Country Report

Honduras

Energy Policy, Knowledge Co-Creation Program, JICA
Course No: 202208409-J001

Tokyo, Japan
June – July 2023

Presented by: Ada Suyapa Cerna
Planning Analyst of the National Electric System Expansion
Electric Power Regulatory Commission (CREE)
Tegucigalpa, Honduras
acerna@cree.gob.hn; ada.suyapacerna@gmail.com

Index

American Continent

1. General Information: Country Profile

Honduras is in the Central American region, bounded to the north by the Caribbean Sea (Atlantic Ocean) and to the south by the Pacific Ocean.

The country has extensive Caribbean beaches, jungle, mountains, rivers, a wide variety of birds, and the second largest coral reef in the world.

Honduras has only two seasons in the year, the rainy season and the dry season. The climate is warm, the average high temperature throughout the country is 32 °C, and the average low temperature is 20 °C.

Language: Spanish
Currency: Lempira
Capital: Tegucigalpa
Land Surface: 112.492 km^2


Traditional clothing


Tegucigalpa city,
Honduras capital


Roatan Island


Biodiversity

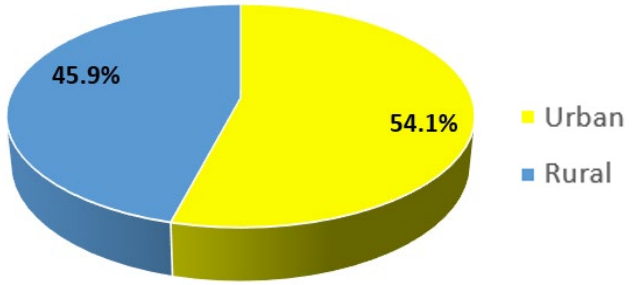

Mayan Ruins


Flag

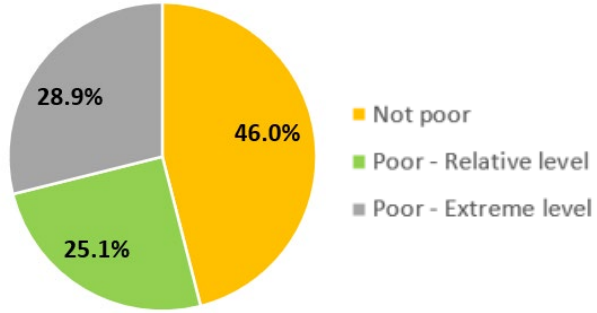
1. General Information: Economic indicators

The population of Honduras is around 10.28 million people. It is estimated that there are 2,152,827 households.

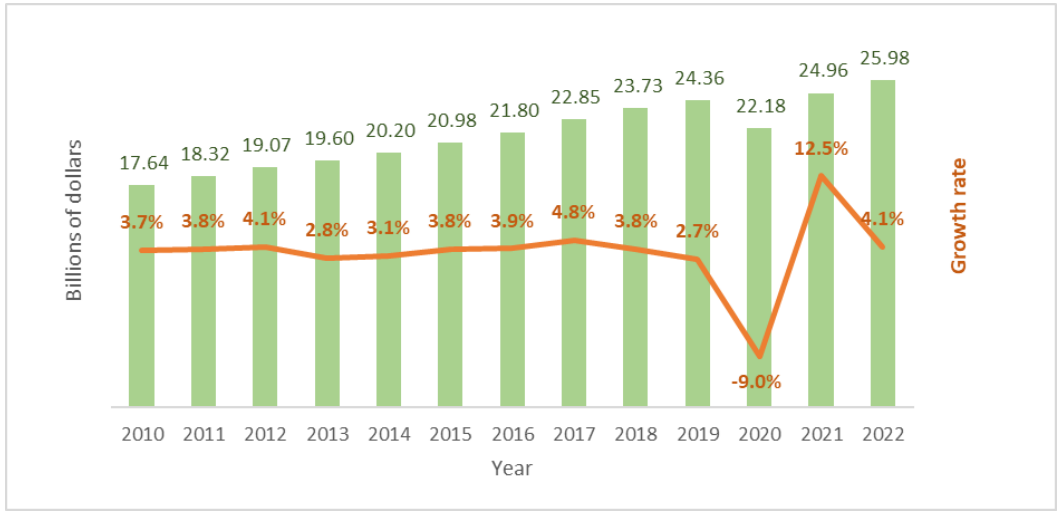
Graph 1. Population Distribution by Geographic Area
(Percentage)



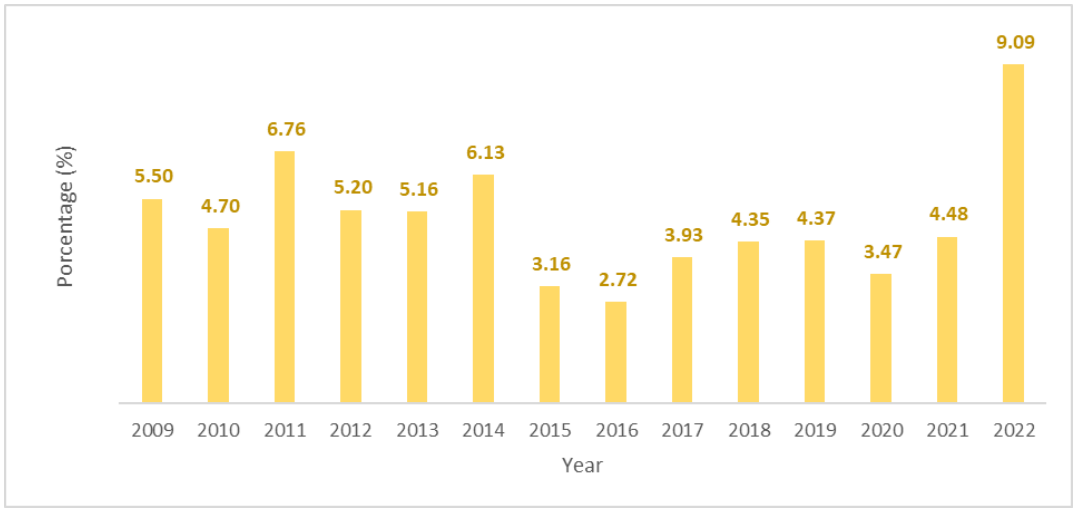
Graph 2. Households by Poverty Level, 2021
(Percentage)



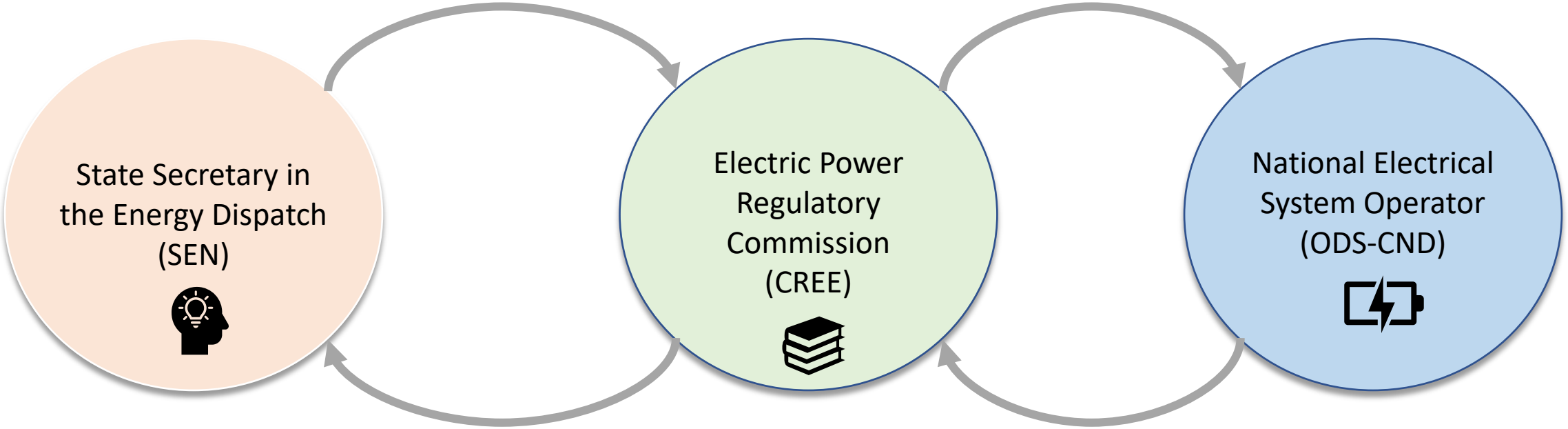
Graph 3. GDP, US$ at constant 2010 prices



Graph 4. Inflation index, consumer prices



1. General Information: Organization of the Electricity Sector



The SEN is the governing institution of the national energy sector.

Its functions are oriented towards the planning, execution and monitoring of strategies and policies for the integral and sustainable development of the energy sector.

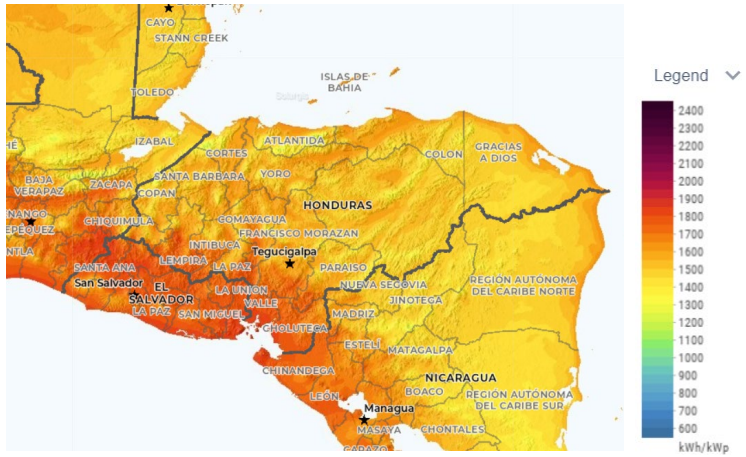
The CREE is the regulator of the national electricity market

Its functions are aimed at: (i) defining the regulatory framework, and (ii) supervising and imposing sanctions on regulated entities

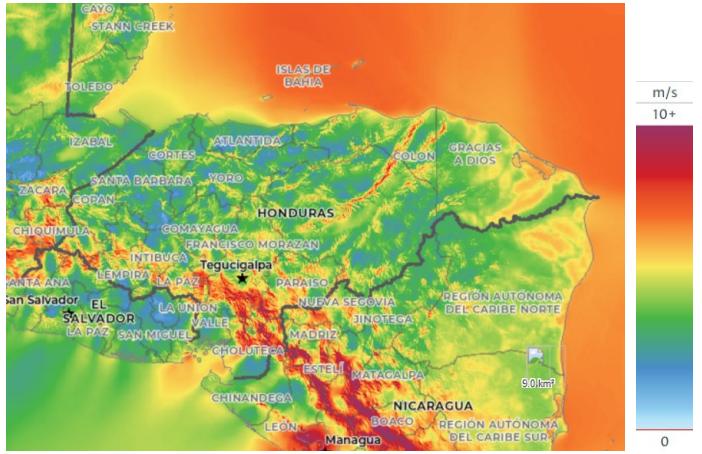
The main function of ODS-CND is to guarantee the continuity and security of the electricity supply, and the correct coordination of the generation and transmission system at the minimum cost for the set of operations of the electricity market.

1. General Information: Availability of Energy Resources

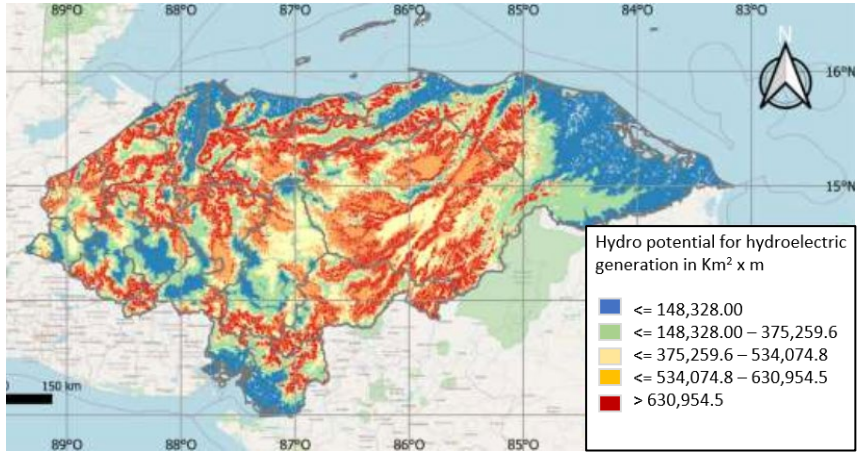
Graph 1. Solar potential (units in kWh/kWp day)



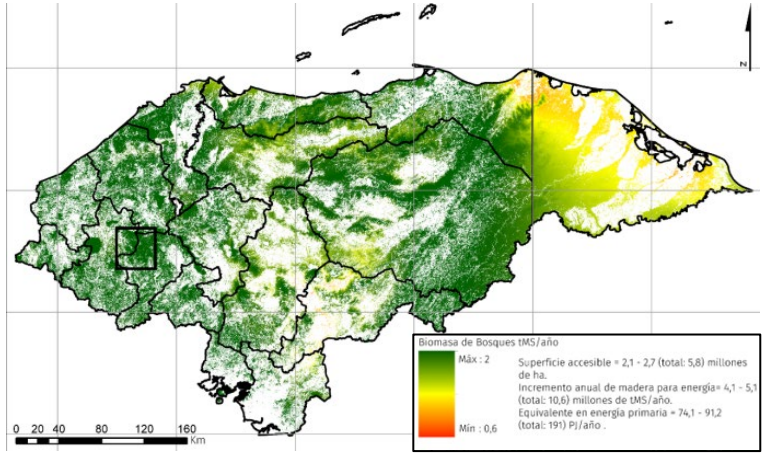
Graph 2. Wind potential (units in m/s), height of 100 meters above ground



Graph 3. Hydro potential for hydroelectric generation



Graph 4. Spatial distribution of accessibility of biomass from natural forests



1. General Information: Availability of Energy Resources

Graph 5. Geothermal potential

Graph 5: The orange points indicate the potential geothermal locations, identified throughout the Honduran territory, that add around 205 points.

Temperature ranges registered: high (>150 °C), intermediate (100-150 °C) and low (<100 °C).

- Honduras is not an oil-producing country, therefore, to supply a certain portion of the national energy demand, it requires importing oil derivatives from countries that have crude oil production and/or refining.

Additionally, the exploitation of minerals in Honduras focuses on the extraction of non-metallic elements such as: gravel, sand, precious stones (particularly opal); and metallic elements such as: gold, silver, copper, lead, zinc, iron, molybdenum and antimony.

2. Past Energy demand and supply: Energy offer

Table 1. Energy offer by type of energetic, 2017-2021

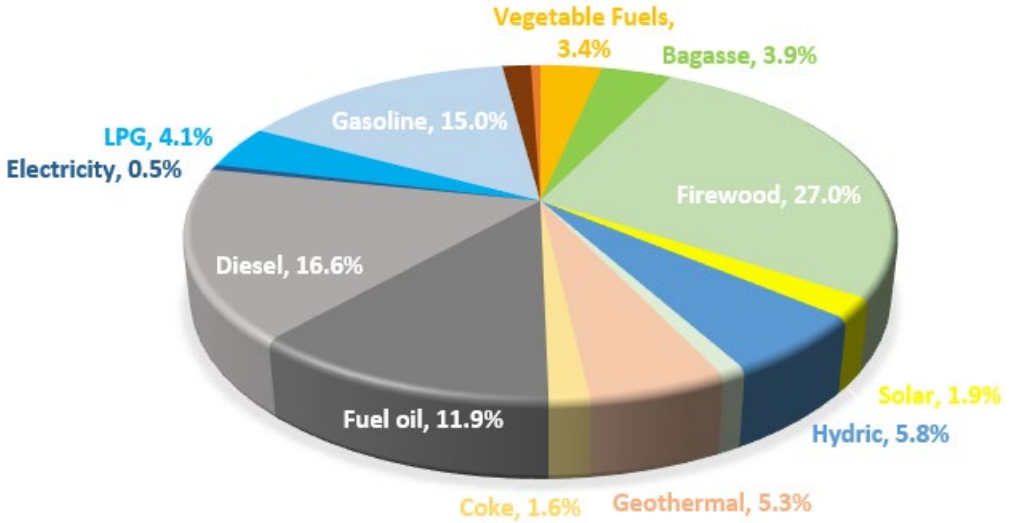
			2017	2018	2019	2020	2021
Total year (KBEP units)			**43,328.00**	**44,095.00**	**47,075.00**	**38,722.00**	**40,805.00**
Representation percentage [%]	Primary energetics	Vegetable Fuels	0.8%	0.4%	0.8%	3.5%	3.4%
		Bagasse	9.2%	8.5%	4.2%	4.9%	3.9%
		Firewood	23.6%	25.8%	23.7%	29.2%	27.0%
		Solar	1.2%	1.3%	1.5%	1.5%	1.9%
		Hydric	4.4%	4.7%	3.1%	4.5%	5.8%
		Wind	0.8%	1.3%	1.1%	1.0%	1.0%
		Geothermal	0.0%	0.4%	3.8%	4.9%	5.3%
	Secondary energetics	Coke	3.6%	5.2%	4.9%	4.0%	1.6%
		Fuel oil	12.0%	7.5%	12.4%	14.1%	11.9%
		Diesel	15.0%	15.0%	14.2%	14.7%	16.6%
		Electricity	13.8%	14.4%	14.2%	0.5%	0.5%
		LPG	3.0%	2.3%	3.1%	4.0%	4.1%
		Gasoline	11.4%	11.5%	11.7%	12.1%	15.0%
		Kerosene AV-Jet	1.2%	1.2%	1.2%	1.0%	1.6%
		Not energetic	0.0%	0.6%	0.0%	0.0%	0.5%

*KBEP: Thousands of barrels of oil equivalent

Table 2. Balance - Energy offer, 2017-2021

	2017	2018	2019	2020	2021
Production	40.7%	42.6%	38.0%	43.8%	43.6%
Import	53.4%	50.9%	55.8%	50.5%	51.7%
Export	4.7%	4.9%	6.0%	5.7%	4.1%
Inventory Change	1.2%	1.5%	0.2%	0.1%	0.5%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Graph 1. Percentage of energy offer by type of energetic, 2021



2. Past Energy demand and supply: Energy consumption

Table 1. Energy consumption by type of energetic, 2017-2021

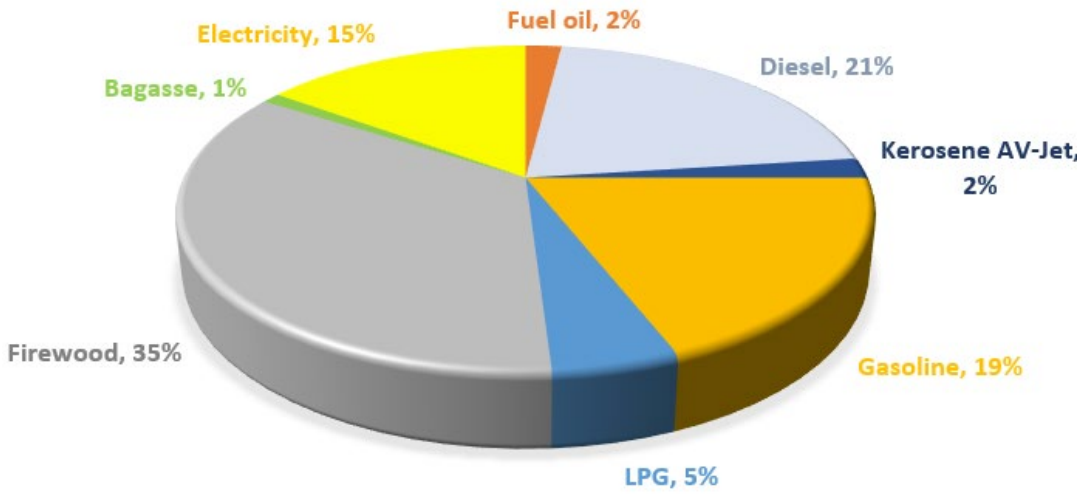
		2017	2018	2019	2020	2021
Total year (KBEP units)		**33,376.00**	**29,679.00**	**30,456.00**	**27,721.00**	**31,128.00**
Representation by type of energetic [%]	Fuel oil	3%	2%	2%	2%	2%
	Diesel	19%	21%	20%	20%	21%
	Kerosene AV-Jet	2%	2%	4%	1%	2%
	Gasoline	15%	17%	17%	17%	19%
	LPG	4%	3%	4%	4%	5%
	Coke	2%	2%	2%	0%	0%
	Firewood	30%	38%	36%	40%	35%
	Bagasse	11%	0%	1%	1%	1%
	Electricity	15%	14%	15%	15%	15%

*KBEP: Thousands of barrels of oil equivalent

Table 2. Final energy consumption by sector, 2017-2021

	2017	2018	2019	2020	2021
Agriculture	0%	0%	1%	1%	1%
Commercial Public Services	11%	10%	9%	8%	9%
Residential	35%	40%	39%	45%	39%
Construction and Others	1%	2%	0%	0%	0%
Transport	31%	34%	35%	32%	37%
Industry	22%	14%	16%	14%	14%
Total	**100%**	**100%**	**100%**	**100%**	**100%**

Graph 1. Percentage of energy consumption by type of energetic, 2021



2. Past energy demand and supply: Electricity subsector

Graph 1. Electricity dispatch by generation technology, 2007 – 2022

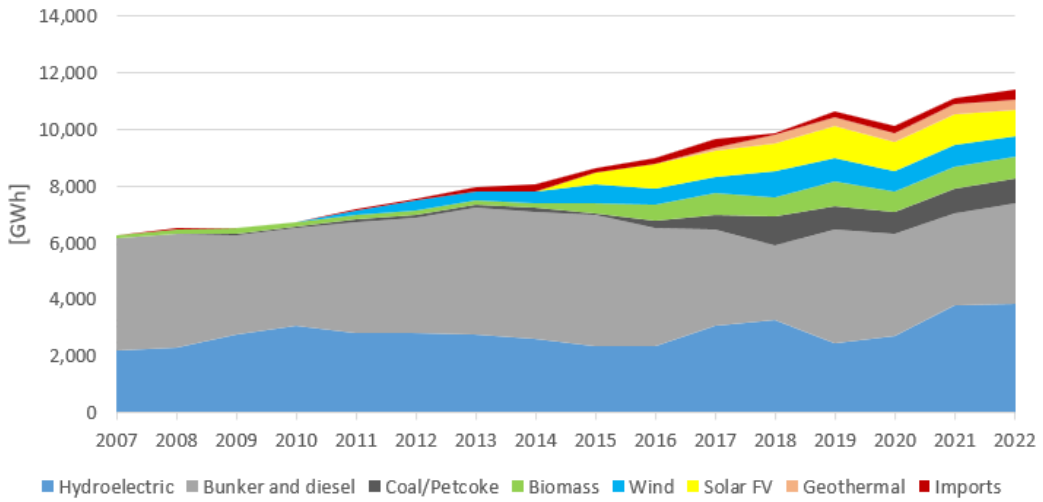
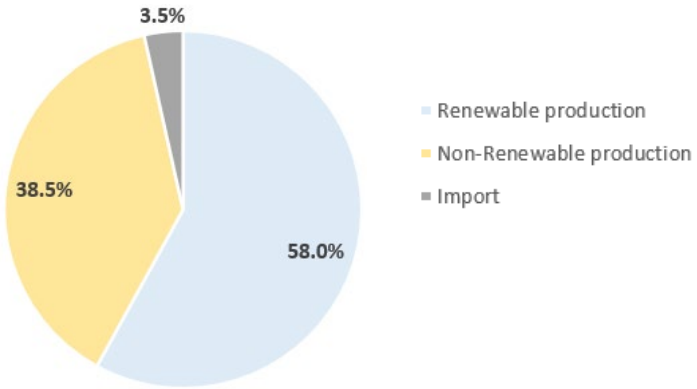


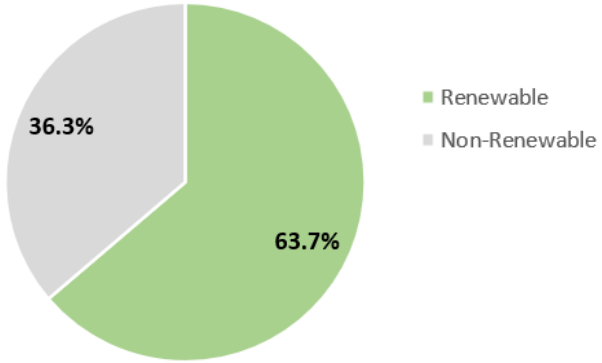
Table 1. Installed capacity electricity sector, May 2023

Type	[MW]	[%]
Hydroelectric	848.97	29.2%
Bunker and diesel	949.85	32.6%
Coal/Petcoke	105.00	3.6%
Biomass	221.29	7.6%
Wind	235.00	8.1%
Solar FV	510.78	17.6%
Geothermal	39.00	1.3%
Total	**2,909.89**	**100%**

Graph 2. Electricity dispatch, 2022

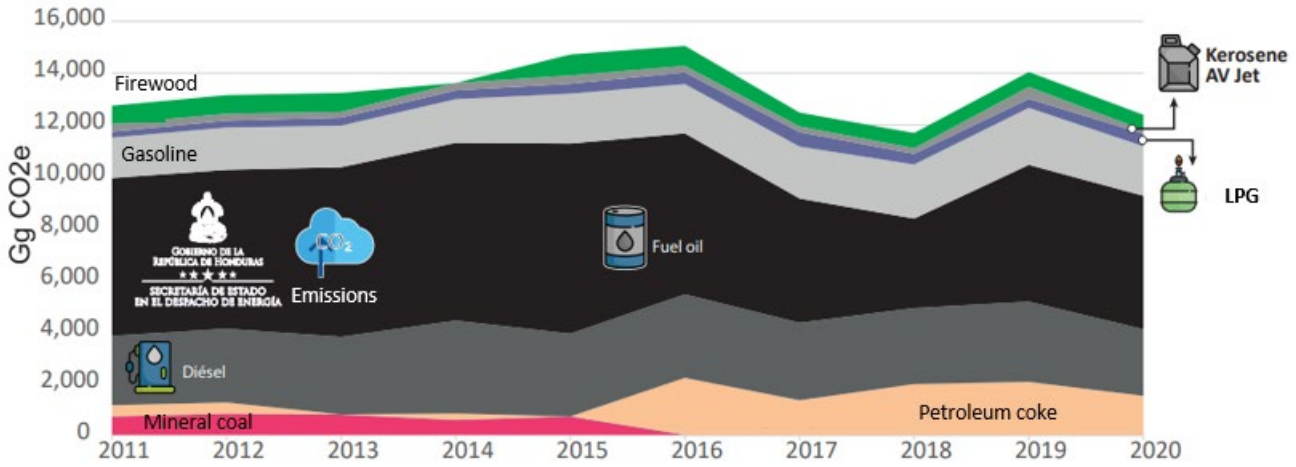


Graph 3. Installed capacity, May 2023



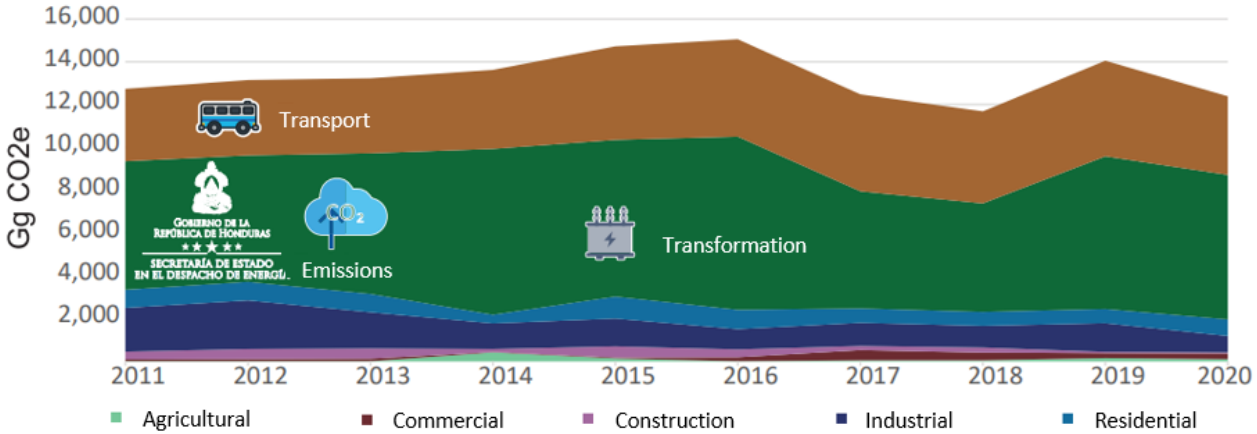
2. Past energy demand and supply: CO2 emissions

Graph 1. Emissions by type of energetic, 2011 - 2020



In Honduras, the main transformation centers are the electricity generation plants, which are usually directly connected to transmission or distribution networks to facilitate the supply of the national electricity demand.

Graph 2. Emissions by consumption sector, 2011 - 2020



2. Past Energy demand and supply: Remarks of the COVID-19 impact

Energy sector:

In Honduras, the effects of the Covid-19 pandemic, declared by the World Health Organization as a public health emergency of international importance on January 30, 2020, were visible from March of that year, as a result of the prevention and control measures for the spread of the coronavirus implemented by the Government of Honduras. The supply and consumption of energy in 2020 compared to 2019 decreased by 17.7% and 8.98% respectively.

To the year 2021, due to the actions of the Government of Honduras to relax mobility restrictions and the gradual reactivation of economic activities, an accelerated growth in the general consumption of energy sources was observed. The energy offer in 2021 compared to 2020 increased by 5.4%, and energy consumption by 12.29%.

Electricity subsector:

Despite the Covid-19 pandemic and the passage of the hurricanes “Eta” and “Iota” in the national territory, which reduced electricity consumption in the country during 2020 (-4.8% compared to 2019), the electricity demand in Honduras in 2021 increased to values even higher than expected. The observed compound annual growth rate from 2007 to 2019 was approximately 4.5%, while the observed growth rate from 2021 to 2020 was 9.2%.

3. Outlook of energy demand and supply: Energy sector

Considerations, trend scenario:

✓ Vehicle efficiency improvements and entry of a bus rapid transit system.

✓ Substitution of energy sources in industries (greater share of electricity and reduced share of fossil fuels).

✓ Efficiency improvements in the industrial sector.

✓ Savings in the use of firewood in the residential sector (greater penetration of efficient stoves and stoves based on electricity and LPG).

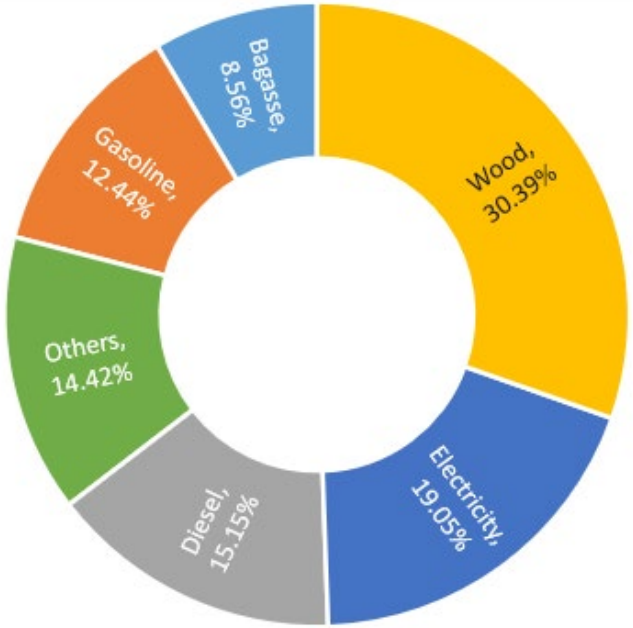
✓ Capacity additions in the electricity subsector in accordance with the minimum cost scenario of the indicative plan for the expansion of national generation.

Table 1. Demand supplied by type of energetic

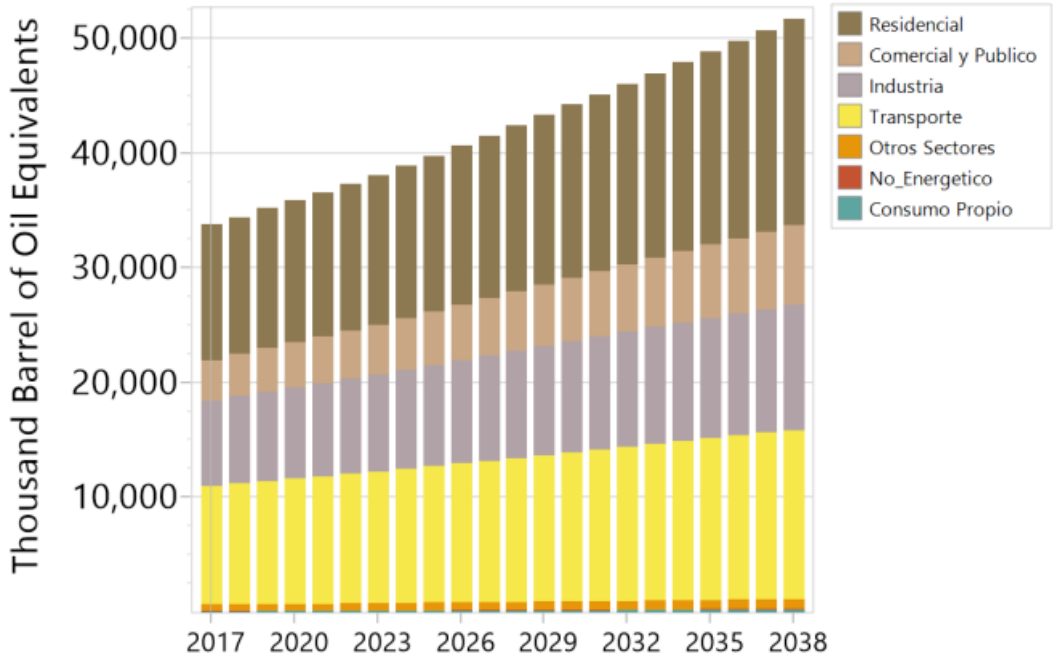
Fuels	2023	2028	2033	2038
Non Energy	0	0	0	0
Electricity	6,069	7,228	8,481	9,839.00
Electricity_solar	11	13	16	19
Electricity_priv	55	61	68	76
Electricity_motor	3	4	4	4
Natural Gas	0	0	0	0
Gasoline	5,292	5,726	6,126	6428
Kerosene	781	882	980	1073
Diesel	6,863	7,268	7,596	7826
Residual Fuel Oil	1,151	1,299	1,435	1561
LPG	1,619	1,908	2,207	2518
Coal Bituminous	0	0	0	0
Wood	11,306	12,576	14,036	15696
Biogas	15	32	51	74
Ethanol	4	36	109	227
Vegetal Wastes	107	223	361	518
Bagasse	3,853	4,126	4,313	4420
Solar	35	75	124	182
Petroleum Coke	547	565	566	552
Lubricants	37	44	51	59
Biodiesel	7	63	174	350
Paraffin Wax	283	276	260	234
Total	**38,038**	**42,403**	**46,958**	**51,655**

3. Outlook of energy demand and supply: Energy sector

Graph 1. Demand supplied by type of energetic, 2038



Graph 1. energy consumption by sector



3. Outlook of energy demand and supply: Electricity subsector, minimum cost scenario

Graph 1. Annual energy dispatch, 2024 - 2031

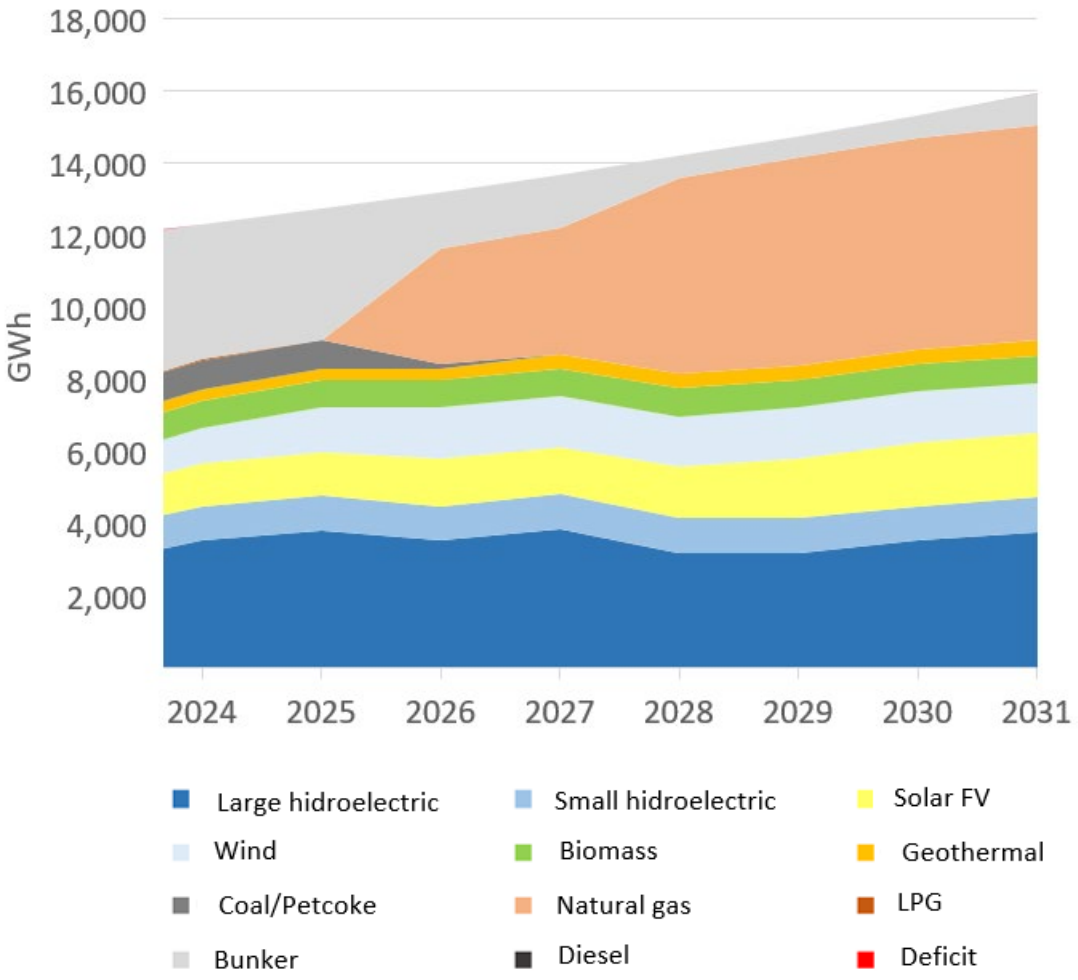
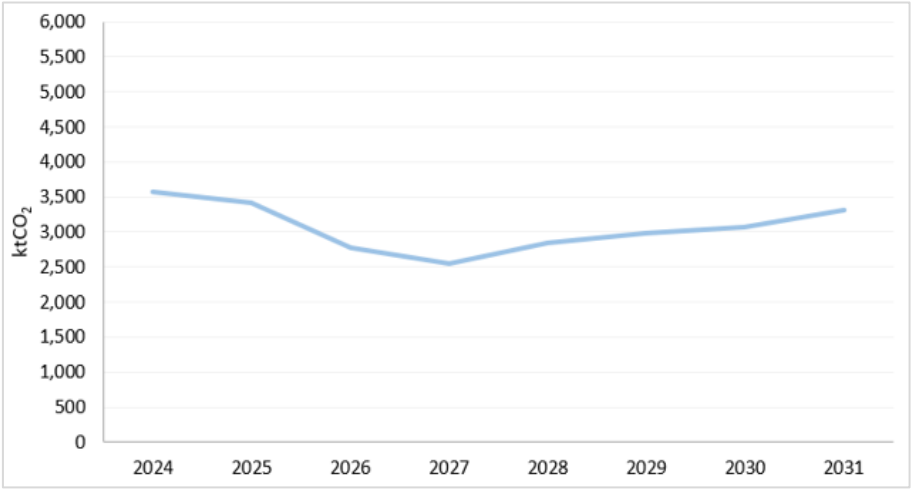


Table 1. Considerations: Capacity additions by technology, 2024 - 2031

	MW							
	2021 - 2024	2025	2026	2027	2028	2029	2030	2031
Hidroelectric	258.5	4						
Geothermal				15				
Solar + SAEB	40		40		40	80	40	
Wind	40	80	40					
Bunker engines	480					40		160
Combined cycle			381		381			
Gas engines								
Gas turbines	74							
Total added	892.5	84	461	15	421	120	40	160

*SAEB: Battery storage system

Graph 2. Annual emissions, 2024 - 2031



4. Current energy policy of Honduras

Graph 1. Strategic axes

4. Current energy policy of Honduras

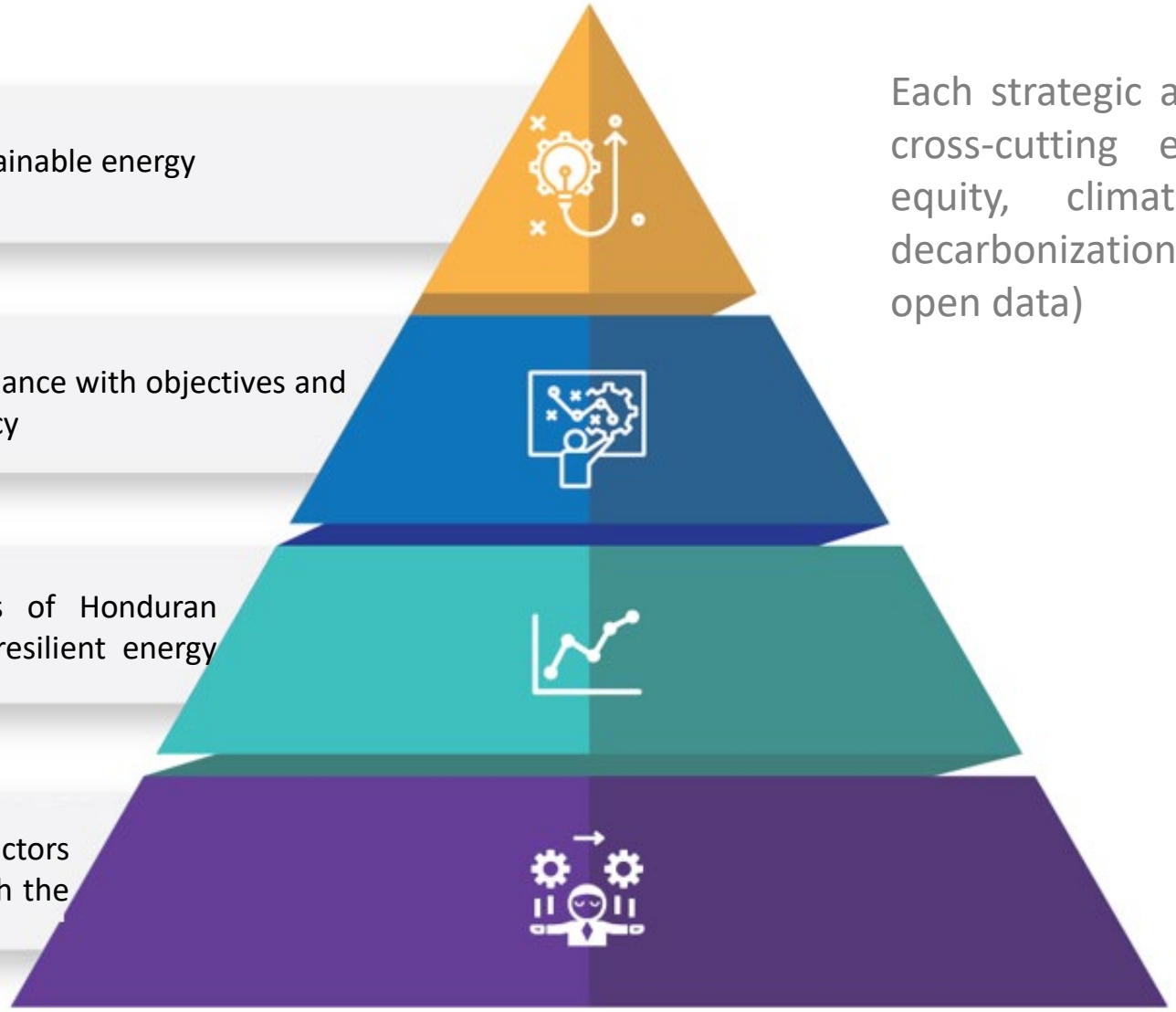
Graph 2. Pillars of the national roadmap 20250

5 STRATEGIC AXES
Areas of action for planning sustainable energy

24 STRATEGIC OBJECTIVES
Referential framework for compliance with objectives and goals of the National Energy Policy

104 GOALS
These capture the aspirations of Honduran people for a competitive and resilient energy sector

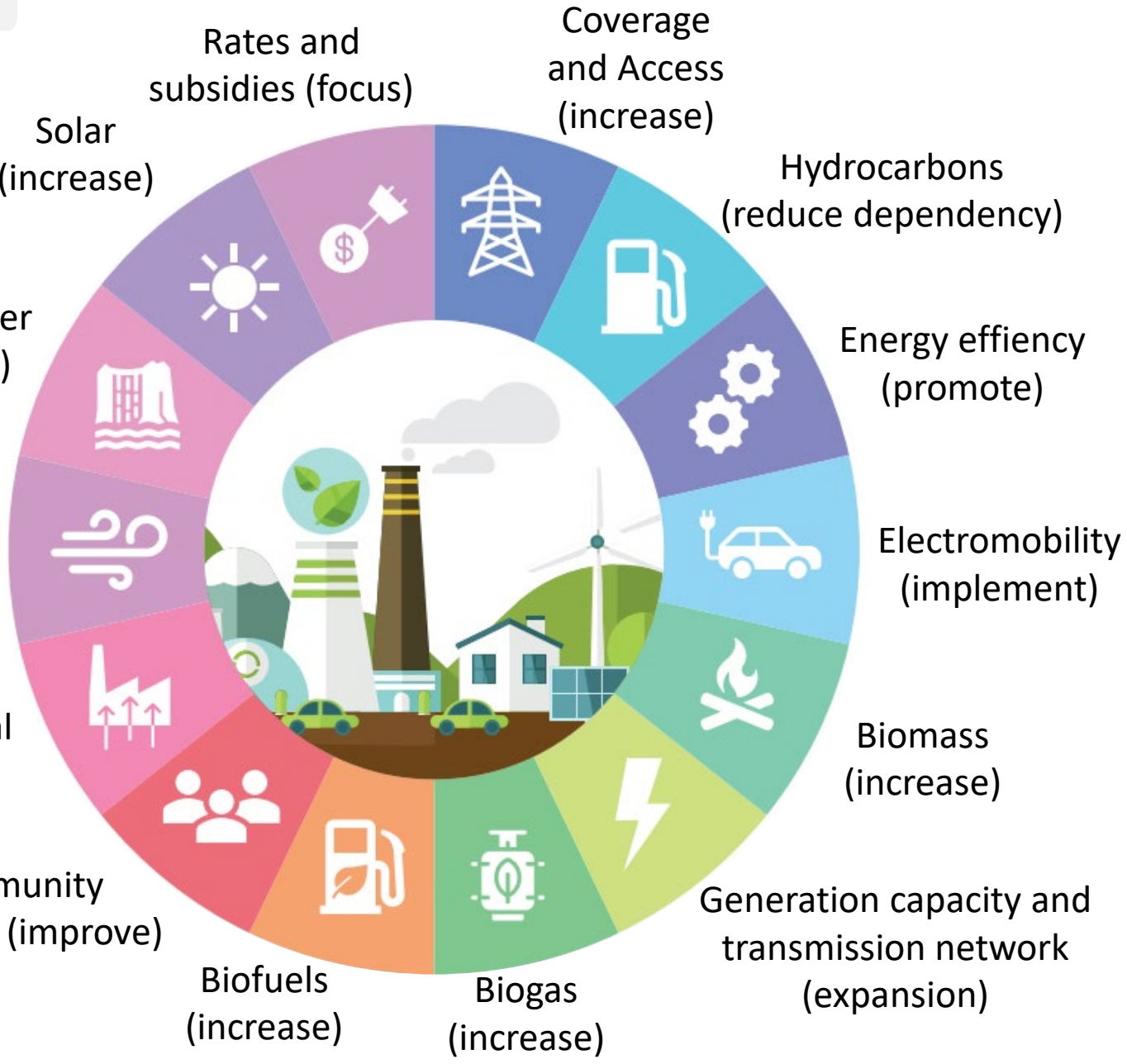
376 ACTIONS
To be developed by various actors directly and indirectly linked with the energy sector



Each strategic axis integrates five cross-cutting elements (gender equity, climate change and decarbonization, inclusion and open data)

4. Current energy policy of Honduras

¿What does the Honduras energy policy seek to promote?



4. Current energy policy of Honduras

Main difficulties faced in the formulation of the national energy policy:

- Break barriers of opposition to the development of non-conventional renewable energy projects due to technological prejudice.
- Increase access and electricity coverage. Around 15% of the national population does not have access to electricity, this is because the electricity subsector has insufficient generation capacity, and energy transport capacity in the transmission and distribution networks to supply the demand of the population.
- Reduce the high consumption of firewood at the national level, since this energy represents the greatest supply and demand in the country. Approximately 23% of urban households and 85% of rural households use firewood as the main energy source for cooking food.
- Overcome dependence on fossil fuels and imports to supply energy demand.
- Promote the development of distributed generation and energy storage systems for the use of renewable energy.

Subjects of interest and expectation

Subjects of personal interest:
Development of policies and strategies aimed at promoting the penetration of non-conventional renewable technologies and energy storage systems, reduction of CO2 emissions and increase of access and electrical coverage nationwide.

Expectation of my superior:
“The Republic of Honduras is in a process of transformation of the national energy sector, which makes it necessary to develop a regulatory framework that is in harmony with public policies. For this transformation process to be successful, professionals with high capacities in both regulation and public policy are required.

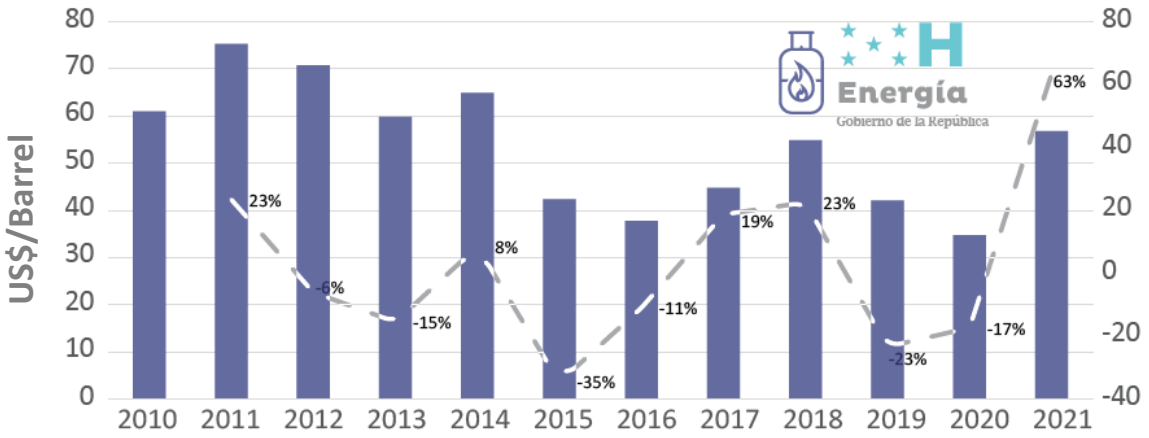
In this sense, our expectation with the program is to have a professional specialized in public policies to transfer knowledge to the rest of the members of this Commission and who have an active participation in the work groups made up of representatives of the different institutions that govern the national energy sector.”

¡Thank you for your attention!

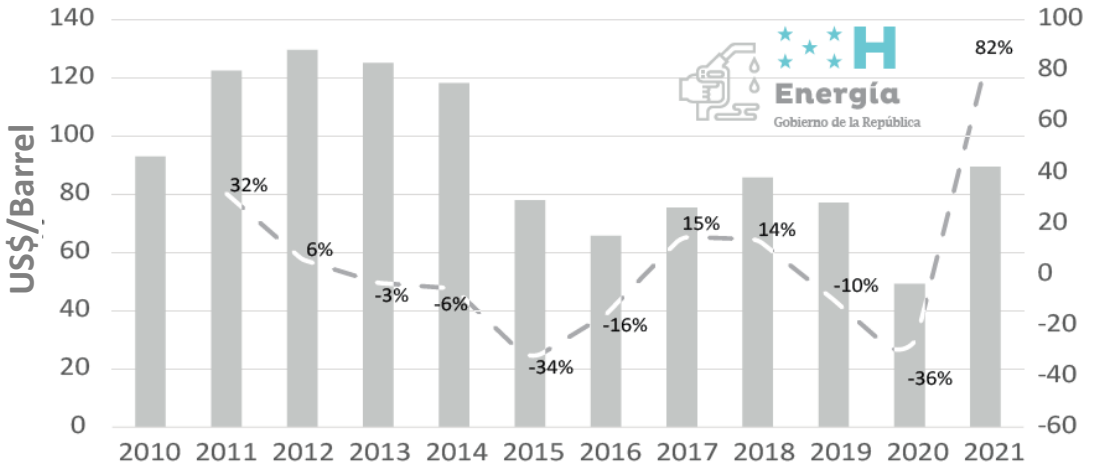
Appendix

1.Energy Prices

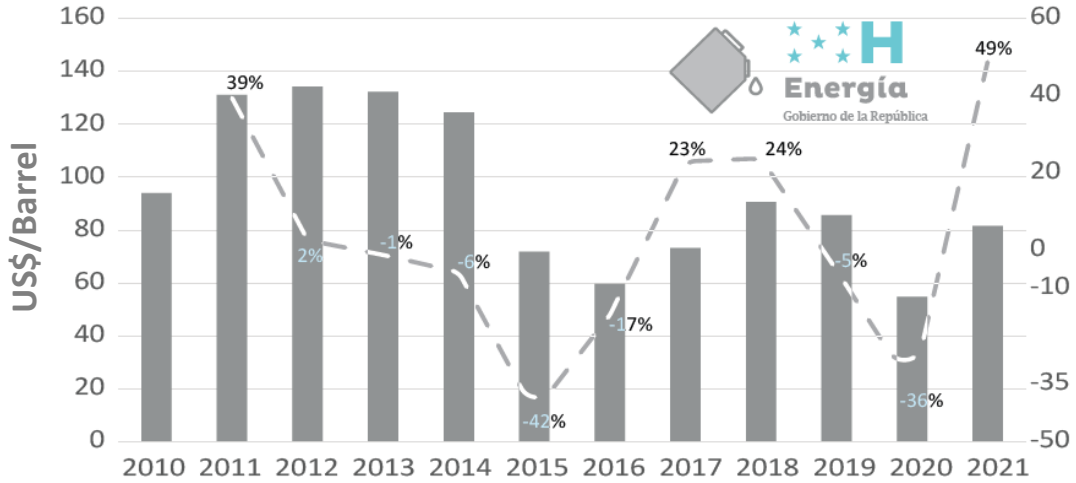
Graph 1. Average import price of LPG



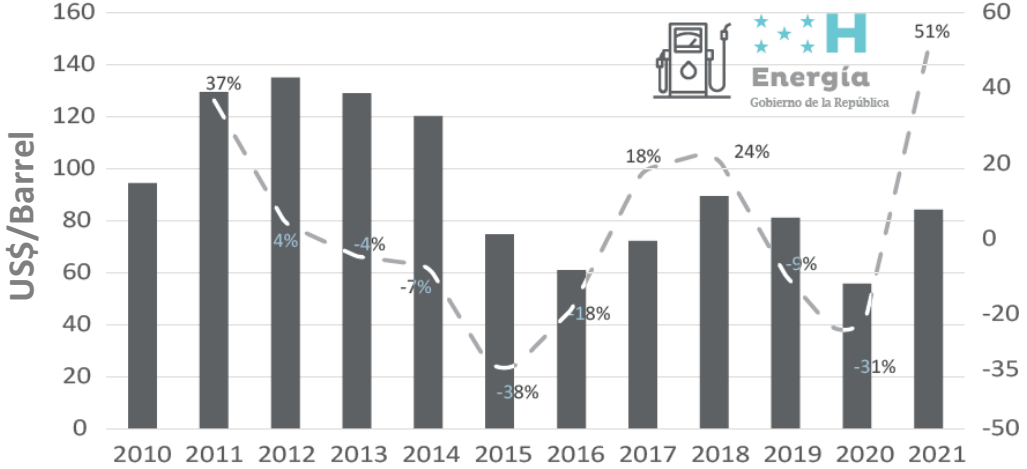
Graph 2. Average import price of a gasoline barrel



Graph 3. Average import price of kerosene



Graph 4. Average import price of diesel



1. Electricity prices

Graph 1. Electric rate applicable from April to June 2023 by type of service

Service	Lempiras/kWh	cents USD/kWh
Residential (consumption from 0 a 50 kWh/month)	4.6735	18.903
Residential (consumption greater than 50 kWh/month)	6.0814	24.598
General low voltage service	6.0818	24.599
Medium voltage service	4.0663	16.447
High voltage service	3.8435	15.546
Street lighting	4.8005	19.417

Exchange rate 19/6/2023:

24.7235 Lempiras/USD

Note: The electricity rate in Honduras is fixed, and its adjustment is made every 3 months.

Graph 2. Actual generation cost, 12/1/2022 to 2/28/2023

	Type	USD/MWh
Contract market	Wind	151.23
	Biomass	148.99
	Solar FV	147.68
	Hydroelectric	141.37
	Thermal	129.39
	Geothermal	123.10
Opportunity market	Thermal	136.88
	Hydroelectric	125.19
	Biomass	102.62
	Geothermal	85.96
	Regional opportunity market (integrated by the countries of Central America and Panama)	79.52

2. Opportunities of investment for domestic and overseas: Electricity Subsector

Under the indicative plan for the generation expansion period 2022 – 2031, developed by the National Electricity System Operator (ODS-CND), it was estimated that in order to supply the growth of national electricity demand at a minimum cost, increase the participation of renewable technologies and reduce CO2 emissions, investments of the following magnitude are required:

Table 1. Considerations: Capacity additions by technology, 2024 - 2031

	MW							
	2021 - 2024	2025	2026	2027	2028	2029	2030	2031
Hidroelectric	258.5	4						
Geothermal				15				
Solar + SAEB	40		40		40	80	40	
Wind	40	80	40					
Bunker engines	480					40		160
Combined cycle			381		381			
Gas engines								
Gas turbines	74							
Total added	892.5	84	461	15	421	120	40	160

*SAEB: Battery storage system

The current situation of the national electricity subsector is critical, since despite having a diversified matrix and an installed capacity of around 2,909.89 MW, this does not provide the sufficient firmness that the system requires to guarantee the quality and security of supply. of the country's demand at the most critical moments in the system, either due to lack of availability of energy resources or lack of generation capacity in certain areas. By the year 2023, a power deficit of approximately 150 MW is being experienced, which has caused serious load cuts nationwide.

2. Opportunities of investment for domestic and overseas: Electricity Subsector

In addition to existing generation projects as of 2021, currently only one 60 MW hydroelectric generation plant called Arenales Etapa I-II (Yaguala) has been incorporated, and two hydroelectric projects of 168 MW and 4 MW installed capacity are known to be under development.

This denotes that urgent measures are required to encourage investment in the electricity subsector and prevent its situation from worsening over time. However, since the adversities represent opportunities, this opens the doors to investment by nationals and foreigners in the country.

References

[1] *"PIB (US$ a precios constantes de 2010) – Honduras",* World Bank
https://datos.bancomundial.org/indicator/NY.GDP.MKTP.KD?locations=HN
[2] *"Inflación, precios al consumidor (% anual) – Honduras",* World Bank
https://datos.bancomundial.org/indicator/FP.CPI.TOTL.ZG?locations=HN
[3] *"Honduras: panorama general",* World Bank
https://www.bancomundial.org/es/country/honduras/overview
[4] *"Población, total – Honduras",* World Bank
https://datos.bancomundial.org/indicator/SP.POP.TOTL?locations=HN
[5] *"Hogares en situación de pobreza",* Honduras, Instituto Nacional de Estadística (INE)
https://www.ine.gob.hn/V3/imag-doc/2021/12/Situaci%C3%B3n-de-pobreza.pdf
[6] *"Encuesta permanente de hogares de propósitos múltiples",* Instituto Nacional de Estadística (INE)
https://www.ine.gob.hn/publicaciones/Hogares/EPHPM_2018/02_EPHPM_Resumen_Ejecutivo_2018.pdf
[7] *"Análisis y evaluación del potencial de los recursos renovables en el país; diseño y capacitación del sistema de información geográfica para el potencial de los recursos renovables en Honduras (SIGPRRH)",* World Bank
de Estado en el Despacho de Energía (SEN) - Empresa Nacional de Energía Eléctrica (ENEE).
https://siehonduras.olade.org/WebForms/Reportes/VisorDocumentos.aspx?or=453&documentoId=48
[8] Global Solar Atlas, World Bank
https://globalsolaratlas.info
[9] Global Wind Atlas, World Bank
https://globalwindatlas.info/es

[10] *“Prospectiva Energética de Honduras 2017-2038”,* Fundación Bariloche
https://sen.hn/wp-content/uploads/2020/11/Prospectiva-Energ%c3%a9tica-de-Honduras-2017-2038-FB.pdf
[11] Balances energéticos nacionales 2017-2021, Secretaría de Estado en el Despacho de Energía (SEN)
https://sen.hn/balance-energetico-nacional/
[12] Plan Indicativo de Expansión de la Generación 2022 – 2031, Operador del Sistema (ODS-CND)
https://ods.org.hn/wp-content/uploads/documentos/planificacion/2022-2031/Plan_indicativo_2022-2031.pdf
[13] Informe Anual de Operación del Mercado 2020 y 2021,
https://ods.org.hn/informe-anual-operacion-del-mercado/
[14] Página oficial Secretaría de Estado en el Despacho de Energía (SEN)
https://sen.hn/
[15] Página oficial Comisión Reguladora de Energía Eléctrica (CREE)
https://www.cree.gob.hn/
[16] Página oficial Operador del Sistema (ODS-CND)
https://ods.org.hn/
[17] Hoja de Ruta 2050, Política Energética Nacional, Secretaría de Estado en el Despacho de Energía (SEN)
https://sen.hn/wp-content/uploads/2021/09/hoja_ruta4_2050.pdf