rational and efficient use of energy, guarantee energy supply and stimulate national economy competitiveness.

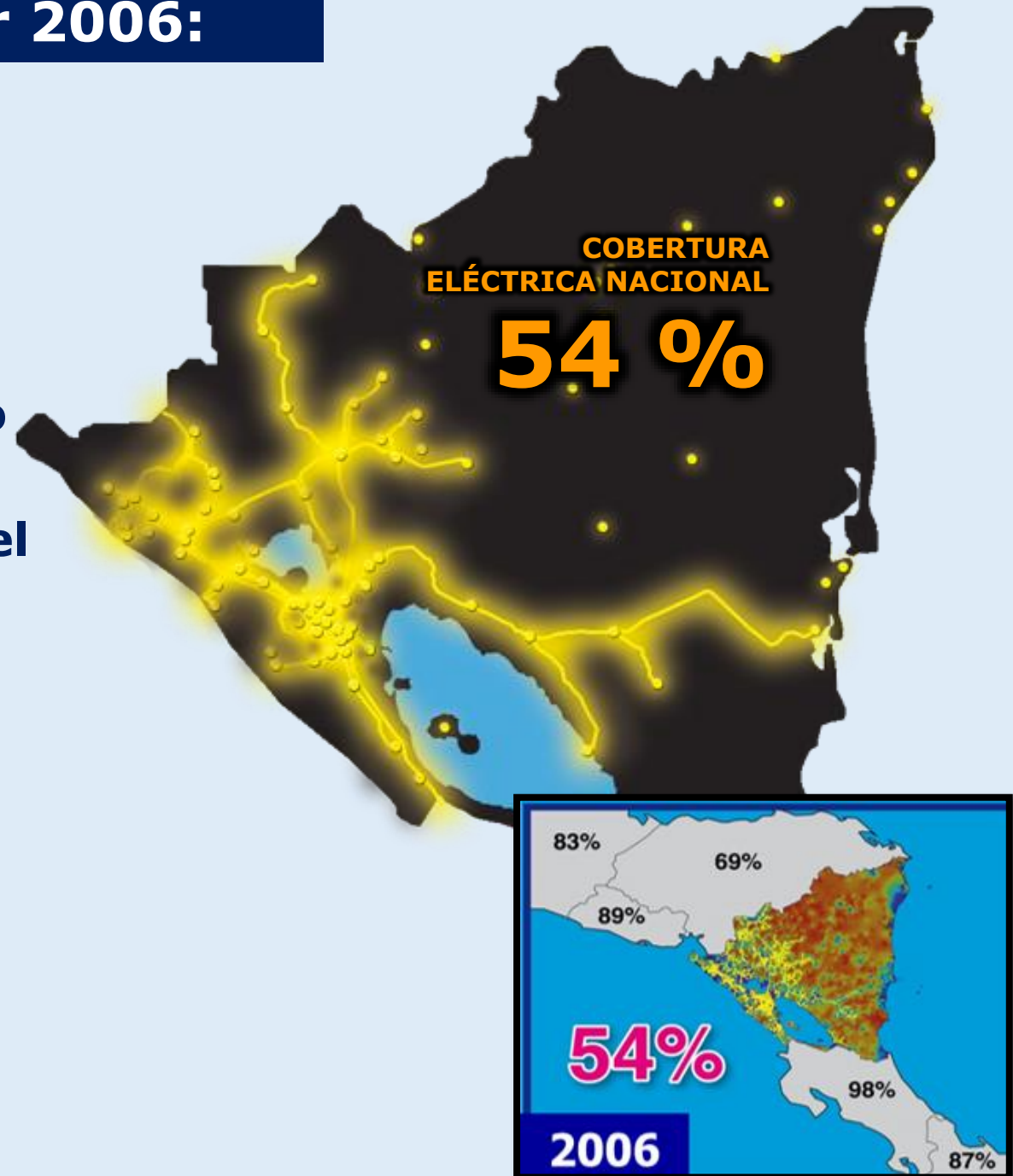


Energy Generation from renewable sources (Law 967)

Extended deadline till 01.01.2023 for new to come RE projects and extensions of existing RE facilities (under operation) to grant access to the benefits of RE bill for projects with RE (Law 532).

Bottleneck Nicaragua energy sector 2006:

- 1) Load shadding of up to **14h/day, due to lack of Energy generation.**
- 2) **Lack of Access to electricity for more tan 3 Million people.**
- 3) **54% electrical coverage country wise** bajo lowest in Cerntral America).
- 4) 75 % generation capacity based on fuel oil.
- 5) Inefficient National Transmission System.
- 6) Caribbean Coast inefficient isolated sytems.
- 7) No Energy Efficiency Programs Energética
- 8) Limited Regional Interconnected System



ELECTRICAL COVERAGE

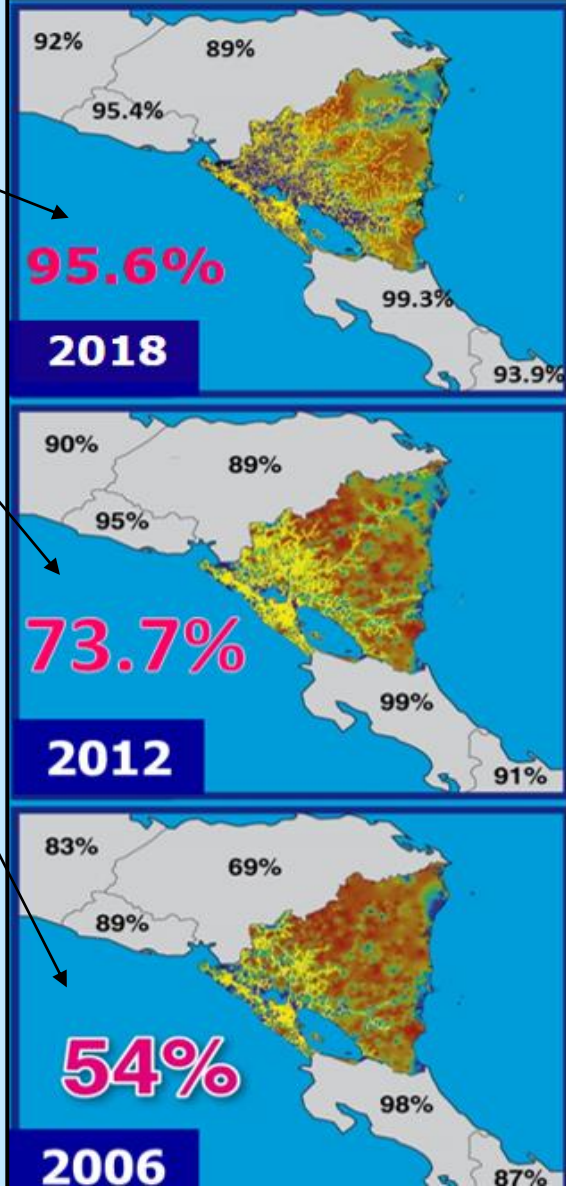
**ELECTRIFICATION
INDICATOR
JUNE 2020:
97.81%**

**EVOLUTION of Central
America**

**TARGET
2021
99.9%**

**TARGET
2020
98.42%**

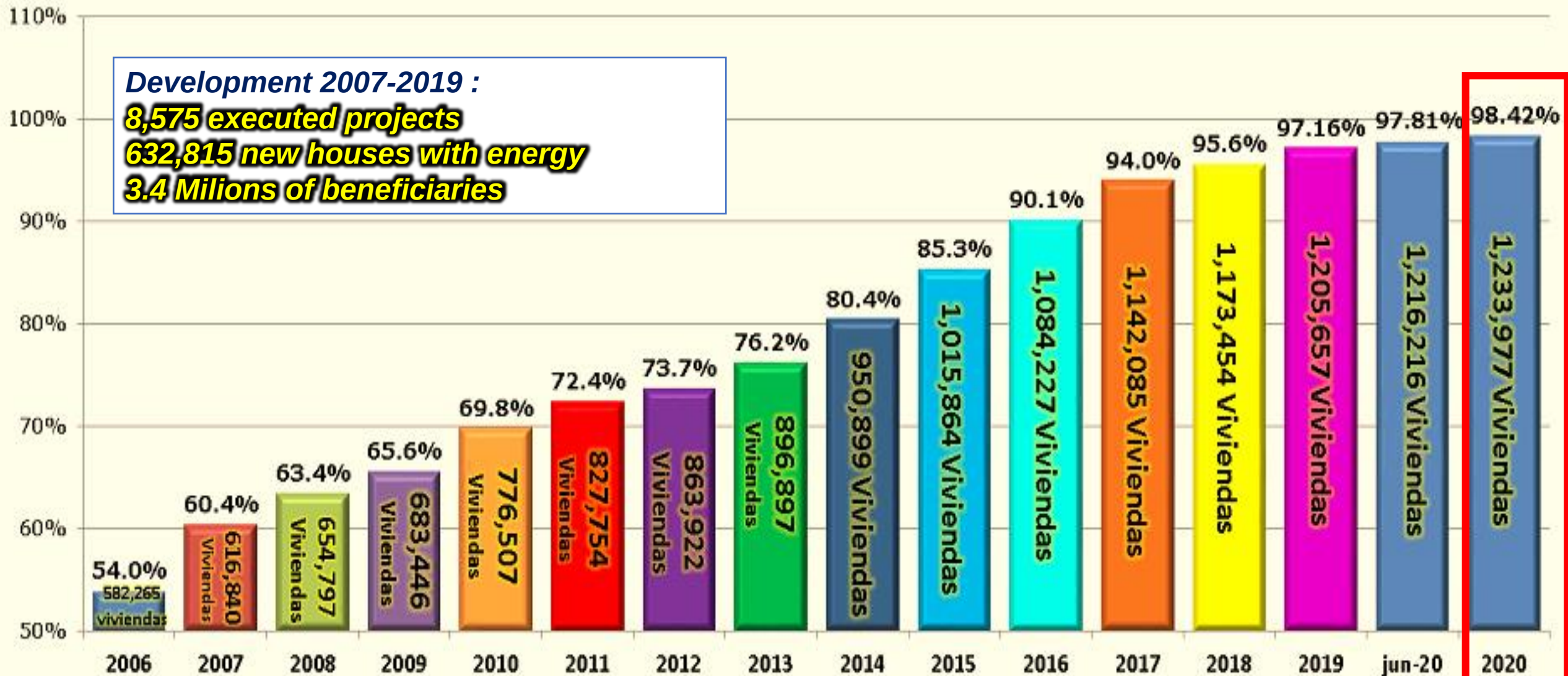
**Índice de Electrificación
De Centroamérica
2006,2012,2018**



Development of National Electrification Ratio

Up to **JUNE 2020** achieved **97.81%**, represents **43.81% increase** compared with 2006.

TARGET 2020: 98.42%

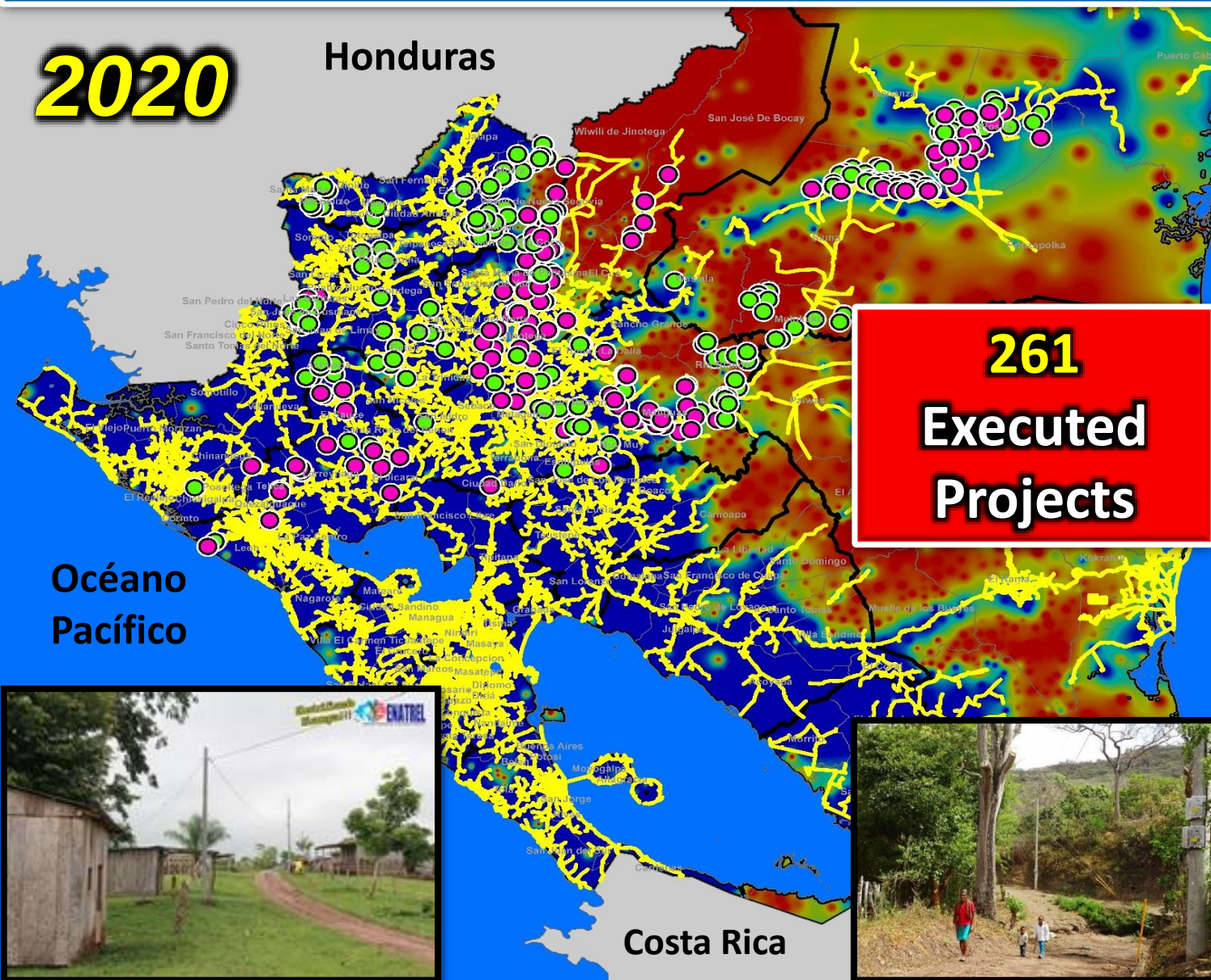


Target 12,223 Houses with 6,049 additional new customers

INVESTIMENT - U\$27.2 MM - (BCIE - OFID - GRUN)

2020

Honduras



KPI	Target	Progress	In Progress
Communities	427	183	244
Houses	12,223	8,847	3,376
Network lenght (km)	1,037	766	272
Beneficiaries	63,926	46,270	17,656
Human Settlements	88	78	10
Houses	6,049	5,146	903
Network lenght (km)	153	141	12
Beneficiaries	13,852	12,865	987
Total Proyectos	515	261	254
Houses	18,272	13,993	4,279
Network lenght (km)	1,190	907	284
Beneficiaries	77,779	59,135	18,644

**261
Executed
Projects**

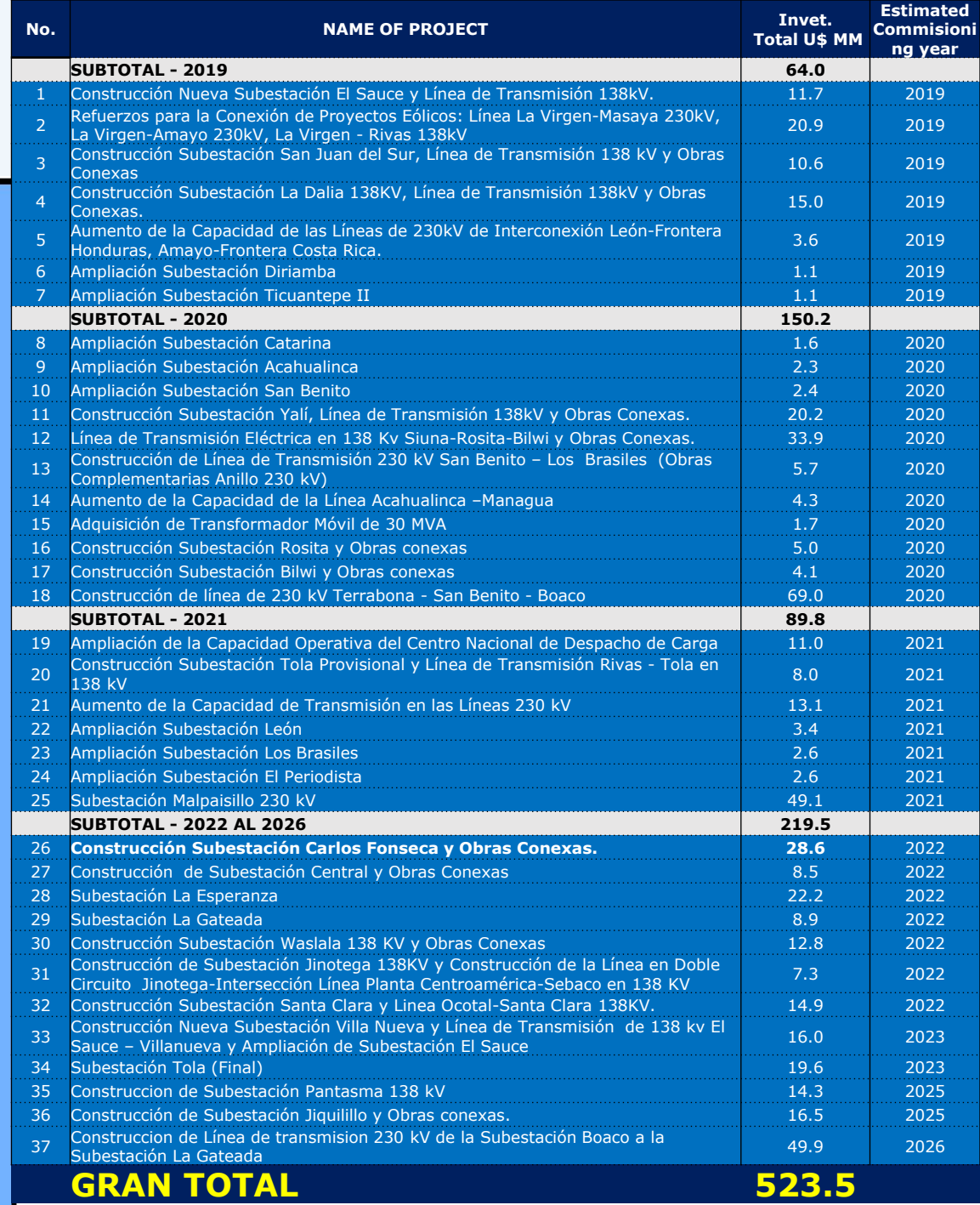
515 PROJECTS

● **261 EXECUTED PROJECTS 2020**

● **254 UNDER PROGRESS 2020**



TOTAL INVERTMENT: U\$523.5 MM



SIEPAC PROJECT – U\$494 Mio



PAIS	Kms
Guatemala	281
El Salvador	285
Honduras	270
Nicaragua	321
Costa Rica	490
Panamá	150
TOTAL	1,797

**230 KV, single circuit
In double circuit towers**

- **300 MW Capacity**
- **28 bays over 15 substations**
- **36 fiber pairs OPGW**



230 KV TRANSMISSION

LEON I – HONDURAS BORDER

SCOPE:

- **76 km phase conductor replacement with associated insulators, fittings and accesories.**
- **Instalation of 48 fiber pairs OPGW in the line León – Frontera Honduras border.**

This Project is a part of required transmission reinforcement of Regional Electrical Market in order to guarantee transit of **300 MW** by the National Transmission System (SIN)

TOTAL Investment:
U\$3.26 Mio
FUNDED BY :
BID – KEXIM –
ENATREL



CONSTRUCCION OF SUBSTACIÓN LA CENTRAL 138 kV

Beneficiaries



INVEST:
USD 11.00 Mio
FUNDED:
BCIE-ENATREL

BENEFICIARIES:
95,853
Inhabitants

40 MVA



Beneficiaries



Energy Efficiency

2007-2020

525 Thousands beneficiaries

U\$41.6 USD Mio

2.6 Mio inhabitants beneficiaries

Less energy consumption for better illumination level



Substitution
**197,079 HG
and Sodium
lamps in
Street
lighting .**

**103.2
GWh/año**



Substitution
2,140,000
incandecent
lamps by
(LFC) in
residential
area

**181.9
GWh/año**



Substitution
of **50
thousands
fluorecent
lamps for
LED** in
government
sector

**2.8
GWh/año**



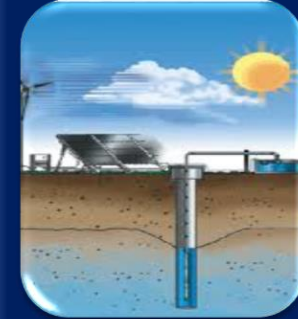
**6 High
efficiency
boilers in
Public
Hospitals.**

**4.7
GWh/año**



**2,307 High
Efficiency AC
in Giv. Offices
and
Hospitals.**

6 GWh/año



**300 PV
panels in
productive
facilities**

**4 GWh /
año**

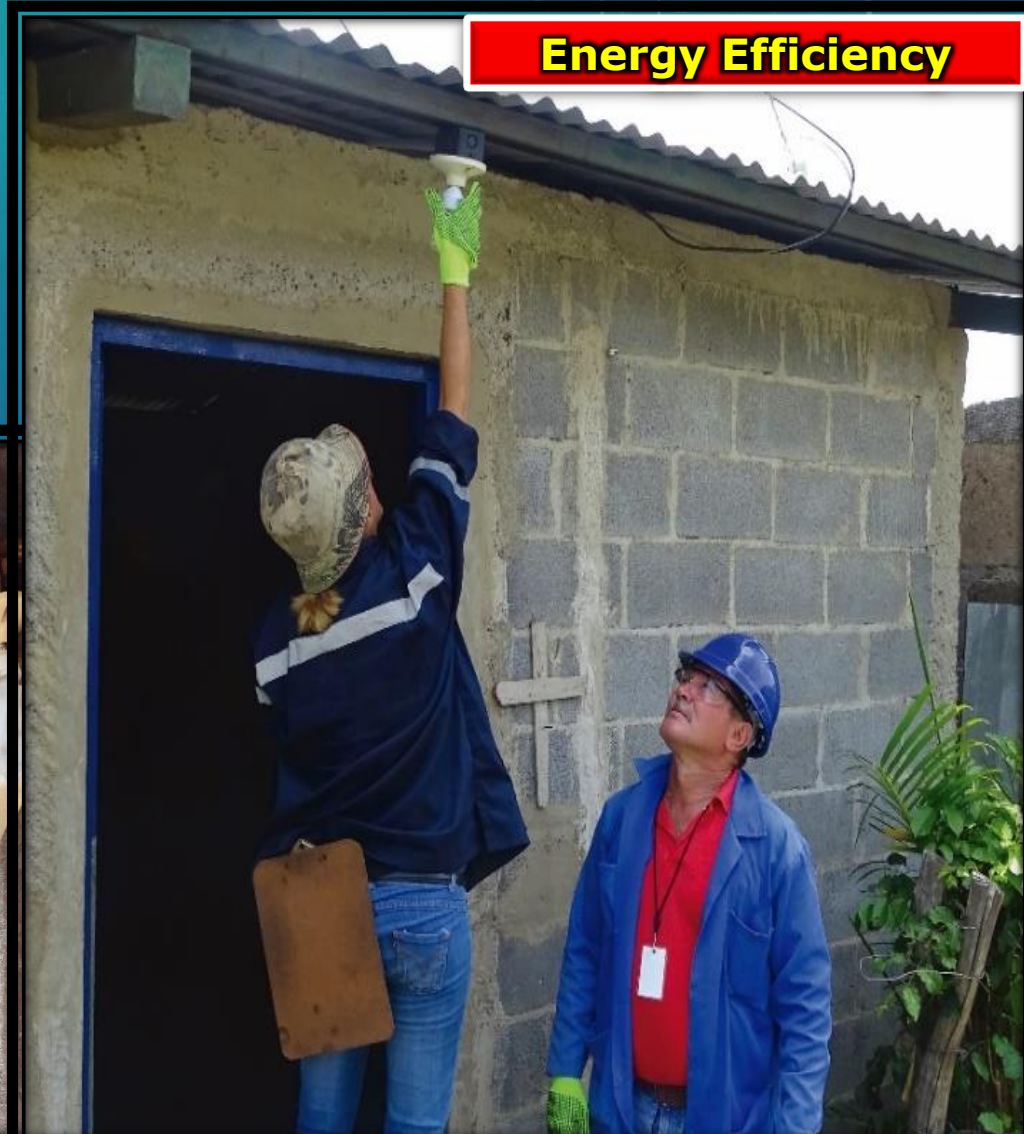


**Replacement
of obsolote
AC system by
new high
efficiency AC
Plus PV
facility
173kWp**

310.2 GWh/año de ahorro en energía-US\$37.2 MM- 222,531 TON CO2.

LAMP REPLACEMENT INCANDESCENTES FOR SAVINGS (LFC)

The project to replace **2,140,000** thrifty light bulbs benefited more than **535,000 homes nationwide.**



INSTALLATION OF 50,000 LED LAMPS AND BULBS

Phase I: 20,000 lamps and light bulbs installed

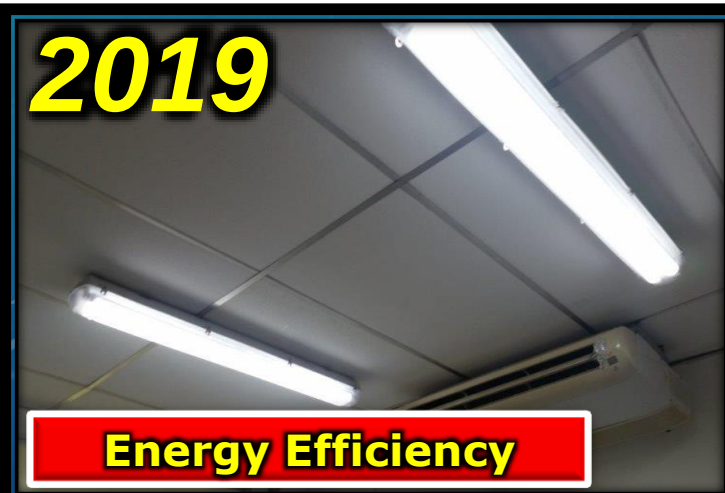
No.	INSTITUCIÓN	CANTIDAD
1	Lotería Nacional	615
2	Ministerio de Industria, Fomento y Comercio (MIFIC)	1,074
3	Dirección General de Migración y Extranjería (DGME)	836
4	Instituto Nicaragüense de Turismo (INTUR)	963
5	Universidad Nacional Agraria (UNA)	3,133
6	Universidad Nacional de Ingeniería (UNI)	5,252
7	Universidad Nacional Autónoma de Nicaragua (UNAN - MANAGUA)	5,787
8	Universidad Nacional Autónoma de Nicaragua (UNAN - LEÓN)	2,340
TOTAL		20,000

**SAVINGS
GENERATED:
2.8 GWh/Year**

**INVESTMENT:
U\$954,526
BID
JICA
BCIE**

Phase II: 30,000 lamps and light bulbs installed

No.	INSTITUCIÓN	CANTIDAD
1	Ejército Nacional Sector Administrativo	2,215
2	Ministerio de Hacienda y Crédito Público (MHCP)	1,095
3	Alcaldía de Managua	2,726
4	Instituto de la Vivienda Urbana y Rural (INVUR)	476
5	Ministerio de Ambiente y Recursos Naturales (MARENA)	1,245
6	Instituto Nacional Forestal (INAFOR)	391
7	Instituto de Turismo (INTUR)	545
8	Consejo Supremo Electoral (CSE)	1,198
9	Ministerio de la Familia (MIFAMILIA)	826
10	Contraloría General de la República (CGR)	1,272
11	Ministerio de Educación (MINED)	188
12	Procuraduría General de la República (PGR)	581
13	Corte Suprema de Justicia (CSJ)	2,104
14	Policía Nacional	1,536
15	Ministerio de Gobernación (MIGOB)	1,747
16	Instituto Nicaragüense de Cultura (INC)	2,346
17	Ministerio de Economía Familiar Comunitaria, Cooperativa y Asociativa (MEFCCA)	1,354
18	Instituto Nicaragüense de Deportes (IND)	157
19	Instituto Nacional Tecnológico (INATEC)	261
20	Instituto Nicaragüense de Acueductos y Alcantarillado (INAA)	170
21	Instituto de Pesca y Acuicultura (INPESCA)	166
22	Instituto Nicaragüense de Seguros (INISER)	1,229
23	Correos de Nicaragua	1,252
24	Instituto Nicaragüense de Aeronáutica Civil (IAC)	172
25	Instituto de Desarrollo de la Información (INIDE)	778
26	Dirección General de Aduanas (DGA)	950
27	Dirección General de Bomberos (DGB)	257
28	Ministerio de Agricultura y Ganadería (MAG)	1,087
29	Empresa Nacional de Transmisión Eléctrica	1,676
TOTAL		30,000



Energy Efficiency

2019

INSTALLATION OF PUBLIC LIGHTING



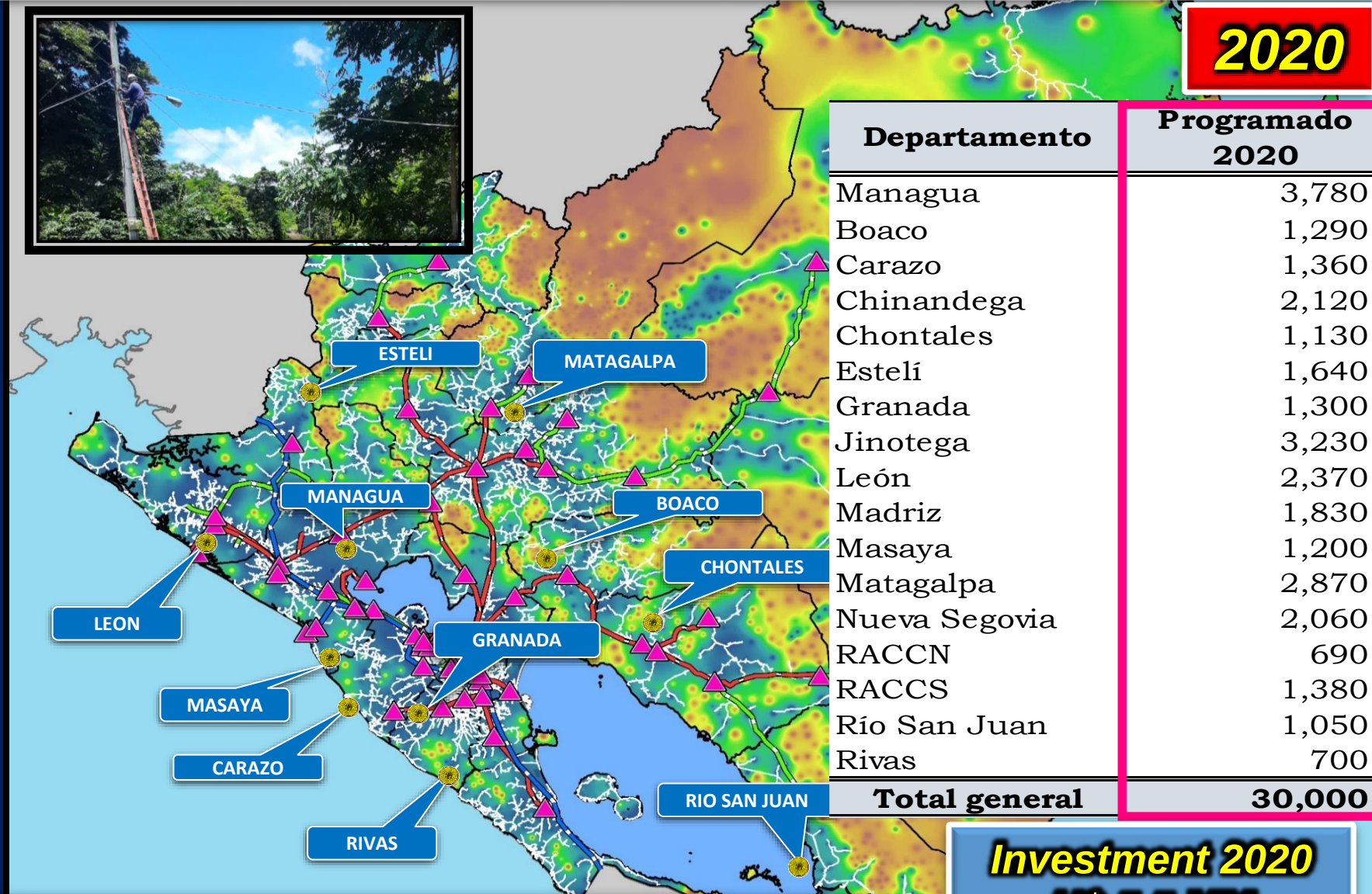
**Investment
U\$25.7 MM**

2007 - 2019

→ **167,079 street lighting luminaires installed.**

→ **6,710 kilometers of power lines.**

→ **73,761 lighted blocks**



2020

Energy Efficiency

**87.5 GWh / year of energy savings
US \$ 9.6 MM - 64,610 Ton CO2 avoided**

**Investment 2020
U\$ 5.5 MM
BCIE - GdN**

The installation of "6 efficient systems for water heating in Hospitals" has been **FINISHED – BCIE USD 1.155 MM** **2020**

Energy Efficiency



**100 %
FINISHED**

Objective: To replace obsolete and inefficient STEAM GENERATION systems with EFFICIENT EQUIPMENT (Boilers).

No	Hospitals	Municipality
1	Humberto Alvarado	Masaya
2	Alemán Nicaragüense	Managua
3	Antonio Lenin Fonseca	Managua
4	Cesar Amador Molina	Matagalpa
5	San Juan de Dios	Estelí
6	Ernesto Sequeira	Bluefields

BCIE Investment : US\$ 1.2 MM
Saving: 4.7 GWh/year

INSTALLATION OF AIR CONDITIONING TO STATE INSTITUTIONS 2019 - 2020

In 2019, **1,760 efficient air conditioners** were installed in public institutions, of which 510 AA correspond to hospitals with an investment of **US \$ 3.4 million - BID.**

COMPLETION OF INSTALLATION OF **547 EFFICIENT** CLIMATE EQUIPMENT IN STATE INSTITUTIONS ”- **BCIE US \$ 0.87 MM**

No.	INSTITUCIÓN	CANTIDAD
1	MEFFCA	64
2	MIGOB	38
3	INVUR	53
4	INIDE	55
5	CGR	106
6	LOTERÍA	45
7	MAG	83
8	SILAIS MANAGUA	60
9	MEM	54
10	MITRAB	92
11	MTI	110
12	MIFAMILIA	23
13	INISER	39
14	HOSPITAL LENIN FONSECA	119
15	HOSPITAL BERTHA CALDERÓN	99
16	DGA	119
17	HOSPITAL LA MASCOTA	227
18	HOSPITAL ALEMAN NICARAGÜENSE	164
19	PGR	90
20	INSS SHELIM SHIBLE1	82
21	INSS CENTRAL 2	36
22	TEATRO NACIONAL RUBÉN DARÍO	2
TOTAL		1760



SAVINGS GENERATED:
6.59 GWh/Year
U\$3.4MM - BID

INSTALLATION OF 547 CLIMATIZING EFFICIENT EQUIPMENT- 2020		
No.	BENEFITED INSTITUTIONS	INSTALLED QUANTITY
1	MARENA	131
2	INAFOR	45
3	INAC	10
4	SIBOIF	17
5	INPESCA	17
6	ENABAS	26
7	INETER	47
8	BOMBEROS DE NICARAGUA	31
9	INTUR	18
10	IND	29
11	INATEC	36
12	CORREOS DE NICARAGUA	30
13	CRIMINALISTICA	14
14	MINISTERIO DE HACIENDA Y CREDITO PUBLICO	37
15	INSTITUTO NICARAGUENSE DE CULTURA	45
16	INAA	14
TOTAL		547

THE INSTALLATION OF: 2020

"300 PHOTOVOLTAIC SYSTEMS FOR THE PRODUCTIVE SECTOR"

**100%
FINISHED**

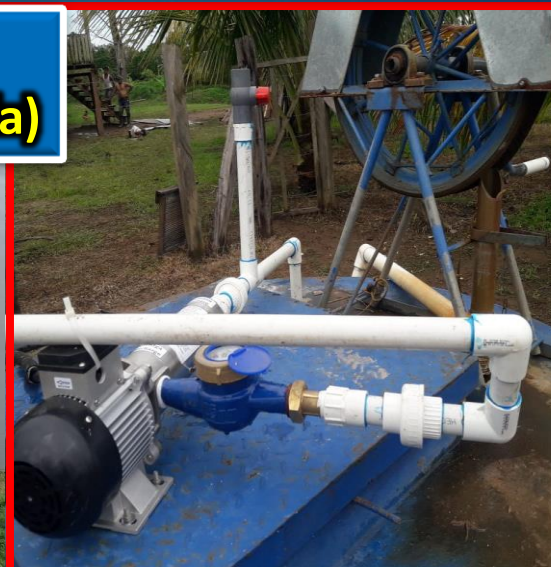
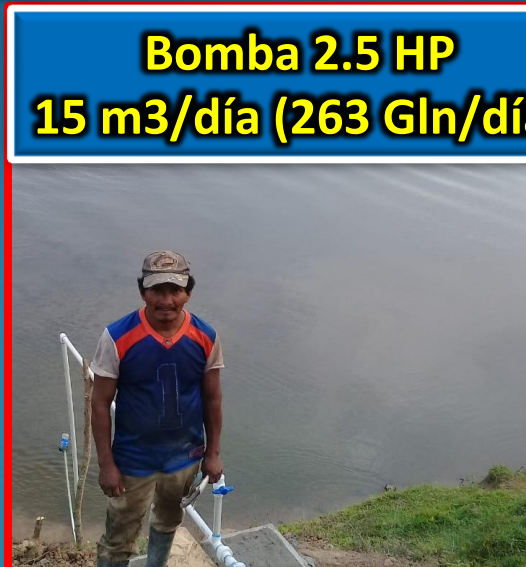
**Bomba 2.5 HP
15 m3/día (263 Gln/día)**

**USD 1.5 MM
BCIE**

300 PHOTOVOLTAIC SYSTEMS

RACCN – RACCS

No.	Municipio	A INSTALAR	INSTALADOS
1	BOCANA DE PAIWAS	15	15
2	MULUKUKU	15	15
3	SIUNA	35	35
4	PRINZAPOLKA	108	108
5	ROSITA	30	30
6	BONANZA	31	31
7	BILWI	66	66
TOTAL		300	300



SFV 820 Wp



RUBÉN DARÍO NATIONAL THEATER

ENERGY EFFICIENCY – U\$1.5 MM

2019

- **New efficient air conditioning system**
- **172.9 kWp Solar Plant (Savings: 571,190 kWh / year)**
- **Efficient Lighting System.**



- **363 Photovoltaic Solar Panels installed.**

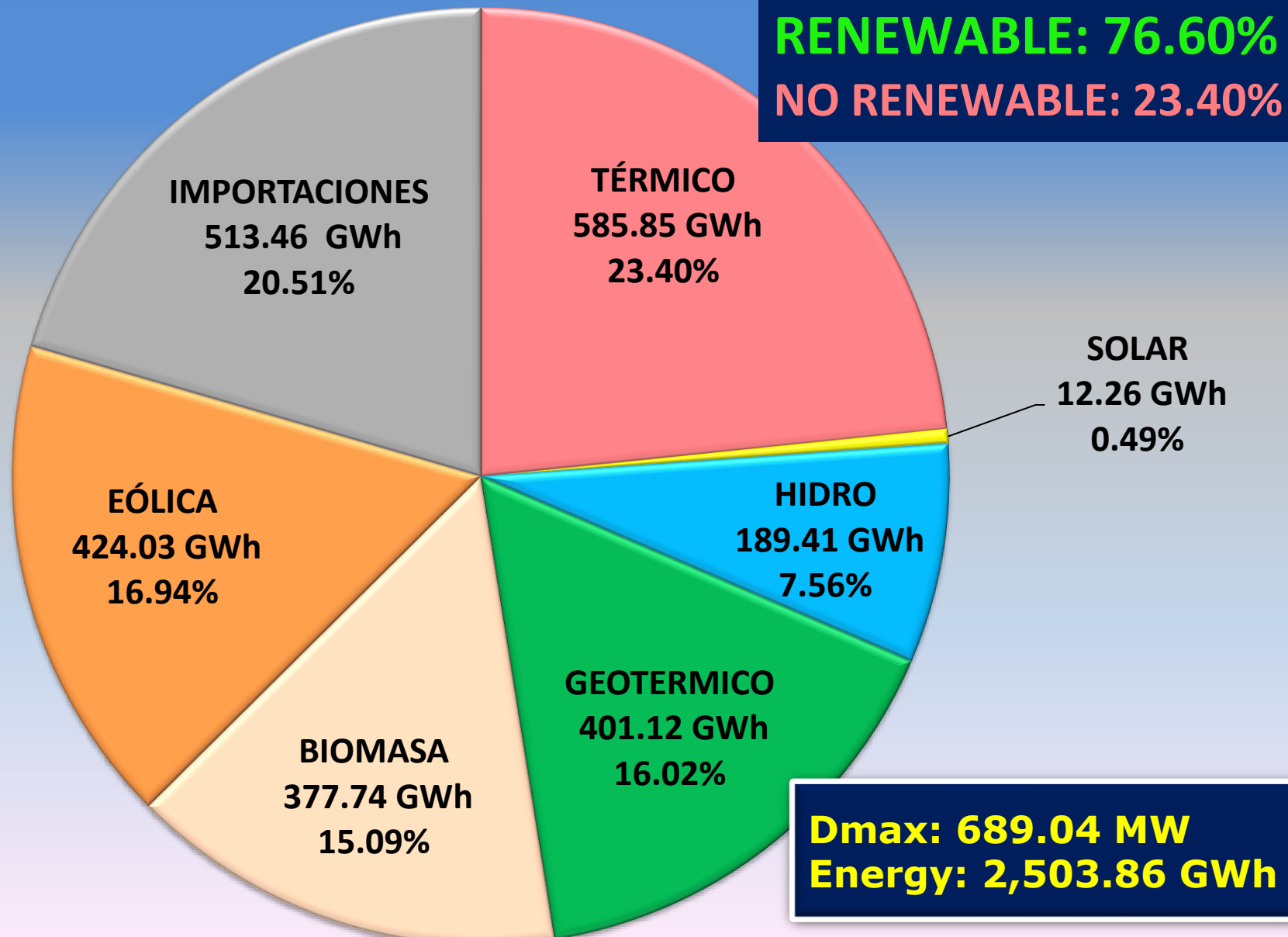


Investment 2019
U\$ 1.5 MM

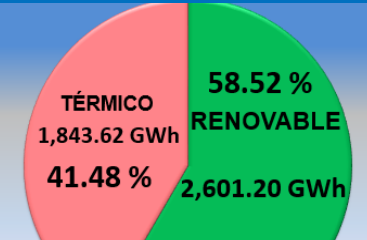


GENERATION MATRIX

JANUARY 01 TO JULY 26, 2020

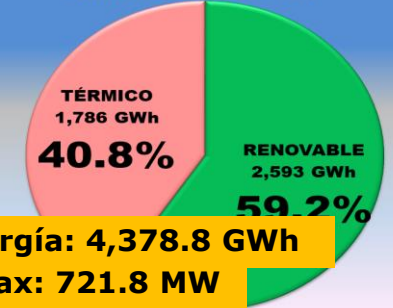


MATRIZ 2019 (GWh)



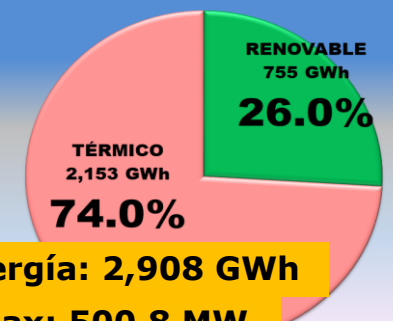
Energía: 4,444.83 GWh
Dmax: 717.5 MW

MATRIZ 2018 (GWh)



Energía: 4,378.8 GWh
Dmax: 721.8 MW

MATRIZ 2006 (GWh)



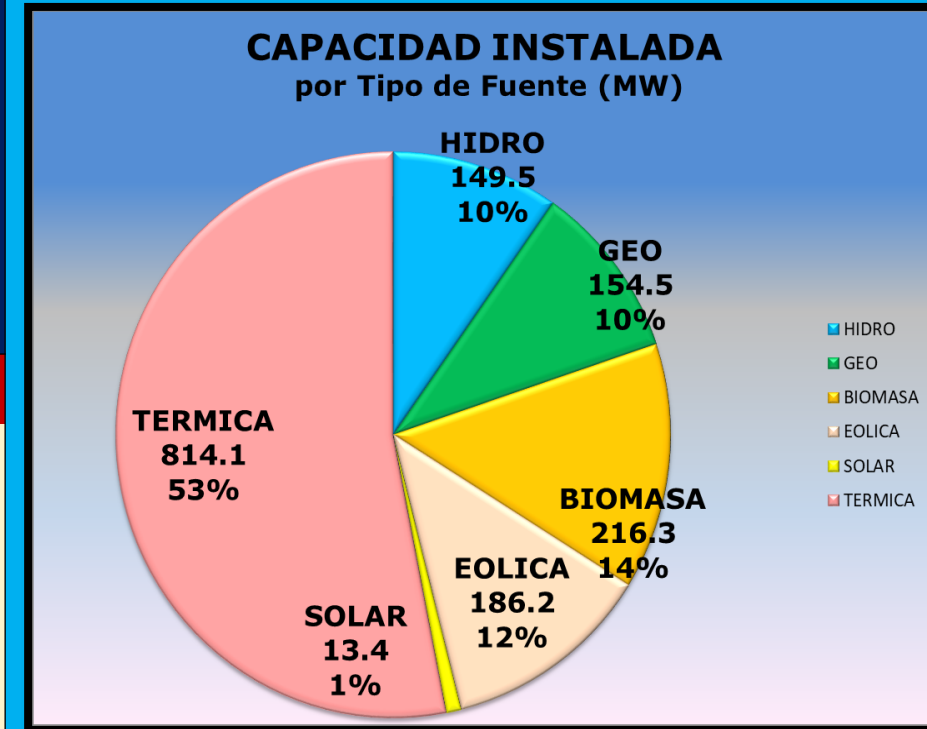
Energía: 2,908 GWh
Dmax: 500.8 MW

INCREASE INSTALLED GENERATION CAPACITY

Investment U\$ 1,565.2 MM

2020

	2006	2007-2020	2020
	INSTALLED CAPACITY (MW)	NEW GENERATION (MW)	TOTAL INSTALLED CAPACITY (MW)
TOTAL	754	879.08	1549.68
HIYDRO	104.4	53.4	157.8
GEOHERMAL	87.5	77	154.5
THERMAL	440.3	439.2	814.1
BIOMASS	121.8	102.5	216.3
WIND		186.2	186.2
SOLAR		20.78	20.78



INSTALLED: 1,549.68 MW
MAX DEMAND 2019:
717.5 MW

879 MW Installed 2007-2020

GENERATION MATRIX EVOLUTION 2006 - 2019

GWh

5,000

4,500

4,000

3,500

3,000

2,500

2,000

1,500

1,000

500

0

2006

2007

2008

2009

2010

2011

2012

2013

2014

2015

2016

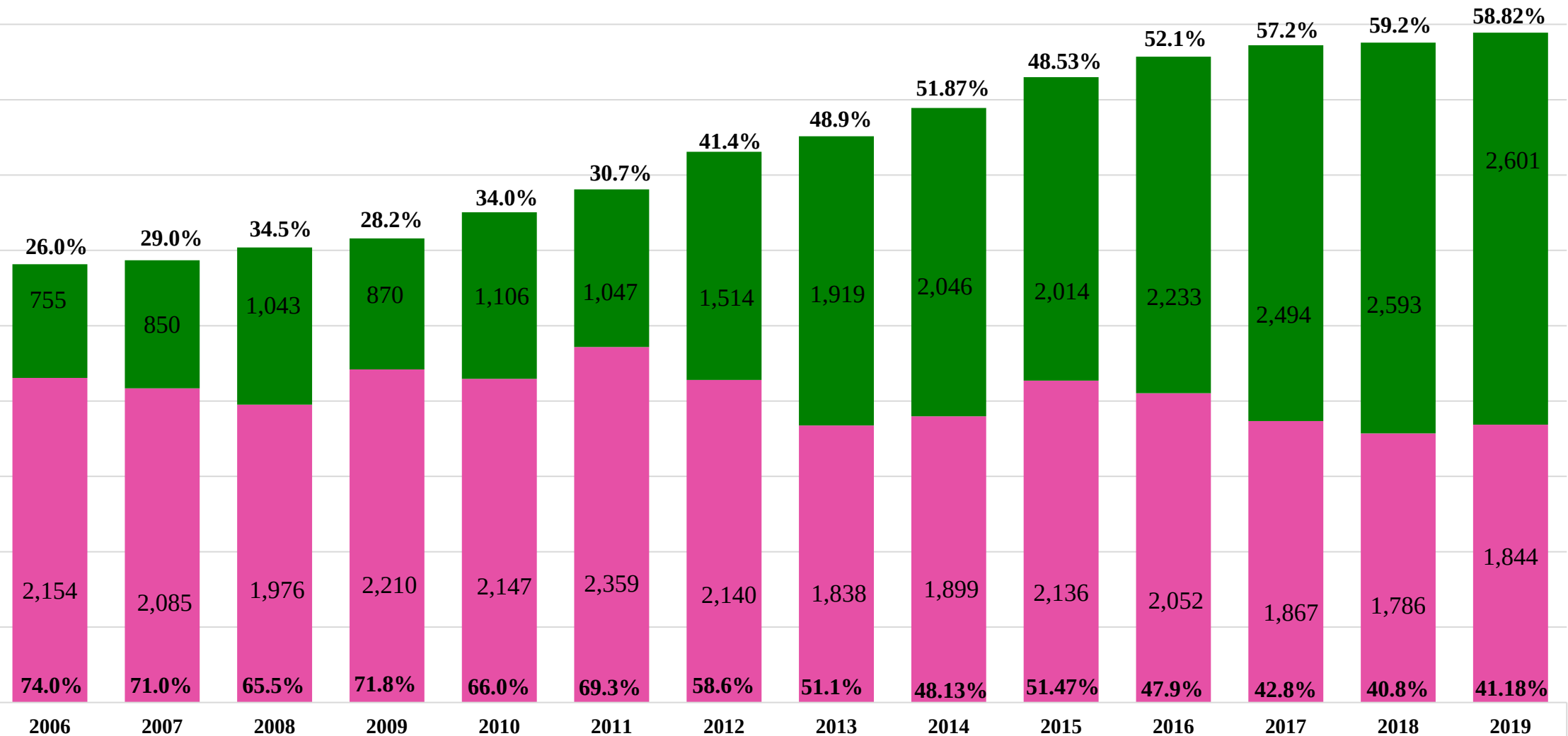
2017

2018

2019

Años

■ Non Renewable (GWh) ■ Renewable (GWh)



INDICATIVE GENERATION PLAN

[illegible]

In **2019** the companies **EPR SOLAR** and **B&S Holding LTD** carried out the pre-investment studies, obtained the environmental permits, and the acquisition of the land. In **this year 2020** they will **start with the construction of the Solar Plant in San Benito** with an investment of approximately **US\$ 100 million**. The Boaco Solar Plant will be built in 2021.



PROJECT LNG NATURAL GAS – New Fortress Energy (300MW)

Background

21,08.2019 signed memorandum of understanding and already approved the Provisional License

Main Power Plant Data:

Installed Capacity: 336 MW

Energy delivery: 2,233 GWh/year (Plant Factor 0.85)

Connection node : Sandino - 230KV substation

Location:

Puerto Sandino, Storage and regasification "off shore"

Currently in progress ESIA, EIR, soil investigation report among others.



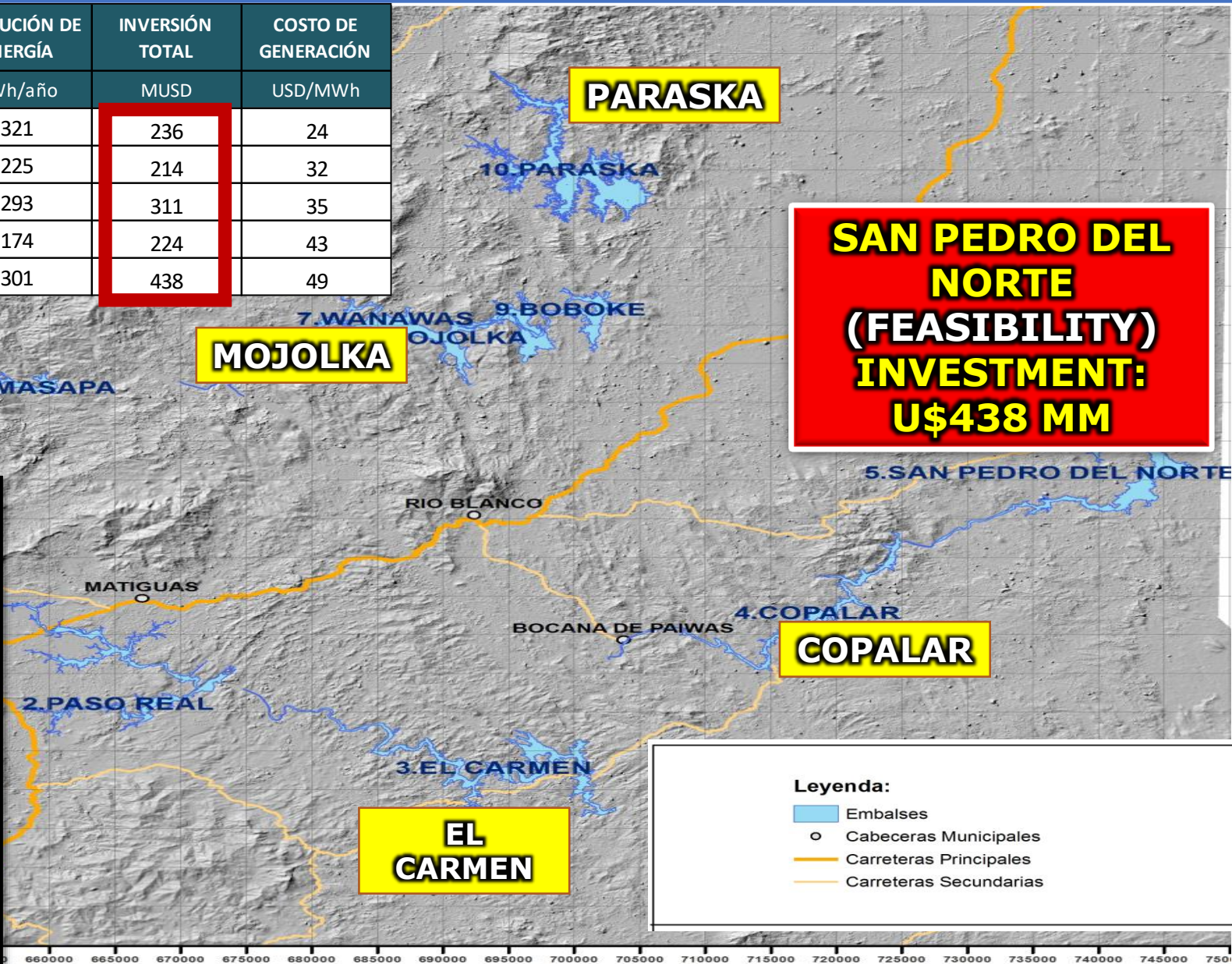
PRE-INVESTMENT STUDIES FOR RENEWABLE GENERATION

Master Plan - Selection of the 5 best FEASIBILITY sites (392 MW)

PROYECTO	POTENCIA INSTALADA	VOLUMEN DEL EMBALSE	PRODUCCIÓN DE ENERGÍA	INVERSIÓN TOTAL	COSTO DE GENERACIÓN
	MW	hm3	GWh/año	MUSD	USD/MWh
* EL CARMEN	76	432	321	236	24
MOJOLKA	71	649	225	214	32
COPALAR	100	173	293	311	35
PARASKA	42	618	174	224	43
SAN PEDRO DEL NORTE	103	356	301	438	49

* In Feasibility and Design process

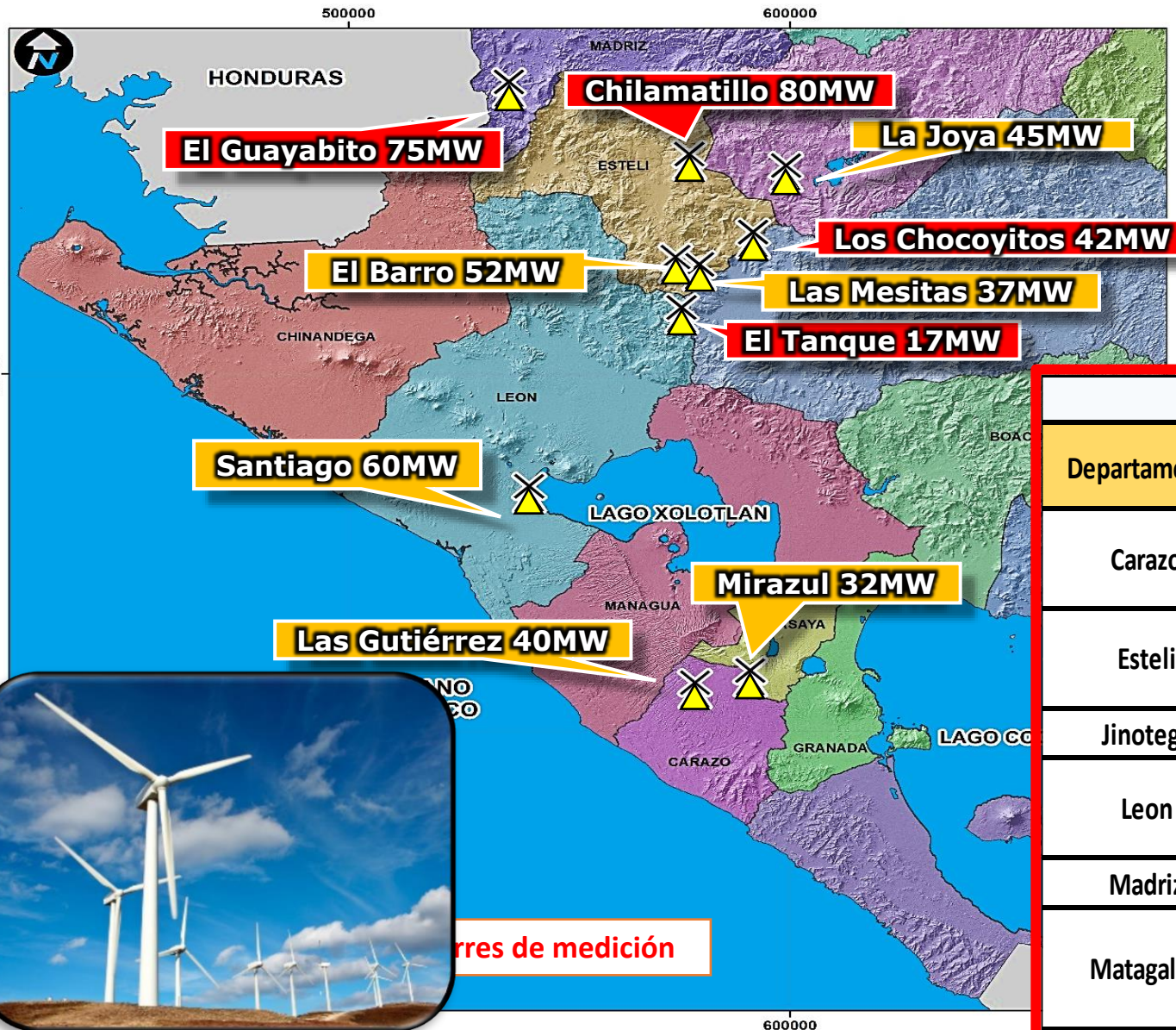
BID U\$ 2.3 MM
FEASIBILITY 2 SITES



Wind Generation Studies (480 MW)

"Wind Generation Potential Study in 10 sites"

FND: \$1,002,488



- **24 months of wind speed data, average of 4 m / s.**

- **In Feasibility Studies: 6 sites(269MW).**

Promedio de velocidad de vientos a Junio 2017

Departamento	Municipio	Sitio	Altura	Capacidad	Velocidad de viento (m/s)
Carazo	Jinotepe	Mirazul	50m	32 MW	5.9
	Diriamba	Las Gutierrez	50m	40 MW	8.9
Esteli	San Nicolas	El Barro	50m	52 MW	7.3
	Esteli	Chilamatillo	50m	80 MW	6.5
Jinotega	San Rafael del Norte	La Joya	50m	45 MW	8.1
Leon	Santa Rosa del peñon	El Tanque	50m	17 MW	6.4
	La Paz Centro	Santiago	50m	60 MW	6.3
Madriz	San Lucas	El Guayabito	50m	75 MW	5.4
Matagalpa	San Isidro La Trinidad	Los Chocoyitos	50m	40 MW	5.3
	San Isidro	Las Mesitas	50m	40 MW	8.2

COSIGÜINA VOLCANO

35 MW

Investment: U\$49.8 MM

FND – U\$ 3,7 MM – Pre- FEASIBILITY

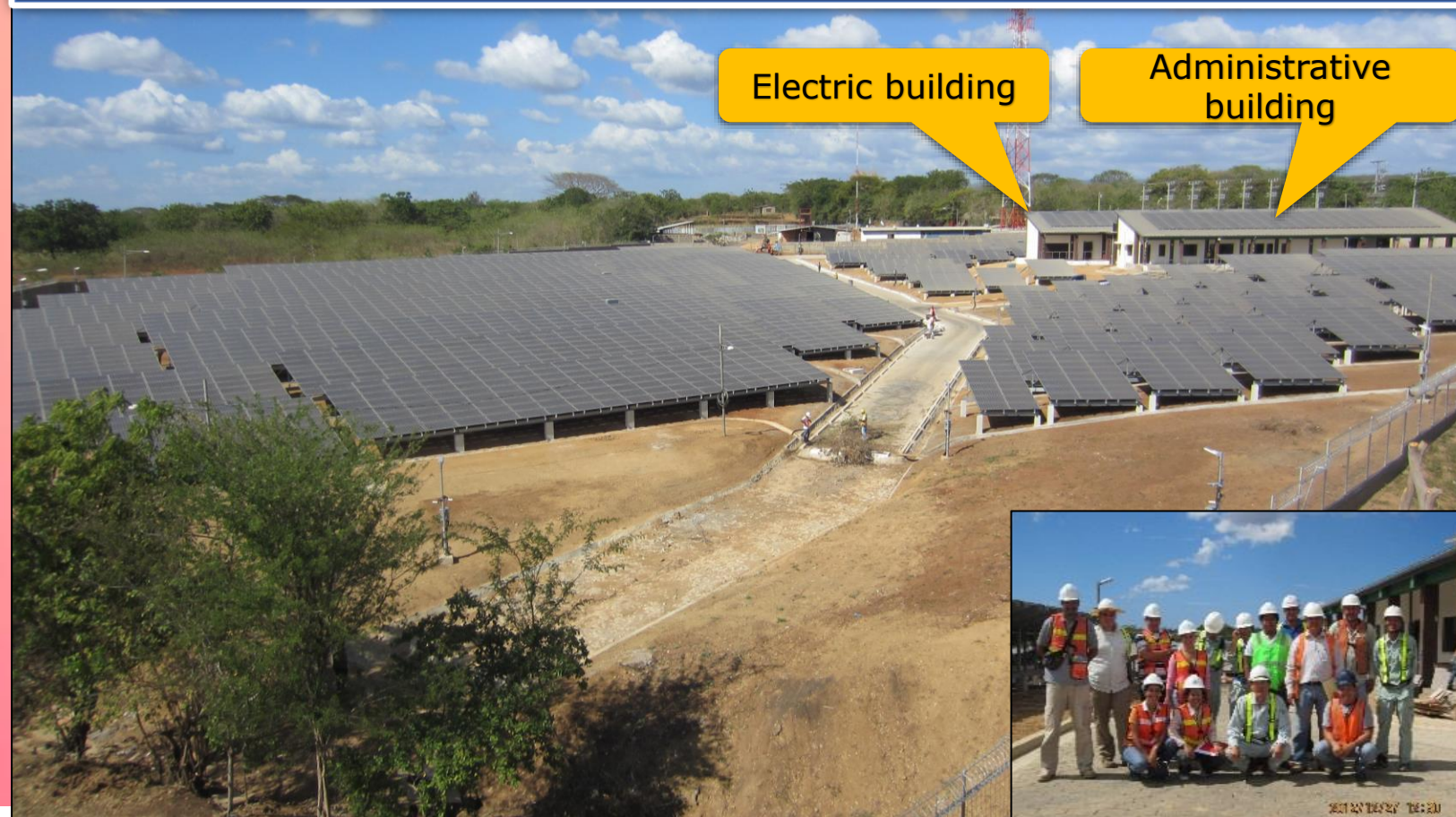
BID - U\$46,1 MM - FEASIBILITY

WITH THE SREP PROGRAM, THE SEEK IS TO DETERMINE THE TECHNICAL FEASIBILITY FOR THE EXPLOITATION OF THE GEOTHERMAL POTENTIAL OF THE COSIGÜINA FIELD, CARRYING OUT EXPLORATION ACTIVITIES IN TWO PHASES



RENEWABLE GENERATION PROJECTS

SOLAR PLANT LA TRINIDAD - DIRIAMBÁ



Investment
U\$12 Millones

Capacity

1.38 MWp

Number of Panels
5,880 Units

Panel Technology:
Monocrystalline

Panels Efficiency:
18.3%

Panels Occupied Area:
4,700 m²

Total Project Area:
20,000 m²

IN OPERATION, 2013

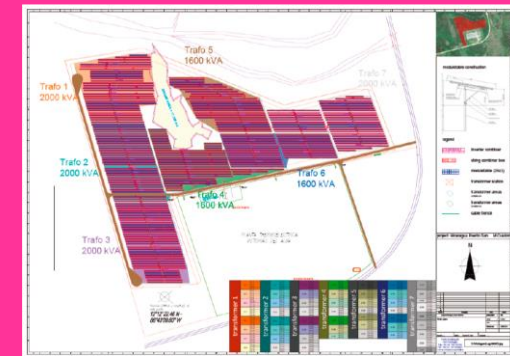
SOLAR PLANT

Developed by : **SOLARIS**

Located in ***Puerto Sandino-León.***

INVESTMENT
U\$20 Millones

12 MW



46,350
SOLAR PANELS

206
INVESTORS

SMALL HYDROELECTRIC POWER PLANT "YAKALWAS" IN THE WIWILI MUNICIPALITY

2019

Advance:
Civil Works: 100.00%
Electromechanical Works: 100.0%



POWER : 1,480 KW

DISTRIBUTION NETWORKS

REHABILITATION 65 KM.

NETWORK EXTENSIONS 60 KM.

Investment: US \$ 7.5 Million



Investment
US\$ 7.5 MM



SMALL HYDROELECTRIC POWER PLANT "LA CAMALEONA" **IN THE SAN JOSE DE BOCAY MUNICIPALITY 2019**



**ADVANCE :
100%**

POWER: 800KW

**YEAR OF
COMPLETION: 2019**

**CONNECTION
VOLTAGE: 24.9KV**

**Investment
U\$ 3.47 MM**

***The PCH La Camaleona interconnects
directly with the PCH Yakalwás / Wiwilí
with a 39 km three-phase line***

PROJECT

HYDROELECTRIC SAN MARTÍN

Power: 5.7 MW

Investment: US \$ 19.4 Million

Operation year: 2019

Location: El Tuma-La Dalia / Matagalpa

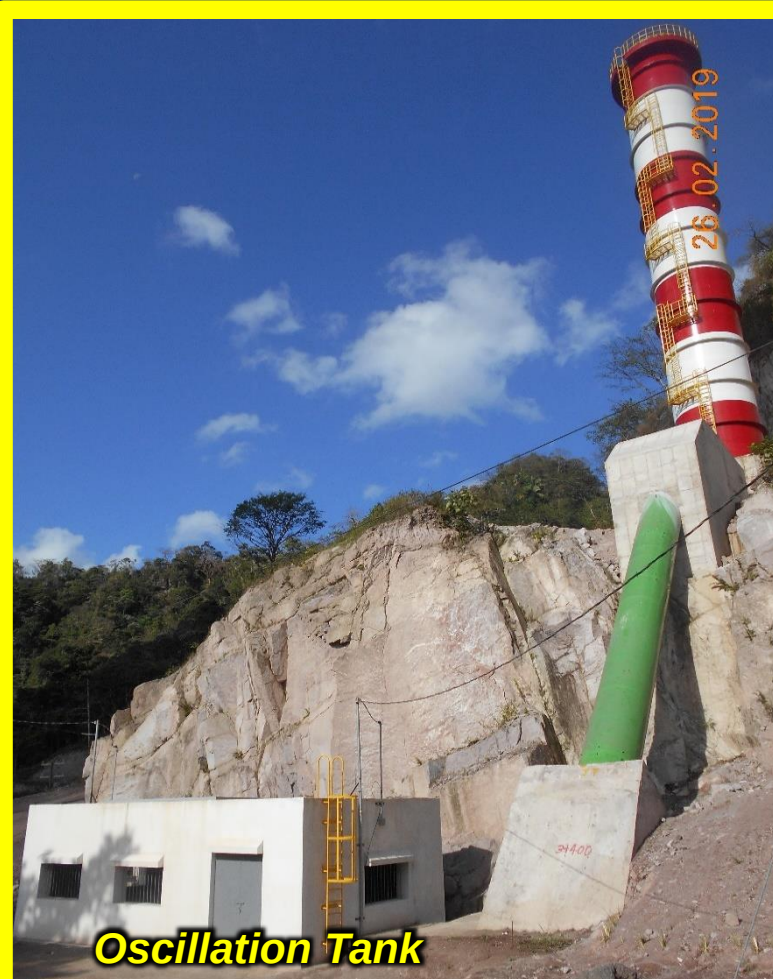
Developed by: IHC, S.A

2019

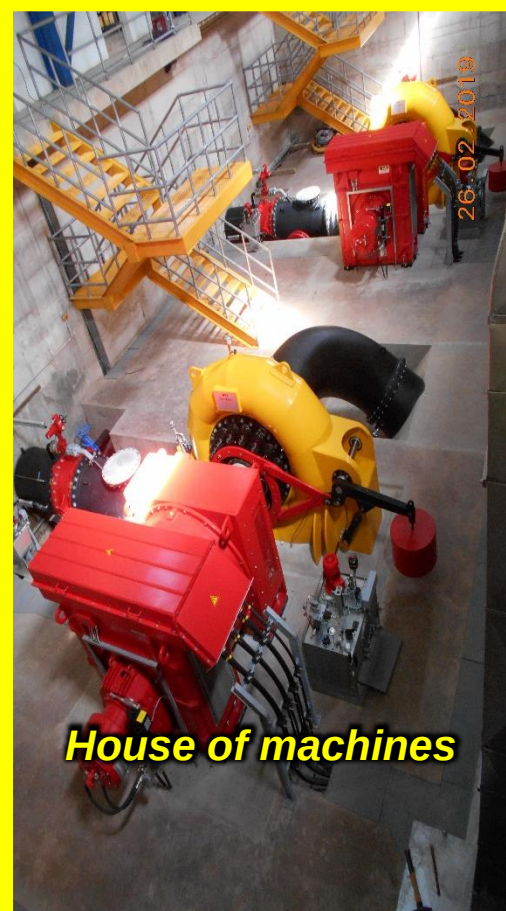
Presa



Investment:
U\$ 19.4 MM



Oscillation Tank



House of machines



House of machines

26.02.2019

PROJECT BIOMASS EGERSA (CASUR)

- **The EGERSA plant started operations in 2019**

It has a total installed power of 40MW, of which 27MW will deliver to the System

Power: 40 MW

Investment: US \$ 50.1 Million

Operation year: 2019

Location: Potosí-Rivas

2019



**Investment:
US \$ 50.1 MM**



Sub-Station



Transformer

PROJECTS IN CARIBBEAN COAST

**PNESER CARIBE - US\$ 579.0 MM
2007-2023**

C1

**Rural
Electrification**

22,864 Homes to be Electrified
119,579 Benefited population

Investment US\$51.2 Million



C2

**Settlement
normalization**

8,575 Housing to Normalize
22,424 Benefited population

Investment US\$ 8.5 Million



C3

**18 MW Renewable
Generation Plants**

15 Solar Generation Systems (15.2 MW)
5 Small Hydroelectric Plants (2.9 MW)
7 Commercial Agencies
21,120 homes benefited
110,458 Population Benefited

Investment US\$ 107.7 Million



C4

**Identification of
energy demand**

Identify the demand for electrical energy
in the 21 municipalities of the RACCN and RACCS.

Investment US\$ 1.66 Million

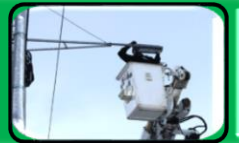


C5

Energy efficiency

245 thousand saving bulbs / 4 thousand street lighting luminaires /
300 productive SFVs / Stadium and park lighting / Caldera Hosp.

Investment US \$ 3.57 Million



C6

**Transmission
reinforcements**

Construction of 10 Substations
335 MVA installed and 1,315 km LT 138KV / 230KV

Investment US \$ 400.4 Million



C7

**Corn Island
Electrical System
Modernization**

Solar Hybrid System / Network Rehabilitation /
Energy Efficiency / Loss Reduction /
Little Corn Island Integration - Investment US \$ 5.9 Million

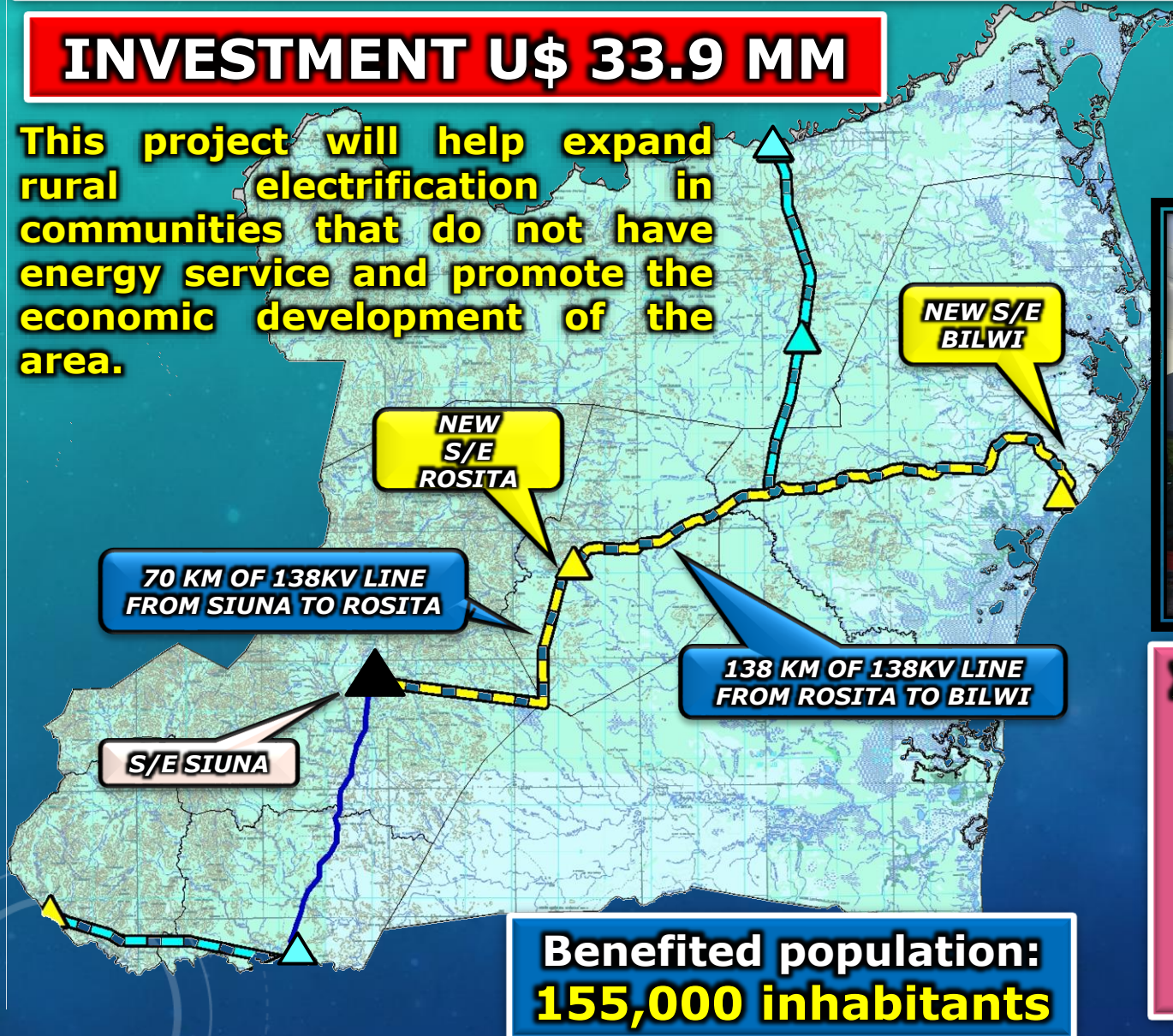


TRANSMISSION LINE SIUNA – ROSITA -BILWI

NORTH CARIBBEAN COAST ZONE(RACCN)

INVESTMENT U\$ 33.9 MM

This project will help expand rural electrification in communities that do not have energy service and promote the economic development of the area.



- **SCOPE:**
- New Rosita Substation.**
 - New Bilwí Substation.**
 - Mulukukú Substation Expansion.**
 - Siuna Substation Expansion.**
 - 208Km Transmission Line.**
 - 270km MLK-BIL Fiber Optic Line.**

EL TORTUGUERO SUBSTATION 138 KV

OFID - U\$21.6MM

**SIGN A LOAN
AGREEMENT IN
JULY 2020**

**EL TORTUGUERO
SUBSTATION**

Renewable Generation:
They will connect:
3MWp Solar Plant (In
financing
management)
At Kukrahill 5MWp
Solar Plant

**100 km of 138kV
transmission line**

Benefited population:
49,200 inhabitants

SCOPE:

EL TORTUGUERO Substation:

- 1 transformation bay with 138 / 24.9kV voltage ratio.
- 1 15 MVA, 138 / 24.9kV power transformer.
- 24.9kV Metaclad cells, indoor type, with their respective equipment.
- Auxiliary Services (AC Panels; DC; Rectifiers and Batteries) and own services transformer.
- Automated control, protection and measurement system.
- Ground grid system and aerial shielding of the substation and the control building.
- Perimeter lighting system and substation bays.
- Metal structures for lattice-type frames.
- Conductor, insulators and fittings for the bars, downspout and connections between equipment.
- Acquisition of land.

LA ESPERANZA Substation Expansion:

- 1 line bay at 138kV, with switch and bypass disconnector.
- 138 KV bar, includes gantries, conductors, insulators, and hardware.
- Expansion of the Ground and Aerial Shielding Network System.
- Expansion of the Automated Control, Protection and Measurement System.
- Expansion of the Lighting System in the new bays.
- Control cables.
- All civil works.

Transmission line:

100 km of 138kV transmission line, between the La Esperanza substation and the new El Tortuguero substation, with 556.5 kcmil ACSR conductor and OPGW type guard wire, mounted on lattice tower and pole structures.

Solar Generation System

SAN JUAN DE NICARAGUA

(Río San Juan)

2019

Investment
U\$1,4 Million



Solar plant
300 kWp



Batteries
664 kWh



Sistema Aislado

Project Site



2 Diesel Plants
210 KW each



1,017 Solar panels,
generators, metal
structures, etc.

 **BID** Investment :
Banco Interamericano de Desarrollo **US\$ 1.4 MM**

EN OPERACIÓN, ENERO 2019

CORN ISLAND (RACCS)

Hybrid Solar Generation System

2019

BACKGROUND

Households : 1,943
 Population : 7,656
 Annual energy consumption MWh : 649.7
 Peak demand : 0.91
 installed capacity MW : 2.0

ITEM	DESCRIPTION	financial services	MONTO (US\$)
COSTOS DIRECTOS DEL PROYECTO			
1	Supply of Goods	BID	\$ 4,118,086.48
2	Civil works	BID	\$ 182,400.00
3	Related Services	BID	\$ 239,500.00
	SUB-TOTAL (US\$)		\$ 4,539,986.48
OTROS COSTOS			
4	Supervision	BID	\$ 165,963.00
5	Feasibility study	BID	\$ 128,571.42
6	Land	ENATREL	\$ 600,000.00
7	Acquisition of Generators and related	ENATREL	\$ 528,000.00
	TOTAL INVERSIÓN (US\$)		\$ 5,962,520.90

PROJECT BENEFITS

Situatio	Diesel consumption n Gallons	generation Hours	Cost/ Gls. Diesel US\$	Diesel Cost (US\$/Mes)	Saved %
Without the Project (April 20	44,906.00	24	3.2	143,699.20	
With the Project (April 2020)	23,270.00	6	3.2	74,464.00	
BENEFITS	- 21,636.00	-18	-	- 69,235.20	48%

**2.1 MWp
Solar
Power**



**Project
Site**

**2.3 MWh
Batteries**



**1.8 MW
Generator**



**3,360 Ton
CO2/año Evitadas**

Note: An increase in BATTERIES 2 MW - U \$ 2.0MM and in Network Renovation is required to reduce Energy Losses.

**CORN
ISLAND**

Caribbean Coast SOLAR SYSTEM VOLTAIC-2020 - 2022

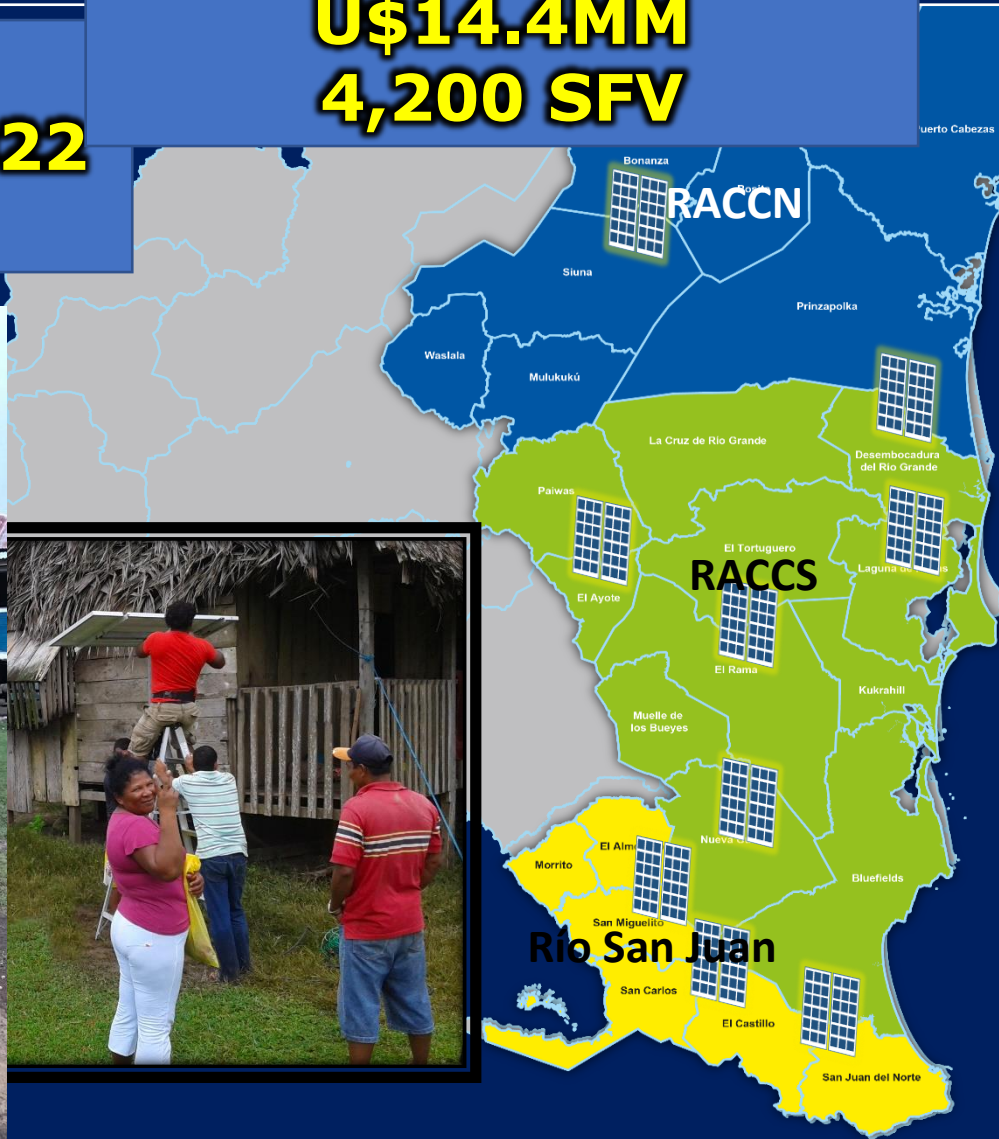
U\$36.1 MM

Phase I
YEARS 2020 - 2022
10,522 SFV

INVESTMENT 2020:
U\$14.4MM
4,200 SFV



Lapan, Bilwi



Dpto	Municipios	Numero de paneles solares	Numero de beneficiarios
Río San Juan	El Castillo	1,296	7,680
	San Carlos	926	5,436
	San Miguelito	104	624
	Laguna de Perlas	2,561	13,854
RACCS	Desembocadura de Río Grande	353	1,854
	El Rama	2,379	13,134
	Nueva Guinea	833	4,614
	El Ayote	1,260	7,236
RACCN	Siuna	810	6,600

Financing Phase I:

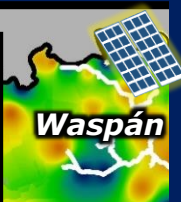
Korea Eximbank

US\$ 33,000.000

 Gobierno de Reconciliación y Unidad Nacional
El Pueblo, Presidente!

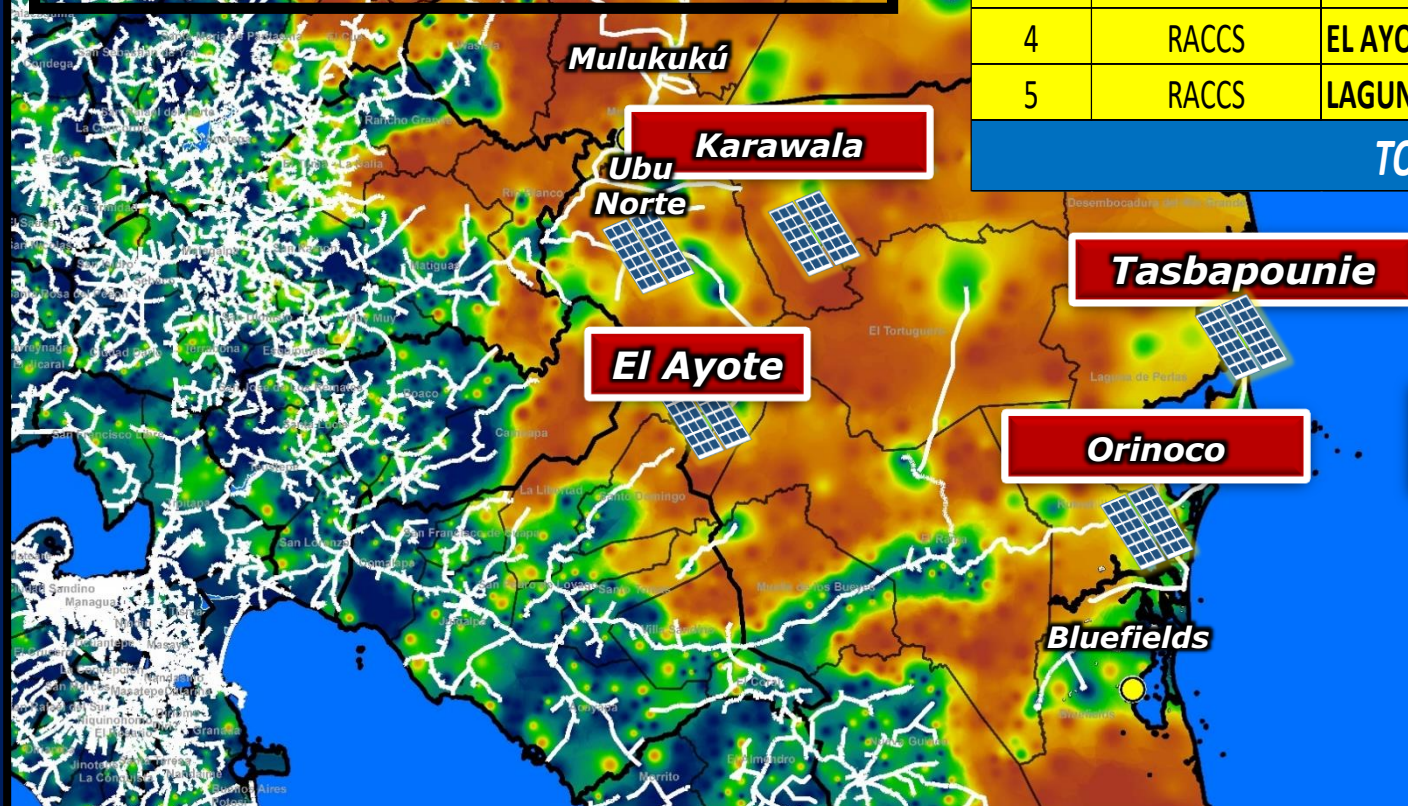
US\$ 3,089,000

2020



INSTALLATION OF 5 SOLAR SYSTEM VOLTAIC - CARIBBEAN COAST

No.	Región	Municipio	Sitios	Potencia a Instalar (Kwp)	Inversión (US\$)	Cantidad Aprox. de Paneles
1	RACCS	LA CRUZ DE RIO GRANDE	KARAWALA	500	400,000	1,697
2	RACCS	LAGUNA DE PERLAS	TASBAPOUNIE	300	240,000	1,018
3	RACCS	CORN ISLAND	LITTLE CORN ISLAND	300	240,000	1,018
4	RACCS	EL AYOTE	EL AYOTE	600	480,000	2,036
5	RACCS	LAGUNA DE PERLAS	ORINOCO	100	520,000	339
TOTALES				1,800	1,880,000	6,108



**US\$ 1.9 Millions
ENATREL**

**Capacity : 1.8 MWp
Number of Solar Panels:
6,108**

INSTALLATION of 6 Hybrid Solar Generation System EN RACCN Y RACCS.



1. WASPÁN:	3 MW U\$ 5.4 MM
2. BILWI:	4 MW U\$ 6.8 MM
3. SIUNA:	5 MW U\$ 5.0 MM
4. LAG. PERLAS:	2 MW U\$ 5.4 MM
5. KUKRA HILL :	5 MW U\$ 8.3 MM
6. BLUEFIELDS:	6 MW U\$ 6.9 MM

TOTAL
CAPACITY
25.0 MWp

SCOPE:

- Type C4 structure
- Photovoltaic modules
- Converter
- Lithium Ion Batteries, Inverter-charger
- SCADA control
- Interconnection to MT Circuit

NATIONAL BROADBAND PROJECT– U\$50 MM

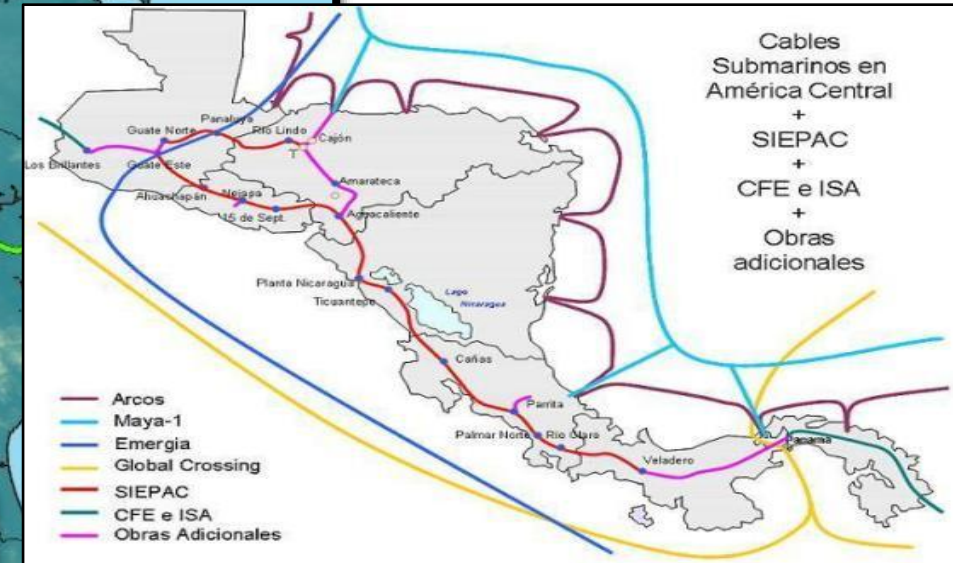
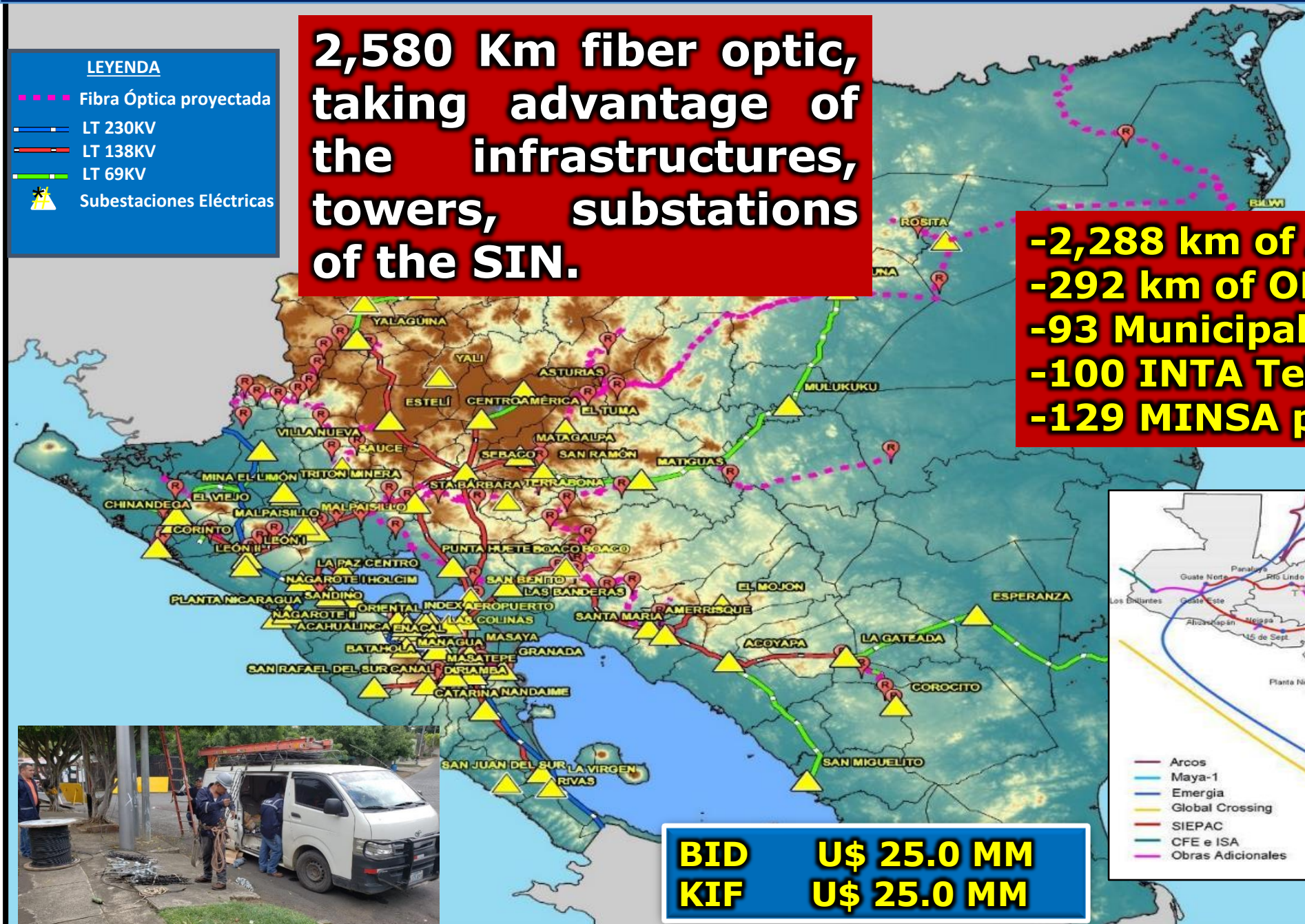
2018-2019

LEYENDA

- Fibra Óptica proyectada
- LT 230KV
- LT 138KV
- LT 69KV
- ⚡ Subestaciones Eléctricas

**2,580 Km fiber optic,
taking advantage of
the infrastructures,
towers, substations
of the SIN.**

- 2,288 km of ADSS fiber optics.**
- 292 km of OPGW fiber optics.**
- 93 Municipalities**
- 100 INTA Telecentres**
- 129 MINSA positions**



BID U\$ 25.0 MM
KIF U\$ 25.0 MM



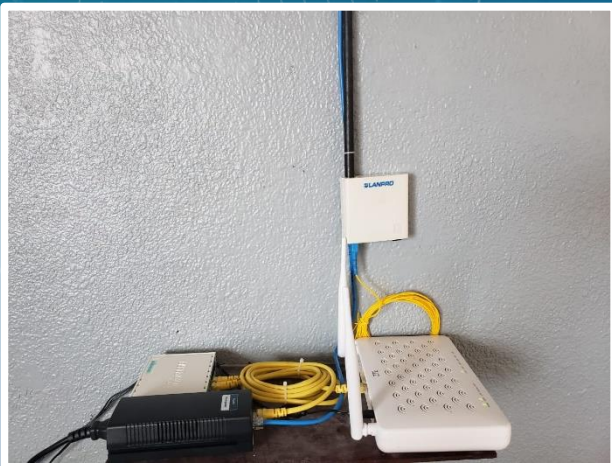
Data transport activation MINED

The National Institute Professor Guillermo Balladares Cano in Estelí was attended

03 AP (Access Point) were placed to guarantee WIFI in 3 Schools in Managua: Colegio Luxemburg, Josefa Toledo and Colegio Santo Domingo in Managua



Technical support was provided to 22 educational centers at the national level



*Technical tasks:
Last mile fiber optic.
Equipment
installation: AP Wifi
and CPE Mikrotik*



NATIONAL BROADBAND PROJECT– INTA (Telecentres)

Internet service and data transport were
activated in 06 Telecentres:

San Francisco Libre – Managua

San José de Cusmapa – Madriz

Matiguás – Matagalpa

Quezalguaque – León

**San Francisco del Norte y San Juan de
Cinco Pinos – Chinandega**



***Internet 10-30 Mbps, previamente se les
dotó de 5 computadoras con sus
accesorios también una impresora***



NATIONAL BROADBAND PROJECT- MINSA

Internet and data
transport service activated
in 129 MINSA

localities :

León, Cindeandega,
Estelí, Madriz, Nueva
Segovia, Managua,
Masaya, Carazo,
Granada, Rivas, Boaco



Thank you!!!!



**Ministerio de
Energía y
Minas**



**Gobierno de Reconciliación
y Unidad Nacional**
El Pueblo, Presidente!