MINISTERIO
DE ENERGÍA Y MINAS
REPÚBLICA DOMINICANA

VICEMINISTRY OF ENERGY SECURITY AND INFRASTRUCTURE

MINISTERIO
DE ENERGÍA Y MINAS
REPÚBLICA DOMINICANA

CONFERENCE

Resilience in the Domincan Republic. Vulnerabilities and Challenges.

Domingo Mateo Urbáez
Director
Energy Security

Santo Domingo, Domincan Republic
August 2017

República Dominicana

Geographical location and climate

The Dominican Republic occupies the eastern part of the island of Santo Domingo (or Española), whose western end corresponds to the Republic of Haiti. It is the second largest in the Greater Antilles, and is located between 17 and 20 degrees north latitude and 68 and 72 degrees west longitude, with the Atlantic Ocean to the north, the Caribbean Sea to the south and being separated from Puerto Rich by the Channel of the Mona and of Cuba by the Wind Channel.

The Dominican Republic enjoys a tropical climate throughout the year. A typical day may have full sun or a combination of sun / clouds. The average annual temperature is 25 ° to 31 ° C (78 ° to 88 ° F).

Demography

The Domincan Republic is comprised of 31 provinces and one National District (the capital). The official language is Spanish. The government is Republican. Both in terms of its size and its population, it is the second largest country in the Caribbean, after Cuba. It has territorial extensión of 48,670 square kilometers and its total population is 9,445,281 inhabitants (2010 census).

MINISTERIO
DE ENERGÍA Y MINAS
REPUBLICA DOMINICANA

República Dominicana
(Domincan Republic)

The Dominican Republic is a middle-income and developing country, with the ninth largest economy in Latin America and the largest in Central America and the Caribbean. The economy has undergone a process of transformation, moving from an orientation focused on agricultural production (sugar) to a service orientation towards tourism, responsible mining and other activities.

The currency is the Dominican peso, its symbol is RD $. Its Gross Domestic Product (GDP) at current prices in 2015 was about US $ 68,102 million. Its GDP per capita, PPP at current international prices is about US $ 14,237.1

MINISTERIO DE ENERGÍA Y MINAS
REPUBLICA DOMINICANA

Sistema Eléctrico Nacional Interconectado (SENI)
National Interconnected Electric System (SENI)

Sector Eléctrico Nacional (National Electricity Sector)

With the passage and implementation of the General Law of Reform of the Public Company No. 141-97, the routes for the unbundling and privatization of the electricity sector are created. The electricity sector saw its vertical organization structure change to a horizontal system, which now consists of generation, transmission, and distribution-commercialization.

This capitalization of the CDE gave rise to the Dominican Corporation of State Electric Companies (CDEEE), as a holding company of Electricity Distributors: Edenorte, Edesur and Edeeste. Likewise, several Public-Private Generation Companies were created, known as Itabo and Haina, as well as two state-owned companies, the Dominican Hydroelectric Generation Company (EGEHID) and the Dominican Electric Transmission Company (DTS).

In order to regulate and ensure compliance with the rules and regulations applicable to the new electricity market created by Law No.141-97, Decree No.118-98 establishes the Superintendency of Electricity (SIE). SIE began to exercise its functions as such in July 1999 and remained under the Ministry of Industry and Commerce until the enactment of Law No.125-01 or General Electricity Law.

MINISTERIO
DE ENERGÍA Y MINAS
REPUBLICA DOMINICANA

Sistema Eléctrico Nacional Interconectado (SENI)
National Interconnected Electricity System (SENI)

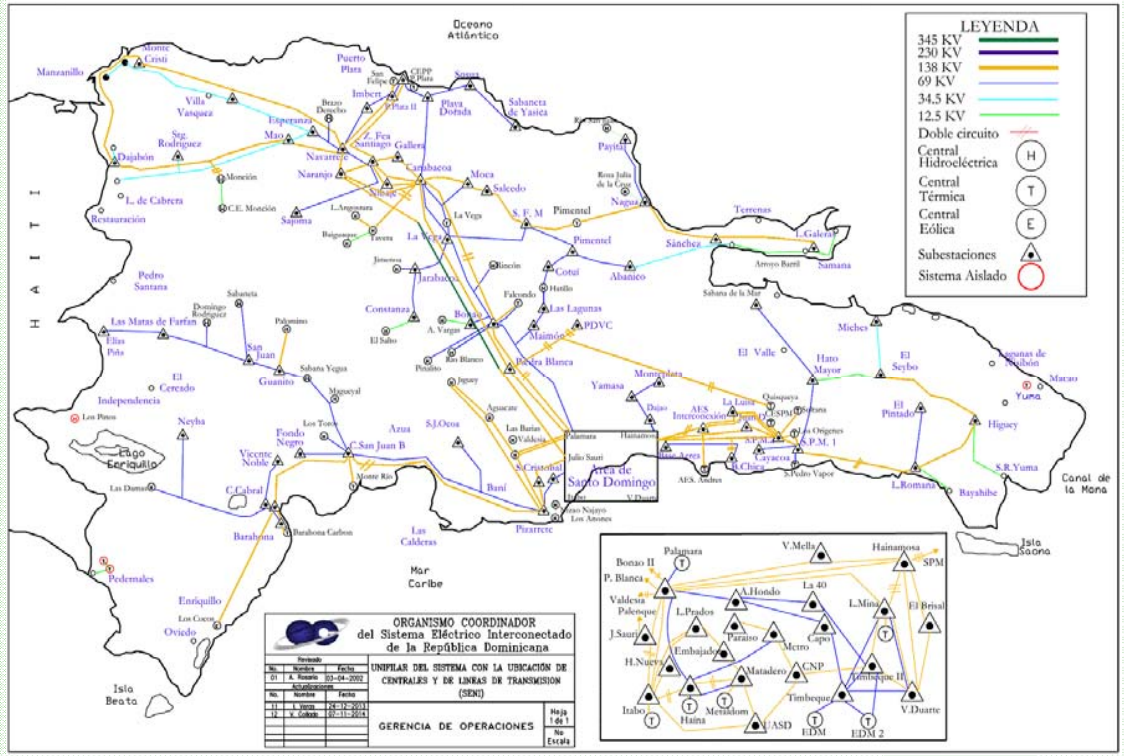
Sector Eléctrico Nacional (2) / National Electricity Sector (2)

On July 26, 2001, Law No.125-01 or General Electricity Law was enacted, which creates the integral regulatory framework demanded by the electricity sector. The same law creates the National Energy Commission (CNE).

In July 2013, Law No.100-13, which created the Ministry of Energy and Mines, was promulgated, with the aim of being the public administration body responsible for formulating and administering energy and metal mining policy and not Metallic. The formulation, adoption, monitoring, evaluation and control of policies, strategies, general plans, programs, projects and services related to the energy sector and its subsectors of electric power, renewable energy, energy Nuclear, natural gas and mining.

MINISTERIO
DE ENERGÍA Y MINAS
REPÚBLICA DOMINICANA

Sistema Eléctrico Nacional Interconectado (SENI)
National Interconnected Electricity System (SENI)



Description of SENI

SENI represents the set of power generation plants and transmission systems interconnected with each other. SENI's integrated programming and operation is carried out by the Energy Control Center (CCE).

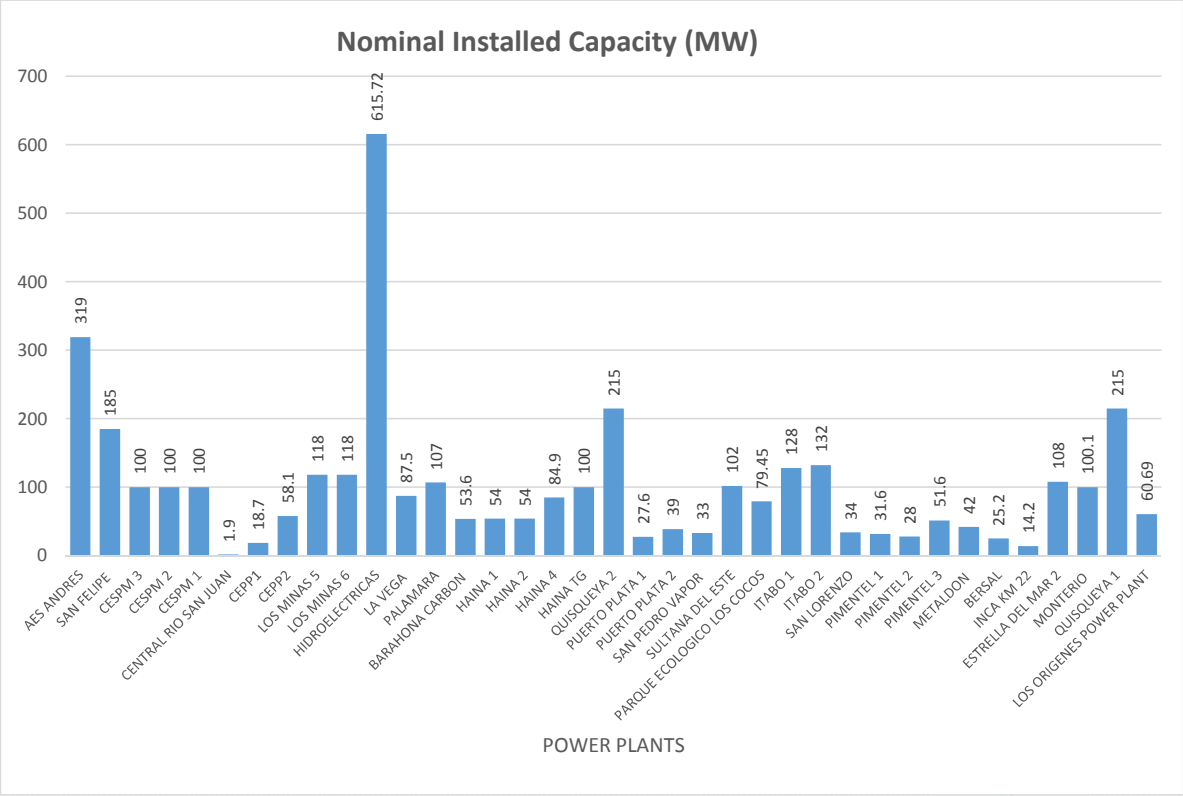
Generation

Transmission

Distribution

MINISTERIO DE ENERGÍA Y MINAS
REPUBLICA DOMINICANA

República Dominicana (Domincan Republic)



Nominal Installed Capacity (MW)

The installed capacity of the Domincan Republic's energy park is of the order of 3780.8 MW, according to a report from the National Interconnected Electricity System (SENI), while the national demand is around 2375 MW.

MINISTERIO
DE ENERGÍA Y MINAS
REPUBLICA DOMINICANA

Sistema Eléctrico Nacional Interconectado (SENI)
National Interconnected Electricity System (SENI)

Energy Generated by Fuel Source/Type	
Fuel	**Percent (%)**
Mineral Coal	14
Natural Gas	31
Fuel oil # 02	08
Fuel oil # 06	39
Water/Hydro	06
Wind	02

MINISTERIO
DE ENERGÍA Y MINAS
REPUBLICA DOMINICANA

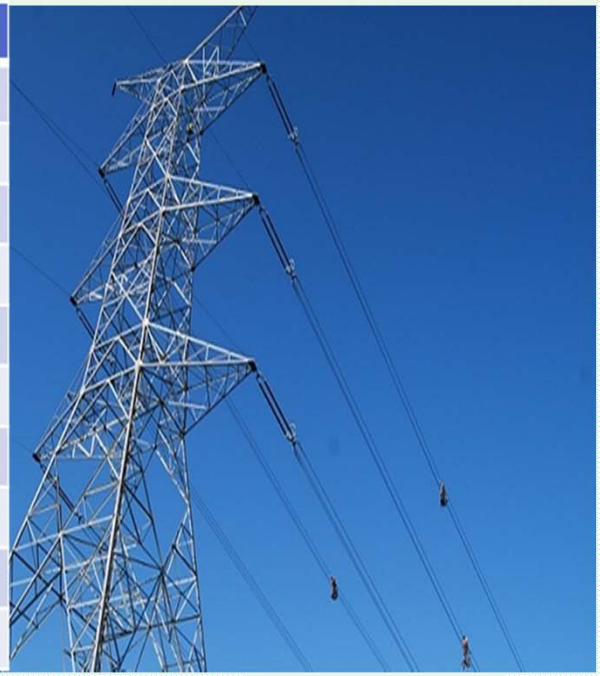
Sistema Eléctrico Nacional Interconectado (SENI)
National Interconnected Electricity System (SENI)

Energy Generated by Technology	
Technology	MW
Motor diésel	1,135.0
Combined Cycle	795.0
Hydraulic	601.9
Steam Turbine	603.4
Gas Turbines	480.0
Wind/Photovoltaics	115.5
Total	3,730.8

MINISTERIO
DE ENERGÍA Y MINAS
REPÚBLICA DOMINICANA

National Interconnected Electricity System (SENI): Electricity Transmission Infrastructure

Infraestructura	Capacidad (MVA)
Subestaciones (21)	4,830.0
Transformación	**Capacidad (MVA)**
Transformación 138/69Kv	2,100.0
Transformación 345/138Kv	2,730.0
Redes de Transmisión	**Longitud (Kms)**
Linea de Transmision 69Kv	1,911.0
Linea de Transmision 138Kv	2,230.48
Linea de Transmision 345Kv	139.70



MINISTERIO
DE ENERGÍA Y MINAS
REPÚBLICA DOMINICANA

Resilience

Resilience of Critical Infrastructure

It is the robustness and ability of infrastructures to recover their operations, minimizing disruptions, resisting and supporting extreme events, guaranteeing reliability and safety of people, operations and the entire energy system.

It assesses a country's ability to withstand sudden changes that can cause the collapse of its energy supply chain and recover as quickly as possible. These disruptive factors can slow down the country's economic growth, of a region or province, making it difficult to operate normally, and in turn damages the well-being of its inhabitants.

These factors include GDP per capita, dependence on energy resources, risks of exposure to and response to natural disasters, quality of protection systems (fire-fighting, warfare, terrorism, etc.).) to people and infrastructures. Likewise, we will depend on the reliability, safety and quality of resource supplies.

MINISTERIO
DE ENERGÍA Y MINAS
REPUBLICA DOMINICANA

Resilience

The economic, social and environmental development of a country should be protected through multi-sectoral strategies with appropriate regulations for disaster prevention, quality infrastructure, productive structure, earthquake resistant buildings, local supplies of very good quality basic products, among other elements .

MINISTERIO
DE ENERGÍA Y MINAS
REPUBLICA DOMINICANA

Vulnerabilities

Atmospheric phenomena

The island of Hispaniola is on the route of hurricanes and is vulnerable to the effects of atmospheric phenomena that begins on June 1 and ends on November 30 of each year. Tropical cyclones are forecast for these seasons, ranging from intense to moderate, and Tropical Storms.

The threat to the country caused by these rains, floods, landslides, tree falls and power lines (transmission and distribution), and damage to homes that can provoke, forces us to be always prepared, which implies mitigation of the possible damages.

MINISTERIO
DE ENERGÍA Y MINAS
REPUBLICA DOMINICANA

Vulnerabilities

Atmospheric phenomena. Background

From its first days the Dominican Republic has been impacted by different atmospheric phenomena, we present in synthesis the most transcendental by the strength of its winds, floods and losses of resources.

Hurricanes and Storms		
Name	Year	Category
San Zenón	1930	4
Inés	1966	4
Beulah	1967	4
David	1979	5
Federico	1979	Storm
Emilia	1987	4
Georges	1998	3
Iván	2004	5
Noel	2007	Storm
Olga	2007	Storm

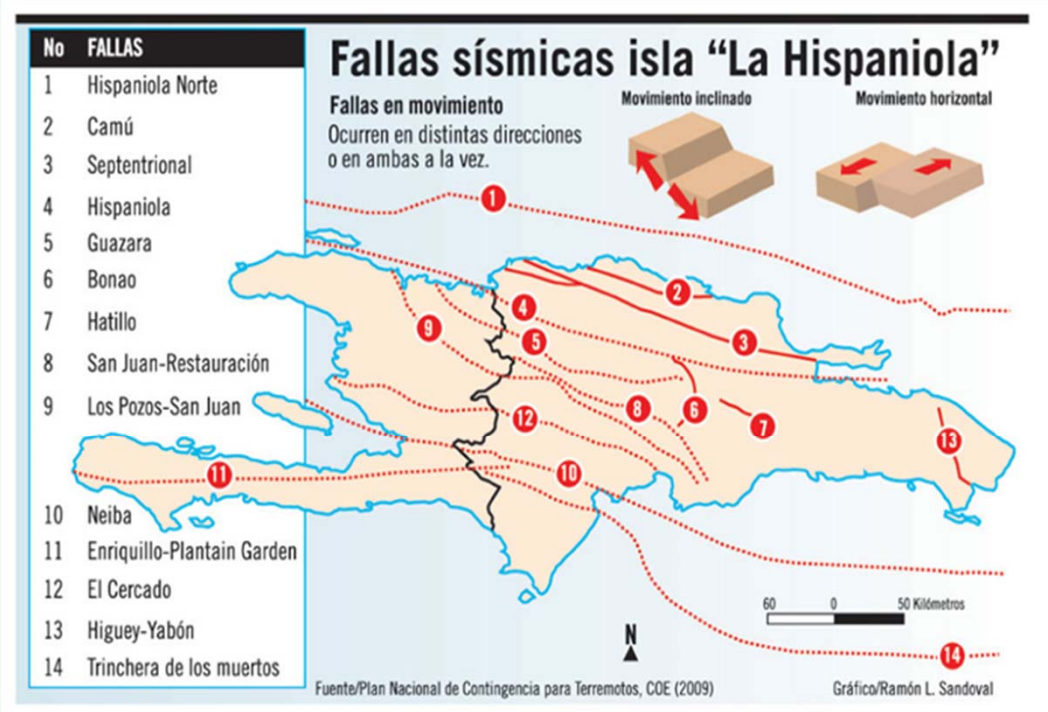
MINISTERIO
DE ENERGÍA Y MINAS
REPUBLICA DOMINICANA

Vulnerabilities

Tectonic Faults

The island of Hispaniola has a system of active geological faults that cross almost all the firm territory and some marine areas, which shows a high seismicity with probability of occurrence of earthquakes and tsunamis.

One of the most important blocks, due to its seismic activity, is to the north of the country, with the northern fault that goes from Manzanillo, Monte Cristi, in the Northwest, to Samaná, in the Northeast, with a length of 300 kilometers.



MINISTERIO DE ENERGÍA Y MINAS
REPÚBLICA DOMINICANA

Vulnerabilities

Tectonic Faults (2)

To the North are also the Trench de Puerto Rico and / or Milwaukee and the North Hispaniola faults. Both groups occupy part of the Atlantic Ocean.

Penetrating from the southern part of the Haitian marine territory, there are several important faults, such as the Enriquillo-Plantain Garden, the Los Muertos Trench, The Wells de San Juan, Neiba, Azua, Ocoa until reaching the Los Muertos Trench, south of Santo Domingo, San Pedro de Macorís and La Romana.

MINISTERIO
DE ENERGÍA Y MINAS
REPUBLICA DOMINICANA

Cases and experiences

- **The Case of Hurricane George**

On September 22, 1998, Hurricane George caused one of the worst natural disasters in the history of the Dominican Republic. With winds of up to 200 km / hour, intense and prolonged rains, causing floods and overflows of rivers and dams in the East and South, affected directly or indirectly in the eastern provinces and the National District hundreds of thousands of people of one Total Dominican population estimated at 8.2 million.

The final balance of the hurricane is 283 deaths, damages to thousands of homes, aqueducts, schools, bridges, roads, energy grid systems, communications. As well as trade, industry and the environment.

It is one of the most remembered cyclones due to its devastation. This produced the largest power failure caused by a natural disaster in the Dominican Republic.

The total damage caused by the passage of Hurricane George was estimated at about 33,000 million Dominican pesos (US $ 2,195 million).

MINISTERIO
DE ENERGÍA Y MINAS
REPÚBLICA DOMINICANA

Cases and experiences.

- **Case of George Huracan (cont ...)**

Electrical energy and fuels

The country's electricity system suffered serious damage as electricity was distributed over an overhead line: winds and floods destroyed cables, transformers and support posts, as well as hundreds of kilometers of transmission lines, Generation plants of Jimenoa and Constanza, which are estimated to require years for their rehabilitation.

The lack of electricity due to damage to the transmission and distribution networks was noticeable: 579.7 kilometers of single-phase and three-phase lines became unusable, as well as 138.8 km of 34.5 kV lines, 113.5 km of 69 kV lines and 50.0 km Km of 138 kV lines. Likewise, they suffered 4.16 km of distribution lines of 12.5 kV.

The CDE made an assessment of the losses in its different sectors, which amounted to 1,333.5 million Dominican pesos, including losses in the hydrocarbons (refinery and oil pipeline) sector.

MINISTERIO
DE ENERGÍA Y MINAS
REPÚBLICA DOMINICANA

Cases and experiences.

- **Case of Hurricane George (cont ...)**

Damage to the oil refinery was minimal due to the timely precautionary measures taken, which began four days before the impact of the hurricane. This made it possible to ensure that there was fuel in the distribution stations, because although the work had to be interrupted on the 22nd, as well as the operations of the ships, hydrocarbon offices were suspended for only several hours and were restarted on the 23rd , Just one day after the phenomenon happened, and on the 26th, the tasks were resumed.

Road infrastructures (roads, neighborhood roads and bridges), ports and airports, telecommunications, buildings of the school sector, sports and recreation facilities, agriculture (food, livestock, poultry others) also suffered.

The environment and ecology were severely damaged by the destruction of thousands of palm trees and other trees in the hurricane hit area, which included the National District, eastern provinces, river basins, forests and national parks. 19 protected areas, including parks and scientific reserves, were affected, with 6,780 square kilometers equivalent to 13.9% of the Dominican territory.

Cases and experiences.

- **Case of Tropical Storms Noel and Olga**

Of the storms, Noel (October 2007) and Olga (December 2007), outside of the season, keep an important historic seat for their damages to the economy and the values of rains that left. By the winds and floods produced by Noel, at least 73 people died, more than 64,000 were evacuated and over 1,500 were rescued. The phenomenon caused the destruction of the village of Duey in Villa Altagracia and the isolation of 39 communities in the southern region.

Noel and Olga caused damage to the national electricity system estimated at more than RD $ 2 billion, affecting public-owned infrastructure, mostly located in the distribution and transmission subsectors. Santiago was one of the provinces most affected by the barrage of the dam of Tavera.

Road infrastructures suffered considerable damage, routes or different routes were carried out for the transportation of cargo and passengers, this implied greater distances from the traditional routes available before the disaster, worse conditions, both of paths and of rolling wallets, increasing their costs of Operations, fuel consumption and longer transportation time.

Cases and experiences.

- **Case Tropical Storms Noel and Olga (cont ...)**

As regards the housing sector, it was seriously affected, especially in the most vulnerable sectors of the population, with a considerable amount of losses, it was necessary to move entire areas (houses and buildings of services) to new land because of the danger of those places they occupied.

Also, the Dominican agricultural sector was affected in agriculture (corn, cocoa, banana, bananas, vegetables and oriental vegetables), livestock, poultry (losses in millions of pesos in chickens and egg production), Among other items.

In general terms, the damages caused by both storms amounted to more than RD $ 14,500 million (equivalent to 1.3% of GDP), with the agricultural sector receiving the greatest impacts.

Conclusions

Results of lessons learned:

- Education and Coordination continue in the forefront as the magic words for handling emergencies that may arise, the situation in the city of Santo Domingo has been aggravated by the increase in population and attention to the region of the deep south, where many Years that does not impact a major hurricane.

- Advance dissemination and promotion of atmospheric phenomena.

- Creation of the COE, as a planner and director of all inter-institutional coordination actions of the system of prevention, mitigation and response to disasters, given the probable occurrence of adverse events or sudden occurrence of the same anywhere in the national territory. Also, guarantee the actions tending to mitigate the effects derived from the event.

MINISTERIO
DE ENERGÍA Y MINAS
REPÚBLICA DOMINICANA

Conclusions (cont.)

- **Regulation for construction of earthquake-resistant infrastructure:** Its purpose is that public and private constructions built throughout the country can resist the effects of seismic movements.
- **Annual plan of maintenance and cleaning of areas of transmission lines and electric distribution:** tree pruning, changing routes and electrical structures (metal towers, posts of greater heights, standardized aluminum wires, etc.).
- **Robustness of Critical Energy Infrastructures so that they can withstand the inclemencies of the wind produced by the hurricanes of greater category.**
- **Regional Agreements for Exchanges of Contingency Plans.** Pre and post phenomenon.
- **Simulation work** in the zones and buildings with the highest concentration of citizens

MINISTERIO
DE ENERGÍA Y MINAS
REPÚBLICA DOMINICANA

Gracias!!!

Domingo Mateo Urbáez
Director Seguridad Energética
Viceministerio de Seguridad Energética e Infraestructura
Email: dmaeo@mem.gob.do

MINISTERIO
DE ENERGÍA Y MINAS
REPÚBLICA DOMINICANA